Denison Mines Corp.
Wheeler River Operation

Environmental Monitoring Plan

Document # 33

Version # 2

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Approval for Use

Version	Date	Description of Activities	Author	Reviewer	Approver
1	January, 2024	Draft for CNSC review			
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Revision History

Version	Date	Description of Revision
1	January, 2024	Draft for CNSC review
2	August, 2025	3 Design of Environmental Monitoring – *reference to Groundwater Protection and Monitoring Plan added.* 7.4 Quality Assurance and Quality Control – *section added.* 10 References – *updated.* Appendix A – *map added.* Appendix B - *Preliminary Monitoring Summary table updated.*

Table of Contents

Appendices

Acronyms and Abbreviations

Term	Definition
COPC	Constituent of Potential Concern
CSA	Canadian Standards Association
EIS	Environmental Impact Statement
ERA	Environmental Risk Assessment
QA	Quality Assurance
QC	Quality Control

1 Introduction

1.1 Background

This *Environmental Monitoring Plan* (Plan) supports the *Environmental Management Program* for the Wheeler River Operation (the Operation). The monitoring plan is intended to meet the expectations of the Canadian Nuclear Safety Commission (CNSC) with respect to environmental monitoring as described in Regulatory Document 2.9.1 [CNSC, 2020] and to follow guidance from the Canadian Standards Association (CSA) on environmental monitoring as described in CSA N288.4:19 [CSA, 2019].

Environmental monitoring is expected to be risk-based, focusing on both nuclear and hazardous substances released from a licensed facility, and providing a characterization of media concentrations of constituents of potential concern (COPCs) sufficient to support the ongoing risk assessment, to meet the requirements of regulations, and to demonstrate that public dose levels meet regulatory requirements.

1.2 Scope

The Plan applies to environmental monitoring during site preparation and construction, as well as commissioning phases of the Operation. The environmental monitoring identified in this Plan is intended to apply to future phases of the Operation but may change over the lifecycle of the Operation based on the results of the environmental monitoring and changes in operations.

The Plan applies to the spatial boundaries identified in the EIS (Environmental Impact Statement) and differ based on environmental media.

1.3 Objectives

In accordance with the needs for environmental monitoring (identified in Section 3), and as described in CSA N288.4:19, the Plan objectives are to:

- *assist in collecting the data required;*
    - *to assess the level of risk to human health and safety, and the potential biological effects in the environment, of the contaminants and physical stressors of concern arising from the facility; and*
    - *to provide data to verify the predictions made by the Environmental Risk Assessment (ERA), refine the models used in the ERA, or reduce the uncertainty in the predictions made by the ERA;*
- *demonstrate compliance with any applicable limits on the concentration and/or intensity of contaminants and physical stressors in the environment or their effect on the environment;*
- *check, independently of effluent monitoring, on the effectiveness of containment and effluent control, and provide public assurance of the effectiveness of containment and effluent control;*
- *provide data required to support operations or to plan for future stages of the facility lifecycle (e.g., decommissioning);*
- *provide resources and data that can be of value during the response to an accident or upset, and in the recovery from such an event;*
- *demonstrate due diligence; and*

- *meet the needs and expectations of stakeholders and Indigenous communities.*

2 Need for Environmental Monitoring

2.1 Monitoring Required by a Regulator

The Environmental Monitoring Plan follows regulatory requirements including those identified in REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures (CNSC 2020), and CSA Standard N288.4-19, Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mine and Mills (CSA 2019), and the Metal and Diamond Mining Effluent Regulations (MDMER) for environmental effects monitoring, as well as any applicable requirements in licenses, approvals, and permits.

2.2 Monitoring Based on Potential Risk to People or Environment

Monitoring focuses on collecting data to verify ERA model predictions, as well as providing data to improve model predictions as the Operation begins. Recommended monitoring supports Denison's environmental protection framework with the goal of reducing uncertainty over time through an iterative process.

Air quality: With the exception of uranium, there were no predicted exceedances of annual screening values for any constituents, indicating that unacceptable chronic effects from direct exposure to air are not expected. Uranium exceeded its annual screening value at the on-site ecological receptor location, but not at the camp. Some short-term exceedances, based on maximum predicted concentrations, were predicted to occur at the camp and at the fence line for nitrogen dioxide (1 hour) and particulate matter (24 hour), and for uranium in TSP and PM10. The predicted exceedances would be infrequent, short-term, and limited spatially. Any public visits to these locations would be very infrequent. Unacceptable levels of risk are not expected from infrequent, short-term exposures to these constituents in air. However, these constituents are to be monitored. The purpose of the air monitoring is to demonstrate compliance with provincial ambient air quality standards and evaluate the predictions that were made in the EIS.

