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Written Submission from the English River First Nation

Mémoire de la Première Nation d'English River

In the matter of the

À l'égard du

Regulatory Oversight Report for Uranium Mines and Mills in Canada: 2024

Rapport de surveillance réglementaire des mines et usines de concentration d'uranium au Canada : 2024

Commission Meeting

Réunion de la Commission

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Canada

English River
First Nation

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January 19, 2026

Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
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"VIA EMAIL cnsc.interventions.ccsn@canada.ca"

RE: ERFN Intervention- Regulatory Oversight Report for Uranium Mines, Mills, Historic and Decommissioned Sites in Canada: 2023

This submission is made on behalf of the English River First Nation (ERFN). This topic is of great importance to the people of the ERFN, because of the presence of the Uranium Mines and Mills located within English River First Nation Ancestral Territory. The people of ERFN have and continue to subsist on this land for generations- fishing, hunting, gathering, and thriving.

English River First Nation is comprised of 19 reserves located in Northern Saskatchewan. ERFN has a population of approximately 2,100 people. The on-reserve members of the First Nation reside at two small remote Northern Saskatchewan reserves called Wapatuanak and La Plonge. These reserves are located approximately 600 km north of Saskatoon.

On September 17, 2025, ERFN participated in the Canadian Nuclear Safety Commission (CNSC) annual Indigenous engagement session. This engagement session allowed ERFN to receive concise and clear information regarding the Uranium Mines and Mills. Further, ERFN was able to raise and discuss issues of common concern with other impacted Indigenous Nations in the Athabasca Basin. ERFN considers this engagement session invaluable and a good example of the open and effective Indigenous engagement we have grown to rely upon from the CNSC.

In addition to attending the CNSC Engagement Session, ERFN has engaged Robin Kusch to assist the Nation in reviewing and understanding the technical and scientific aspects of the Regulatory Oversight Report for Uranium Mines, Mills, Historic and

Decommissioned Sites in Canada (RoR) for the 2024 year. Mrs. Kusch has once again provided the people of ERFN a thorough and informative critical review of the RoR. Mrs. Kusch has outlined questions that have arisen from her review. These questions have been posed to Cameco, and we look forward to receiving their response in due course.

ERFN concludes that there is no reason to object to the CNSC's conclusions in the 2024 RoR. Further, ERFN does not take issue with the finding that the operations and historical and decommissioned sites are being managed effectively in terms of the Safety and Control Areas. The RoR concludes that adequate protections are in place to protect the environment and humans.

Sincerely,

Cheyenna Hunt B.A., LL.B.
English River First Nation
Director, Lands & Consultation

Technical Memorandum

Review of the Regulatory Oversight Report for Uranium Mines and Mills in Canada: 2024

January 19, 2026

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Submission Background

The Regulatory Oversight Review (RoR) provides an opportunity for the Canadian Nuclear Safety Commission (CNSC) to share information with Indigenous Nations and communities impacted by nuclear facilities, illustrating their governance of these facilities and providing a performance summary of each. The RoR process provides an opportunity for concerns to be raised to the CNSC.

This technical memorandum has been prepared for the English River First Nation (ERFN) and provides a summary and review of the Regulatory Oversight Report for Uranium Mines and Mills in Canada: 2024 (CMD 26-M3; 2024 RoR) with the intent to inform the ERFN's Intervener Submission. The RoR is published by the CNSC to provide evaluation of licensees based on their safety procedures and adherence to regulatory policies. The Commission Member Document (CMD) was 110 pages (electronic document), the review effort included summarizing relevant information relating to concerns expressed by ERFN. Concerns expressed pertain in general to environmental protection of their Ancestral lands (Nuhtsiye-kwi Benéne in Dene), safeguarding their traditional, current and foreseeable way of life and reclaiming their identity and heritage (culture). Specifically, concerns were related to the preservation of their people's ability to hunt, fish and gather country food and advocate for their devotional connections with the lands of Nuhtsiye-kwi Benéne. ERFN maintains that any activity that poses a risk of environmental degradation within or in the vicinity of the Nuhtsiye-kwi Benéne should be considered a threat to the vitality of ERFN people and their ways of life – past, present and future.