Other Environmental monitoring: As presented in the EIS, the waterbodies that were part of the aquatic assessment included Whitefish Lake, McGowan Lake and Russell Lake (see Figure 2-2 for locations). These waterbodies were included based on their location and potential for downstream effects from the Operation. The Plan includes collection of surface water, sediment, and soil samples as well as fish tissue samples, benthic invertebrate tissue samples, and country foods such as blueberries. Monitoring locations are in the area of Whitefish Lake, McGowan Lake and Russell Lake. Monitoring constituents include those identified as COPCs in the ERA, including metals and uranium-238 series radionuclides, and chloride and sulphate in lake waters.

2.3 Monitoring to Support Radiation Dose Assessment

In order to support the radiation dose assessment, radionuclides are monitored in the relevant media that contribute to dose (see Appendix B).

2.4 Monitoring based on Other Operational Needs

Denison will install a freeze wall to provide containment for mining solutions, and to prevent the regional groundwater system from entering the mining zone. Once freeze holes are constructed, the freezing process will be started, which allows for a 12-month development of the freeze wall before operations begin. Temperature monitoring holes will be installed in close vicinity to the freeze holes to monitor the thickness of the freeze wall and confirm that containment parameters are achieved.

2.5 Monitoring based on Indigenous Community Input

Indigenous Knowledge (IK) was incorporated into the EIS. Denison maintains ongoing relationships with the Indigenous nations and communities and continues to engage on various aspects of the Operation.

Denison will continue to engage with the Indigenous nations and communities and plans to work together to ensure the environmental monitoring plan also reflects the interests of the Indigenous nations and communities.

3 Design of Environmental Monitoring

Monitoring Plans and corresponding Procedures are implemented to assess the environmental performance of the Operation relative to the predictive assessment that has been completed in support of the environment assessment process. Such monitoring is needed since there is always some level of uncertainty associated with environmental assessment predictions. Monitoring and follow-up programs provide the information that is required to verify predicted effects (or their absence), to evaluate the effectiveness of mitigation measures, and to confirm compliance with statutory requirements. These programs also serve as a conduit for communications with Indigenous Nations and communities in that they provide real-time information regarding Project performance.

The objectives of the monitoring program by media are provided below and also address the follow up monitoring commitments identified in Section 16 of the EIS:

- Air - To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards.
- Noise - To confirm that the Project is compliant with the federal and provincial guidelines that have been adopted for this assessment.
- Surface Water Quantity - As no significant residual effects were identified and uncertainty was low with respect to the assessment of Project effects on Surface Water Quantity, a follow-up program is not required. However, it is suggested that continued hydrologic monitoring is important to provide Project phase information to monitor predictions and support effluent discharge permitting and approvals (i.e., by providing flow information to support estimation of surface water quality).
- Surface Water Quality: Monitoring of surface water quality to verify the accuracy of the predicted effects and the effectiveness of the proposed mitigation measures. The surface water quality monitoring program should be considered in conjunction with the surface water quantity (hydrology) monitoring program.

- Fish and Fish Habitat: Monitoring and follow-up are proposed for the Fish and Fish Habitat VC to verify the accuracy of the predicted effects and the effectiveness of the proposed mitigation measures. The fish and fish habitat monitoring program should be considered in conjunction with the surface water quantity (hydrology), surface water quality, sediment quality and benthic invertebrates and fish health monitoring programs as these provide information relevant to fish habitat quality or fish health. For example, monitoring of water quality in Whitefish Lake will be important for evaluation of fish habitat in Whitefish Lake.
- Sediment Quality and Benthic Invertebrates: Monitoring and follow-up are proposed for the Sediment Quality and Benthic Invertebrates VCs to verify the accuracy of the predicted effects and effectiveness of proposed mitigation measures.
- Fish Health: Monitoring and follow-up are proposed for the Fish Health VC to verify the accuracy of the predicted effects and the effectiveness of the proposed mitigation measures.
- Soil: Monitoring serves to verify that mitigation measures are both appropriate and effective and provide a procedure to adapt mitigation measures if/where necessary.
- Vegetation and Ecosystems: Monitoring serves to verify that mitigation measures are both appropriate and effective and provide a procedure to adapt mitigation measures if/where necessary.
- Human Health: Monitoring of environmental COPC concentration data to verify Environmental Risk Assessment (ERA) model predictions, and to provide data to improve model predictions as the Project begins.

A map illustrating the specific monitoring locations is shown in Appendix A and may be adjusted during construction phase accordingly. The locations, frequency, and parameters for the monitoring are provided in Appendix B.

The monitoring locations include many of the baseline locations, both within the area of anticipated COPC exposure from the Operation, and in reference areas outside the area of influence from the Operation. This design will allow for comparison of COPC concentrations over time to baseline concentrations, to detect any increased concentrations due to the Operation, and to delimit the spatial extent of such effects. It will also allow detection of any regional changes, as seen in reference areas, so they are not incorrectly attributed to the Operation.

Information regarding groundwater monitoring can be found in the *Groundwater Protection and Monitoring Plan* Document #34.

4 Program Performance and Data Acceptance Criteria

4.1 Program Performance Criteria

Program performance will be evaluated annually for each environmental medium in terms of the percentage of planned samples over the year that were successfully obtained and analyzed. It is expected that a small proportion of samples may not be successfully collected and analyzed, due to equipment malfunction, weather, lack of availability of media or other logistical reasons. The performance objective is 90% of planned samples in each medium successfully obtained and analyzed.

4.2 Data Acceptance Criteria

Data acceptance criteria are defined for chemical and radiochemical analyses and are analyte specific. The criteria pertain to results of quality control (QC) samples that are associated with each batch of samples analyzed. Types of QC samples are described in Sections 7.2 and 7.3. If the QC samples do not meet these criteria for any analyte, an unusual laboratory situation is indicated and results for the associated program samples are flagged as suspect. If the QC data indicate a laboratory problem, the sample may be re-analyzed. Any flagged sample result will be carefully reviewed before data use to determine if it should be included or excluded for that data use.

The data acceptance criteria will be developed by Denison's Environmental Department, considering the data quality needs of the EMP, as well as laboratory capabilities, and any regulatory requirements. The data acceptance criteria for EMP chemical and radiochemical parameters are listed in Appendix C.

5 Sampling and Analysis Procedures

5.1 Sampling Procedures

Environmental sampling will be conducted in accordance with standard operating procedures (SOPs) as described by Denison. These SOPs encompass sampling of various media and analytes, as appropriate to the media and analytes as described in Section 4.3 above, as well as sample submission and field measurement procedures. The SOPs follow accepted sampling practice.

5.2 Analysis Procedures

The chemical and radiochemical analyses to be performed on environmental samples will be performed in accordance with the SOPs of the qualified analytical laboratories. The SOPs follow accepted analytical practice. The laboratories are accredited by the Canadian Association for Laboratory Accreditation (CALA) as conforming to international standard ISO/IEC 17025 for the analyses from Section 4.3 that are assigned to them.

6 Interpretation of Monitoring Data

6.1 Reporting Data and Uncertainties

The reporting requirements will be determined by regulatory authorities and internal requirements. The monitoring data for each COPC in each medium at each monitoring location will be reported as raw data, and summary statistics will be reported (e.g. minimum, mean, maximum, standard deviation, standard error of mean, number of measurements, frequency below detection, frequency above environmental guidelines). Analytical uncertainties associated with each measurement will be reported. Uncertainties in estimated values, such as the mean, will be quantified.

Data will be analyzed to identify temporal and spatial trends either through graphical analysis or statistical methods if warranted.

Measured values from laboratories are recorded in an uncensored form, along with detection limits. In reports, measurements below detection limits should be flagged, and may be reported as "less than" values, or at face value, to be decided in consultation with regulatory authorities.

6.2 Comparisons to Environmental Criteria

At a minimum, the interpretation of monitoring data will involve comparison of COPC concentrations for each COPC in each medium at each monitoring location against relevant environmental criteria. More detailed statistical and long-term trend analyses may be used to address specific questions and will vary depending on the monitoring station and media. At a minimum, the criteria in the following list are used to interpret applicable data:

- Guidelines and standards (i.e., generic thresholds) exist for air quality, surface water quality, sediment quality, and soil quality. These values represent levels of constituents that are expected to produce no adverse affect, under any conditions. For this reason, guidelines and standards are considered to be conservative. Higher levels may be tolerated with little or no effect in some circumstances. Methods used to develop guidelines are vetted prior to guideline comparison to confirm comparisons remain appropriate. A range of guidelines may be used due to their conservative nature and inherent uncertainty when applied to environmental data.
- Baseline data were collected prior to construction and are available for each environmental media presented in the Plan. Comparison to an upper limit of baseline data helps to identify the degree of change since pre-construction.
- Reference data are collected upstream or upwind of the receiving environment and help differentiate between potential effects of the Operation and natural or other sources of change.
- Site-specific objectives for constituents and physical parameters may be developed specifically for the Operation considering the local environmental conditions and the results of the most recent regulator approved ERA.
- Predicted concentrations from the Wheeler River EIS or the most recent regulator approved ERA. Predictions will vary over time with the stage of mine development.

Detection limits and natural or seasonal variability are considered when interpreting data. Statistical or visual data assessments are used to identify outliers, or erroneous data. Erroneous data should be excluded from data interpretation. Use (or not) of other outliers should be considered and justified, considering the assumptions of any planned statistical analyses.

6.3 Environmental Criteria

Environmental criteria were selected in the EIS for each discipline. Criteria were selected based on federal and provincial guidelines and standards at the time of the submission. They may be subject to change if the guidelines and standards change. The criteria identified in the EIS will be used; however, updates to guidelines and standards will be verified prior to use.