Review Background

English River First Nation

ERFN is a Dene and Cree First Nation located in Northern Saskatchewan. ERFN's Nhutsiye-kwi Benéne encompasses 75,000 km^2 of the boreal forest in central-northern Saskatchewan, stretching from the Churchill River in the south to Wapata Lake in the north. ERFN has seven historical settlements located at Sucker Creek, Cree Lake, Elak Dase, Knee Lake, Dipper Rapids, Wapachewunak and La Plonge. Since 1992, an additional twelve reserve parcels have been added to their land base through the Treaty Land Entitlement process, which aims to resolve outstanding Treaty land obligations. ERFN's two largest reserves are La Plonge Reserve and Wapachewunak, located approximately 600 km north of Saskatoon, Saskatchewan. ERFN's main settlement area is located along the Churchill River, about 500 km north of Saskatoon at the Wapatuanak Reserve, Saskatchewan. The ERFN is a signatory to Treaty 10 (1906) and is comprised of nineteen different reserves:

- La Plonge 192,
- Elak Dase 192A,
- Knee Lake 192B,
- Dipper Rapids 192C,
- Wapachewunak 192D,
- English River (Porter Lake) 192H,
- English River FN Barkwell Bay No. 192I,
- English River FN Haultain Lake No. 192K,
- English River FN Flatstone Lake No. 192L,
- English River FN Cable Bay No. 192M,

- Ile a la Crosse 192 E,
- Primeau Lake 192F,
- Cree Lake 192G,
- Grasswoods 192J,
- Leaf Rapids 192P,
- English River First Nation Cable Bay Cree Lake192N,
- English River FN Beauval Forks No. 192O,
- Slush Lake Reserve No. 192Q, and
- Mawdsley Lake Reserve No.192R.

The ERFN's total membership is 1,927, with approximately 810 members living on reserve lands (Cheyenna Hunt, personal communication, September 2025). Comprised of both Cree and Dene people, the "people of the river" are known for their bold and collaborative spirit and trusting and humble nature (CanNorth 2017).

The ERFN name originates from the English River area, which was inhabited by the Poplar House people for periods during the year. Most of the families that now live at the Wapachewunak Reserve and La Plonge reserve, traditionally lived along the Churchill River system at Primeau Lake, Knee Lake, Dipper Lake and/or Cree Lake to the north. Summers were spent primarily fishing along the river system. For the rest of the year, family units would spread out through the northern forests for trapping and subsistence hunting. Commonly used winter trapping areas included Haultain Lake, Costigan Lake, Foster Lake and the area between Cree Lake and the Churchill River (Jarvenpa 1980, CanNorth 2017, SVS 2022).

The community is shaped by its respected Elders who are widely consulted for decisions, wisdom and strength. ERFN is dedicated to stewardship of the land and the education of future generations through land based learning youth camps and other opportunities to share knowledge on the land (Cameco 2021). ERFN is rising to the challenge of ensuring sustainable development in the vicinity of their communities and within their Nhutsiye-kwi Benéne and recognizes the unique and important role they have to play in the protection of Northern Saskatchewan. While remaining true to traditional values as "keepers of the land," members also pursue opportunities to participate in the development of ERFN's resources (e.g., forestry, industry and workforce).

ERFN established Des Nedhe Group of Companies in 1991 to create sustainable employment and business opportunities for English River members. Since its inception, Des Nedhe Group has invested in established companies that are leaders in Saskatchewan's mining and construction industry and expanded its portfolio into the areas of retail and real estate development and management. The company takes pride in its strong focus on growth through investment, experienced management team and history of delivering solid financial results. Looking forward, Des Nedhe Group is exploring new opportunities across the Country, in multiple sectors, and is positioned to play an important role in Canada's economic future.