6.4 Use of Monitoring Data for Radiological Dose to the Public and ERA Updates

In the ERA, concentrations of COPCs in environmental media including water, sediment, soil, and Traditional Food items were predicted using the environmental pathways model IMPACT at defined human receptor locations. Air concentrations at human receptor locations were obtained from the air quality model and dictated into the IMPACT model. Concentrations of COPCs in environmental media were predicted over all Project phases. Water and sediment concentrations at exposure locations (Whitefish Lake Middle, Whitefish Lake South, McGowan Lake, and Russell Lake) and reference locations (Kratchkowsky Lake and Whitefish Lake North) were input to IMPACT.

Assessment of radiation exposures to members of the public is commonly based on estimation of the incremental effects of the project or site. Assessments consider the radiation dose received from external exposure to radiation as well as the dose received from inhalation and ingestion of radionuclides. The radionuclide dose to human receptors from all pathways is converted into a dose that is presented in millisieverts per year (mSv/yr).

Assessment of non-radiological exposures to members of the public is commonly based on estimation of the total effects of constituents, including the background and project or site components. Assessments consider the dose received from ingestion of constituents of concern as well as dermal absorption due to contact with soil. This is presented as a dose in milligrams per kilogram per day (mg/kg/d) for each pathway. Assessments also consider inhalation of airborne constituents of concern.

The monitoring data that will be collected under the EMP will be used to calculate exposure and dose from COPCs using the IMPACT model, following the approach that was established in the ERA.

Future ERA updates will continue to guide the monitoring program, in terms of the parameters, location and frequency of analysis.

7 Quality Assurance and Quality Control

7.1 Quality Assurance

Quality Assurance (QA) is used to verify that the process is operating within acceptable limits and Quality Control (QC) is the mechanisms established to measure non-conforming method performance. The QA/QC processes incorporate the requirements of CSA N286 and ISO 9001.

7.2 Quality Control Samples

As per CSA N288.4, 10% of total samples analyzed should be field and laboratory QA/QC samples. There should be QA/QC samples for all media sampled in the EMP. The types of QA/QC samples to be collected in the field are listed below:

- Duplicate Samples
    - a separate sample collected at the same time or in rapid succession from the same station as an EMP sample.
    - used to assess field (sampling) plus laboratory variability.
- Field and laboratory parallel analyses
    - variables such as pH and conductivity measured in the laboratory and the field using different instruments.
    - provides an indication of whether conditions have changed between field sampling and laboratory analysis.
    - may also identify systematic errors in field instruments.
- Field Blank
    - empty sample containers filled in the field with pure water that was provided by the laboratory and transported to the field.
    - handled identically to EMP samples except for the water used to fill containers.
    - a test of whether sampling conditions, reagents, instruments, or containers may contaminate samples.

7.3 Laboratory Quality Control

Accredited laboratories have their own quality control programs, with their own criteria for flagging suspect data. If the laboratory detection limits, blank criteria, precision criteria, and accuracy criteria are met, it is anticipated that environmental monitoring data will be mostly quantitative (not “less than”), not appreciably affected by contamination, not appreciably affected by laboratory sources of variability (relative to variability in the environmental concentrations), and not biased to an extent that would compromise monitoring program objectives.

Laboratory QA/QC analysis properties are described below:

- Precision
    - defined as the reproducibility and reliability of the test method.
    - determined by analyzing laboratory replicate samples (i.e., multiple containers that each contain subsets of a homogenized sample).
- Accuracy
    - defined as the degree of closeness of measurements to the analyte's true value.
    - determined by analyzing reference standards (i.e., solutions derived from accurately known commercial formulations).
- Sample contamination
    - determined by analyzing laboratory blank samples (i.e., distilled, deionized water).
- Detection limits or sensitivity

- defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank sample with a specified confidence level for a given method and representative media.
- detection limits vary among methods for most analytes and are an important consideration when concentrations are likely to be very low (i.e., near detection limits).

7.4 Quality Control Surface Water Quantity

The following QA/QC actions will be taken to ensure surface water quantity QA/QC:

- Flowrate and water levels are measured in accordance with industry best practices guidelines stated in WMO-No 168.
- When data is input to electronic format it will be reviewed for outliers and input errors.
- Streamflow data will be checked for unusually high or low values, flagged, and checked for context.
- Stage -discharge curve development, update and maintenance will be conducted in accordance with the Hydrometric Manual – Data Computations Stage-Discharge Model Development and Maintenance (WSCECCC 2016).

8 Reporting, Review and Audit

8.1 Reporting of Results

The required results of the environmental monitoring will be reported annually to the Canadian Nuclear Safety Commission (CNSC) and the Saskatchewan Ministry of the Environment (Sask ENV). The annual report will meet any applicable reporting requirements in the facility licence and/or provincial approvals for the Project.