Saskatchewan Uranium Industry

The Athabasca Basin of northern Saskatchewan has been the site of several major uranium discoveries and Saskatchewan is recognized as a world leader in uranium production. The uranium is exclusively used for electricity generation at nuclear power plants, which is a non-carbon emitting energy source and provides about 15% of Canada's electricity needs. The uranium industry is a significant economic driver

in northern Saskatchewan. Within ERFN's Nhutsiye-kwi Benéne, three uranium operations are currently operating or in a state of care and maintenance (Key Lake Mill [1983; halted mining in 1997 and milling halted from 2018 to 2021], McArthur River Mine [1999; halted mining from 2018 to 2021], and Cigar Lake Mine [2015; halted mining from March 2020 to September 2020]), and there are two additional operations just northeast of ERFN Traditional Lands near Wollaston Lake (McCLean Lake Mine and Mill [1999] and Rabbit Lake Mine and Mill [1975; mining and milling halted in 2016 and operations transitioned to care and maintenance].

Collaboration Agreement

All of the uranium mines and mills in northern Saskatchewan are considered of interest to the communities of ERFN. In northern Saskatchewan, the industry leaders Orano Canada Inc (Orano) and Cameco Corporation (Cameco) have entered into formal agreements with Indigenous communities, including ERFN (referred to as collaboration agreement (CAs) or impact benefit agreements (IBAs). These agreements provide Indigenous communities with workforce and business development programs, dedicated community engagement programs, community investment monies and mechanisms to collaborate around environmental stewardship. These industry leaders have also entered into several trapper compensation agreements with individual land users who are affected by their activities.

After ten years of thoughtful negotiation and an opportunity for all members to weigh in through a ratification vote, ERFN and Denison Mines signed a Shared Prosperity Agreement on September 26, 2023 in connection with the proposed development of the Denison Wheeler River Project in Northern Saskatchewan. The agreement acknowledges that the proposed project is located within ERFN's ancestral Lands and provides consent from ERFN to advance development of the uranium mine.

These agreements are part of the effort undertaken in recent history to engage and respect local communities, First Nations, Metis Nations and local land users during the planning and execution of industrial developments. Execution of these agreements ensures that engagement occurs with the intent to minimize the potential and perceived negative impacts from a development, as well as optimize potential positive impacts. Signing of these agreements conveys a general trust in the industry's performance and is recognition of a positive working relationship with the industry leaders.

Consultation

The Canadian Nuclear Safety Commission (CNSC) consults on regulatory documents, discussion papers and proposed regulations to ensure transparency and public engagement in nuclear safety. The CNSC consults with Indigenous Nations and communities, host communities, other interested parties and the general public to help develop many of the tools in its regulatory framework.

Consultation is recognized by the Canadian Nuclear Safety Commission (CNSC) as an important part of the process to develop the details of its regulatory framework. In recent years, specifically since 2018, ERFN has witnessed an evolution in the consultation process that they view as positive. ERFN has signed long term formal Terms of Reference for Engagement with the CNSC. This advancement is one of the ways in which the CNSC has responded to the feedback that ERFN has provided to them since 2018; ERFN applauds this advancement in reconciliation. Now there is more readily available and approachable ways to have direct dialogue between the CNSC and First Nations, which ERFN sees as invaluable to the process of building and maintaining trust in Canada's Nuclear Industry. The outcome of feeling like you

have no power in a situation is a state of forced apathy, the direct engagement with ERFN has resulted in a sense of relevance and with the consultation process a sense of consequence. As well, there is a seriousness conveyed about their concerns when during hearings CNSC members reiterate or even directly represent the views the First Nations have conveyed to them directly. Previously, ERFN felt as though their views were filtered through the proponents of projects and/or operating companies to the CNSC and as such could see their perspectives being softened, deemphasized, devalued, or even lost. ERFN looks forward to continued advancement in their relationship with the CNSC and the way they are engaged.

Leadership Role

In addition to the recent empowerment discussed above, members of ERFN gained a heightened awareness of the external factors that can affect the mining industry and that life-of-mine estimates based on resource delineation are just projections, in other words there are no guarantees regarding the persistence of the economic benefits to the local economy. In response, the communities shifted their engagement focus from operational performance and economic benefits to the long-term environmental effects of closure and understanding associated reclamation uncertainties. Recently in 2023 with the rebound of uranium prices and projected revival of the nuclear energy industry, members of ERFN are allocating more resources to identifying and pursuing opportunities for their communities to confirm they are optimizing the social and economic benefits presented by having such an industry in northern Saskatchewan. As well, ERFN has been pursuing community driven opportunities to demonstrate to community members the value and quality of resources within the Nuhtsiye-kwi Benéne and develop research that speaks to community concerns (e.g., Country Food Study, Medicinal Plant Quality and Cancer Rate Study).

Key concerns of the ERFN communities continue to include:

- Operation and ultimate closure of the Key Lake Operations, due to the long-term (1000s of year) management of tailings and linkages to Wheeler River system that is an area of heightened value; and
- Operation and ultimate closure of McArthur River Operation and Key Lake Operations, due to potential for cumulative effects on the Wheeler River system.

Key concerns of the ERFN communities now include:

- Development of the proposed Denison Wheeler River Project; specifically, concerns regarding cooperation among existing and proposed operations to confirm adverse environmental and social impacts minimized and cumulative effects assessed sufficiently.

The Wheeler River region is recognized as an important cultural, ecological, and sustainability resources (i.e., drinking water, food and air) area for the communities of ERFN. The prevalence of the importance of the resources (clean air, water, soil, and country foods) in this area is considered likely to increase in value to local land users following closure of local operations.

ERFN is dedicated to stewardship of the land for future generations and doesn’t take this responsibility lightly. Often in relation to First Nation consultation and engagement the focus is on the spatial extent of their traditional and current land use, and it is conveyed that their concerns should be limited to these

areas. However, it is recognized that the climate and environments around the world are changing, and there is no way to know in the future where the traditional resources that could be necessary to support future generations will be located within northern Saskatchewan or even Canada. As such, ERFN has interest in uranium operations and sites from two perspectives: (1) protection of all lands in northern Saskatchewan and (2) gaining an increased understanding of operational and long-term tailings management methods / technologies relevant to post-closure conditions.

Summary of Regulatory Oversight Report

The report provides information on the 5 uranium mines and mill licensed to operate in northern Saskatchewan 2024:

- Two Uranium Mine – Cameco's Cigar Lake and McArthur River Operations,
- One Uranium Mine and Mill – Cameco's Rabbit Lake Operation, and
- Two Uranium Mill – Cameco's Key Lake and Orano's McClean Lake Operations

As indicated in the RoR, the uranium mine and mill facilities discussed in the report are located on Treaty 10 territory, the Homeland of the Métis, and are within traditional territories of the Dene, Cree and Métis peoples. This review focuses on the operations and activities within and in the vicinity of the Nuhtsiye-kwi Benéne.

Financial Guarantees and Institutional Control Program

Financial guarantees ensure that sufficient financial resources are available to fund all necessary decommissioning and waste management activities should the licensee not be able to fulfill its obligations. An understanding of the establishment of Financial Guarantees for each operation and progression towards and requirements for the provincial Institutional Control Program have been valuable to ERFN developing a more general trust in the industries regulatory framework. The financial guarantees for Cigar Lake and McArthur River are lower relative to the other facilities because of the absence of tailings management facilities at those sites. The 2024 RoR provides the financial guarantees for each of the five operations. Complied in Table 1 provided in Appendix A are the financial guarantees reported from 2017 to 2018 and 2020 to 2025 (values were not provided in the 2019 RoR).

Values are updated to reflect any progressive reclamation (e.g., a mined-out pit and its associated supporting infrastructure is decommissioned and reclaimed), as well as any expansion of the operation's liability (e.g., a new water treatment plant is established).

Percent change from 2022 to 2023 for each operation are: Cigar Lake Operation +0.002%, McArthur River Operation 0%, Rabbit Lake Operation -79.2%, Key Lake Operation 4.3%, and McClean Lake Operation 0%.

Percent change from 2023 to 2024 are: Cigar Lake Operation 0%, McArthur River Operations +428.5%, Rabbit Lake Operation 406.9%, Key Lake Operation 0%, and McClean Lake Operation 0%.