An Environmental Performance Report will be prepared for Sask ENV every 5 years. The report will follow the provincial Environmental Performance Report Guideline.

The ERA will be reviewed at a minimum every five years or when changes to Project facilities, processes or activities result in environmental aspects and impacts that are outside the basis of the environmental risk assessment. If the review or changes to the Project warrant, the ERA will be updated. With each ERA update, the most recent EMP data are utilized in the ERA estimates of receptor exposure to COPC concentrations.

8.2 EMP Review

The environmental monitoring program performance will be evaluated annually against program performance criteria, as outlined in Section 5.1 above. If performance criteria are not met, causes will be investigated, and possible corrective actions to improve program performance will be considered.

In addition, the effectiveness of the environmental monitoring program in accomplishing its objectives will be reviewed annually, and recommendations may be made for improved design or other corrective actions.

8.3 EMP Audits

An internal audit of the environmental monitoring program will be conducted every five years, or more frequently if indicated by substantive facility changes, in concert with the ERA review/update. The audit will be conducted by staff not involved in the environmental monitoring program. It will include reconsideration of the need for an environmental monitoring program, and of the monitoring objectives, and of the program design to meet objectives. The audit results will be documented and will be considered in a review/update of the monitoring program.

The internal audits will follow the *Audits Procedure* (WRE-QUA-103) as described in the *Management System Program*.

9 Staff Qualifications and Training

9.1 Qualifications

The necessary qualifications for staff involved in environmental monitoring are as described in the *Training Management Program* and supporting Plans and Procedures.

9.2 Training

The necessary training for staff involved in environmental monitoring are as described in the *Training Management Program* and supporting Plans and Procedures.

10 References

10.1 Internal

Document Number	Document Name
6	Management System Program
8	Training Management Program
9	Environmental Management Program
34	Groundwater Protection and Monitoring Plan
35	Biodiversity Management Plan

10.2 External

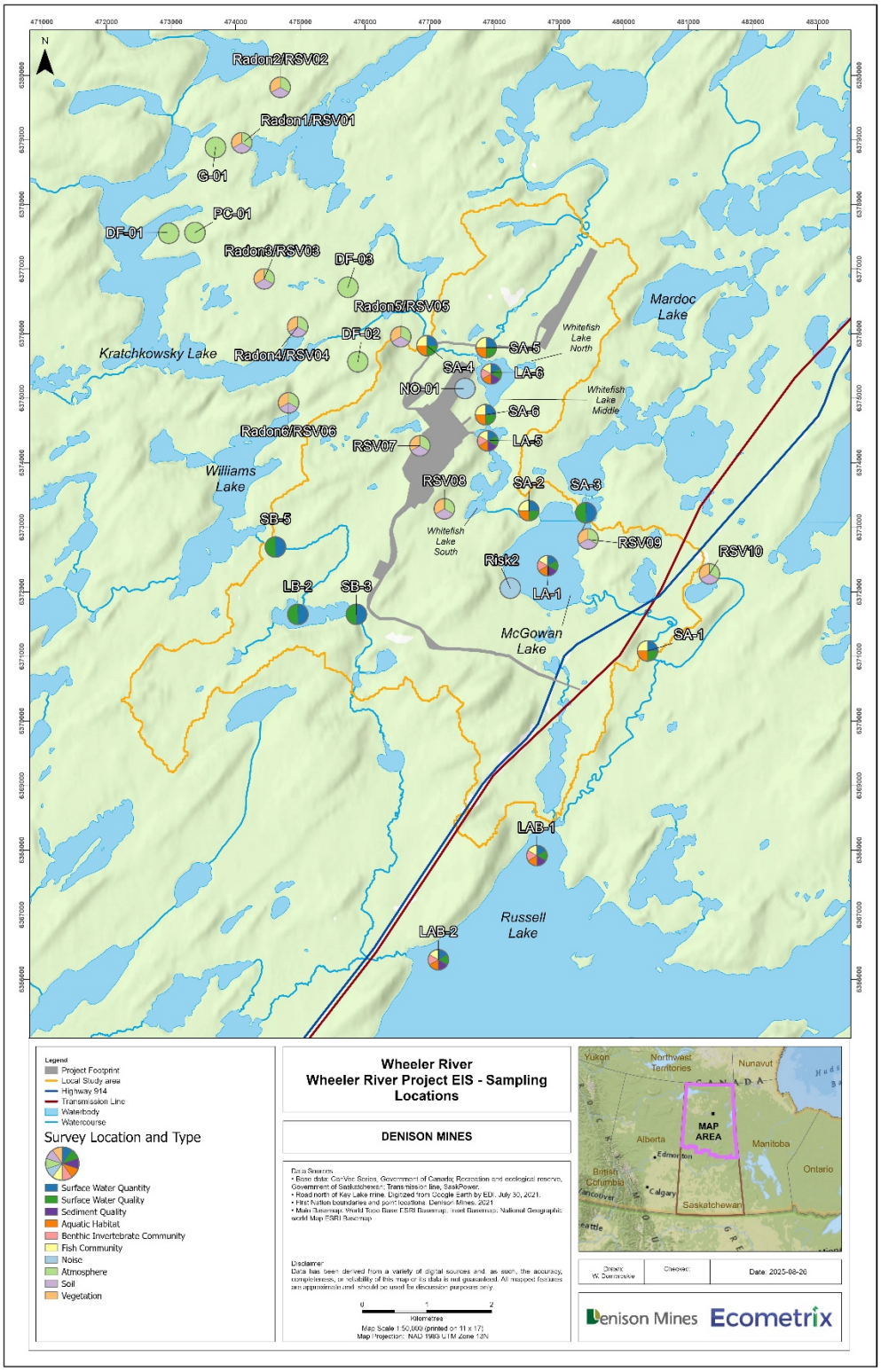
Canadian Nuclear Safety Commission (CNSC). 2020. Regulatory Document 2.9.1. Environmental Principles, Assessments and Protection Measures, Version 1.2. September 2020.

Canadian Standards Association (CSA). 2019. CSA N288.4:19. Environmental monitoring programs at nuclear facilities and uranium mines and mills

Guide to Hydrological Practices, Volume I (WMO-No. 168). Guide to Hydrological Practices, Volume I (WMO-No. 168). September 2024.

Water Survey of Canada Environment and Climate Change Canada (WSCECCC). 2016. Hydrometric Manual – Data Computations Stage-Discharge Model Development and Maintenance, report # qSOP-NA049-01.

Appendix A Map of Monitoring Locations



Appendix B Preliminary Monitoring Summary

Media	Station ID	Station UTM Coordinates		Station Description	Rationale for Monitoring	Duration of Program	Frequency	Sampling/Measuring Method	Constituents / Parameters
		Easting	Northing						
Noise	NO-01	477768.12	6375033.71	Near baseline location	• To demonstrate compliance with federal and provincial guidelines	All Project phases	One week campaign once per phase	Integrating sound level meters	Energy equivalent sound level for the daytime period ($L_{eq,day}$); energy equivalent sound level for the nighttime period ($L_{eq,night}$); combined day-night sound level (L_{dn})
Noise	Risk 2	478246.31	6372058.28	Nearest sensitive receptor where access is granted (Cabin at McGowan Lake)		All Project phases			
Atmosphere	Radon1, Radon2, Radon3, Radon4, Radon5, Radon6,	473769.45 474687.63 474440.43 474958.38 476806.51 474817.12	6378954.24 6379813.56 6376847.13 6376105.53 6375952.49 6374928.37	Near baseline Location - final points will be defined with detailed design	• To demonstrate compliance with provincial ambient air quality standards	All Project phases	Quarterly collection of monitors	Alpha-track etch monitors	Radon
Atmosphere	DF-01, DF-02, DF-03	473275.05 475888.33 475735.30	6377553.43 6375564.03 6376717.65	Near baseline Location- final points will be defined with detailed design		All Project phases	Monthly collection of samplers	Dustfall sampler	Dustfall (mg/cm^2/30-day) Metals in dustfall (% of fixed dustfall)
Atmosphere	PC-01	473369.22	6377565.20	Near baseline Location- final points will be defined with detailed design		All Project phases	Monthly collection of samplers	Passive sampler	Nitrogen Dioxide Sulphur Dioxide
Atmosphere	G-01	473687.05	6378883.61	Near baseline Location- final points will be defined with detailed design		All Project phases	Quarterly collection of OSLDs	Landauer InLight optically stimulated luminescence dosimeters	External Gamma
Atmosphere	TBD	TBD	TBD	Near baseline Location- final points will be defined with detailed design		Site Preparation and Construction. Operation Monitoring TBD.	Quarterly composite of 4 weekly 24-hr Hi Vol samples	Passive samplers for CO High Volume Air Samplers	Total suspended particulates (TSP), Particulate Matter (PM10, PM2.5), carbon monoxide, arsenic, cadmium, cobalt, chromium, copper, molybdenum, nickel, lead, selenium, uranium, vanadium, zinc
Surface Water Quantity	SA-1	480370.21	6371085.93	Icelander River flowing from McGowan Lake	• To confirm predictions and	All Project phases	Continuous	Stage dataloggers, hydrometric monitoring	

Media	Station ID	Station UTM Coordinates		Station Description	Rationale for Monitoring	Duration of Program	Frequency	Sampling/Measuring Method	Constituents / Parameters
		Easting	Northing						
Surface Water Quantity	SA-2	478533.05	6373258.27	Inflow to McGowan Lake from Whitefish Lake	support effluent discharge permitting and approvals	All Project phases	Continuous		Streamflow, lake level, stream discharge, water levels
Surface Water Quantity	SA-3	479415.66	6373226.99	Inflow to McGowan Lake from Whitefish Lake		All Project phases	Continuous		
Surface Water Quantity	SA-4	476958.18	6375812.93	Inflow to LA-6 (Unnamed Lake) from Kratchkowsky Lake		All Project phases	Continuous		
Surface Water Quantity	SA-5	477873.77	6375782.24	Inflow to LA-6		All Project phases	Continuous		
Surface Water Quantity	SA-6/LA-6	477863.33	6374744.73	Flow from LA-6 to Whitefish Lake		All Project phases	Continuous		
Surface Water Quantity	SB-3	475866.84	6371652.28	Southern Project drainage basin flowing to Russell Lake		All Project phases	Continuous		
Surface Water Quantity	LA-1	478824.07	6372406.21	McGowan Lake		All Project phases	Continuous		
Surface Water Quantity	LA-5	477897.50	6374417.24	Whitefish Lake		All Project phases	Continuous		
Surface Water Quantity	TBD	TBD	TBD	Kratchkowsky Lake		All Project phases	Continuous		
Surface Water Quality (Note 1)	SA-1	480370.21	6371085.93	Stream colloquially known as the Icelander River, which is located downstream of LA-1 (McGowan Lake)	• To verify the accuracy of the predicted effects and the effectiveness of the proposed mitigation measures	All Project phases	Annual grab samples during construction Quarterly grab samples during operations	In situ during field surveys, depth profiles Laboratory analysis of samples collected from the field	Conductivity, pH, temperature, dissolved oxygen, water clarity. pH, conductivity, total suspended solids, total dissolved solids, alkalinity, acidity, hardness, nutrients (total and dissolved phosphorus, ammonia and total kjeldahl nitrogen), chloride, sulphate, total and dissolved metals, low level mercury, methylmercury (at select locations), and radionuclides (Pb-210, Po-210, Ra-226, Th-230).
Surface Water Quality	SA-2	478533.05	6373258.27	Downstream of the outflow from LA-5 (Whitefish Lake South) and upstream of the inflow to LA-1 (McGowan Lake)		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		
Surface Water Quality	SA-3	479415.66	6373226.99	Situated in a small channel upstream of LA-1 (McGowan Lake) and downstream of LA-2		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		

Media	Station ID	Station UTM Coordinates		Station Description	Rationale for Monitoring	Duration of Program	Frequency	Sampling/Measuring Method	Constituents / Parameters
		Easting	Northing						
Surface Water Quality	SA-4	476958.18	6375812.93	Upstream of the inflow to LA-6 (Whitefish Lake North)		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		
Surface Water Quality	SA-5	477873.77	6375782.24	Situated upstream of the inflow to LA-6 (Whitefish Lake North)		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		
Surface Water Quality	SA-6	477863.33	6374744.73	Situated downstream of the outflow from LA-6 (Whitefish Lake North) and upstream of the inflow to LA-5 (Whitefish Lake South)		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		
Surface Water Quality	LAB	478658.56	6367916.19	Russell Lake		All Project phases	Annual grab samples during construction Quarterly grab samples during operations		
Sediment (Note 1)	McGowan Lake (LA-1)	478824.07	6372406.21	Representative sample locations in depositional areas of lakes within the Local Study Area	• To verify the accuracy of the predicted effects and the effectiveness of the proposed mitigation measures	All Project Phases	Every 3 years	Field collection of sediment samples in depositional areas (by coring or petit Ponar grab) and laboratory analysis	Moisture, grain size, total organic carbon, metals, radionuclides (Pb-210, Po-210, Ra-226, Th-230), nutrients, total mercury, methylmercury (at select locations)
Sediment	Whitefish Lake South (LA-5)	477897.50	6374417.24			All Project Phases	Every 3 years		
Sediment	Whitefish Lake North (LA-6)	477950.73	6375396.63			All Project Phases	Every 3 years		
Sediment	Russell Lake (LAB-1)	478658.56	6367916.19			All Project Phases	Every 3 years		
Sediment	Russell Lake (LAB-2)	477134.55	6366303.84			All Project Phases	Every 3 years		
Fish and Fish Habitat (Note 1 and Note 2)	TBD	TBD	TBD	Within Project Local Study Area, at representative near-field, mid-field and far-field locations and inclusive of sensitive habitats. .	• To verify the accuracy of the predicted effects and the effectiveness of	All Project Phases	Every 3 years	Field collection of fish by netting or electroshocking. Observation/measuring of physical parameters relevant to fish habitat	Fish species presence, abundance and life history parameters (e.g., sex, length, weight, condition, age).

Media	Station ID	Station UTM Coordinates		Station Description	Rationale for Monitoring	Duration of Program	Frequency	Sampling/Measuring Method	Constituents / Parameters
		Easting	Northing						
					the proposed mitigation measures				Physical parameters of water body (e.g. depth width, flow, substrate).
Fish Health (Note 1)	TBD	TBD	TBD	An upstream reference location (i.e., LA-6 – Whitefish Lake North), at a downstream near-field location close to the point of discharge (i.e., LA-5 – Whitefish Lake South), and at downstream mid-field locations (i.e., in LA-5 – Whitefish Lake South prior to its discharge to LA-1 – McGowan Lake), downstream far-field location (i.e., Russell Lake).	• To confirm predictions and monitor changes in fish tissue concentrations of COPC that may be attributable to the Project • Monitoring to meet regulatory criteria (i.e., federal tissue residue guidelines)	All Project Phases	Every 3 years	Field collection of fish by netting or electroshocking.	Fish tissue concentrations of non-radiological (selenium, mercury, methylmercury, other metals), radiological parameters, and moisture. Life history parameters collected via fish and fish habitat sampling will be used for interpretation of fish health.
Benthic invertebrates and sediment habitat (Note 1)	McGowan Lake (LA-1)	478824.07	6372406.21	Representative sample locations within the Local Study Area	• To verify the accuracy of the predicted effects and effectiveness of proposed mitigation measures	All Project Phases	Every 3 years	Field collection of benthic invertebrate samples in depositional areas (by petit Ponar with sieving) and laboratory analysis (taxonomic and chemical)	Benthic invertebrate community measures (e.g., mean Simpson's diversity, dominant taxa) Benthic invertebrate chemistry (metals and radionuclides) Sediment habitat characterization (chemistry and particle size)
Benthic invertebrates and sediment habitat	Whitefish Lake South (LA-5)	477897.50	6374417.24			All Project Phases	Every 3 years		
Benthic invertebrates and sediment habitat	Whitefish Lake North (LA-6)	477950.73	6375396.63			All Project Phases	Every 3 years		
Benthic invertebrates and sediment habitat	Russell Lake (LAB-1)	478658.56	6367916.19			All Project Phases	Every 3 years		
Benthic invertebrates and sediment habitat	Russell Lake (LAB-2)	477134.55	6366303.84			All Project Phases	Every 3 years		
Soil	RSV1-10	473769.45 474687.63 474440.43 474958.38 476806.51 474817.12 476847.71 477227.34 479449.22 481326.79	6378954.24 6379813.56 6376847.13 6376105.53 6375952.49 6374928.37 6374263.28 6373286.24 6373147.92 6372279.77	Permanent sample plots distributed throughout the Local Study Area and Regional Study Area	• To verify that mitigation measures are both appropriate and effective and provide a procedure to adapt mitigation measures if necessary	All Project Phases	Periodically throughout all Project phases (approximately every 3 years).	Field collection of soil samples and laboratory analysis	Essential and non-essential metals and radionuclides
Vegetation (lichen, blueberry)	RSV1-10	473769.45 474687.63 474440.43 474958.38	6378954.24 6379813.56 6376847.13 6376105.53	Permanent sample plots distributed throughout the Local Study Area and Regional Study Area	• To verify that mitigation measures are both appropriate and	All Project Phases	Coincident with soil sampling.	Field collection of vegetation samples and laboratory analysis	Essential and non-essential metals and radionuclides

Media	Station ID	Station UTM Coordinates		Station Description	Rationale for Monitoring	Duration of Program	Frequency	Sampling/Measuring Method	Constituents / Parameters
		Easting	Northing						
		476806.51 474817.12 476847.71 477227.34 479449.22 481326.79	6375952.49 6374928.37 6374263.28 6373286.24 6373147.92 6372279.77		effective and provide a procedure to adapt mitigation measures if necessary				
Environmental Effects Monitoring (Note 1)	TBD	TBD	TBD	Within the area of influence, reference waterbodies and far-field waterbodies	• To satisfy regulatory requirements (MDMER)	All Project Phases	Every three years initially, then as required according to the monitoring results and MDMER.	Biological and receiving water quality monitoring studies	TBD, but may include fish population, fish tissue and benthic invertebrate community studies. Analysis of water quality samples.

TBD: To Be Determined

Notes: (1) Water quality, fish habitat, fish health, sediment quality and benthic invertebrate community studies identified as part of this Plan are to be harmonized with the Environmental Effects Monitoring, such that the data collected as part of the Plan can be used to support the MDMER requirements.

(2) Fish and Fish Habitat monitoring will harmonize with the monitoring undertaken as part of the *Biodiversity Management Plan* such that the data collected will be useful for both purposes.

Information regarding groundwater monitoring can be found in the *Groundwater Protection and Monitoring Plan* Document #34.

Appendix C Data Acceptance Criteria

To be developed.