In 2023 there was a significantly decrease in the Rabbit Lake Operation financial guarantee (-79.2%), which was questioned in ERFN's review. The 2023 RoR did not specifically list activities completed to reflect this change, but it did state that 2 of the 3 mined-out pits had been reclaimed. Overall, the reported value did not seem consistent of a in-pit tailings management facility and mill. In 2024 RoR, the Rabbit

Lake Operation and McArthur River Operation financial guarantees appears to have significantly increased and decreased, respectively; as such, it is now assumed that the value reported in 2023 RoR was a copy and paste error from the McArthur River dashboard. As well, in the 2024 RoR there appears to be several copy and paste errors including the Rabbit Lake dashboard figure caption and location text referring to McArthur River Operation.

Inspections & Non-compliances and Safety and Control Area Performance Ratings

In 2024, CNSC completed 27 inspections across the 5 operations, respectively. There were 114 non-compliance issues identified; Table 2 provided in Appendix A provides the number of inspections completed and number of non-compliances and orders issued from 2018 to 2024. Two joint inspections with Saskatchewan Ministry of Environment were completed in 2024, one at McClean Lake Operation and the other at Rabbit Lake Operation.

- Cigar Lake Operation in 2023 there were 18 non-compliances through 6 inspections and in 2024 there were 15 non-compliances through 6 inspections,
- McArthur River Operation in 2023 there were 19 non-compliances through 7 inspections and in 2024 there were 18 non-compliances through 4 inspections,
- Rabbit Lake Operation in 2023 there were 20 non-compliances through 3 inspections and in 2024 there were 10 non-compliances through 4 inspections,
- Key Lake Operation in 2023 there were 14 non-compliances through 3 inspections and in 2024 there were 31 non-compliances though 6 inspections, and
- McClean Lake Operation in 2023 there were 22 non-compliances through 3 inspections and in 2024 there were 32 non-compliances through 6 inspections.

In the 2024 RoR it is identified that a performance rating level of Satisfactory (SA) means any non-compliance or performance issue have been, or are being, adequately corrected. As in 2017 to 2021 and 2023, in 2024 all 5 operations received a performance rating of SA for all fourteen Safety and Control Areas (SCAs); a table is inserted below to illustrate which SCAs the Notices of Non-Compliances (NCCs) were issued under for each operation in 2024. To address these NNCs, the licensees submitted corrective action plans (CAPs) that were reviewed and accepted by CNSC staff. All NCCs were deemed of low safety significance and, with the exceptions identified below, have since been closed by CNSC staff.

NCCs that have not been closed are:

- CNSC staff performed a human performance management focused remote inspection for the 4 Cameco uranium mine and mill sites, triggered by identified inconsistencies in relation to training program documentation that was being transitioned to a common program for all four sites. The inspection identified 8 NCC that remain and the implementation of corrective actions continue to be assessed by CNSC staff.
- One NCC related to WHIMIS compliance remains open for Rabbit Lake Operation.
- One NCC related to an onsite emergency notification system remains open for Cigar Lake Operation.

Table Summarizing Notice of Non-Compliances Issues in 2024 for each Operation

Safety and Control Area	Cigar Lake	Key Lake	McArthur River	McClean Lake	Rabbit Lake
Management Systems[a]	2	-	1	5	1
Human Performance[b]	1+8*	8*	8*	-	2+8*
Operating Performance[c]	2	-	1	3	2
Safety Analysis	-	-	-	-	-
Physical Design[d]	-	-	-	1	-
Fitness for Service[e]	-	1	-	3	-
Radiation Protection[f]	3	12	7	7	1
Conventional Health & Safety[g]	-	12	1	4	2+1*
Environmental Protection[h]	1	1	-	2	-
Emergency & Fire Protection[i]	5+1*	1	6	6	2
Waste Management[j]	-	1	1	-	-
Security	-	-	-	-	-
Safeguards & Non-proliferation	-	-	-	-	-
Packaging & Transport[k]	-	3	1	-	-

* NNCs remain open, and the implementation of corrective action continues to be assessed by CNSC staff.
a The NNCs related to change management, change control and information management
b The NNCs related to training qualification records, sufficient number of qualified workers to safely perform duties, clear training instructions, and applying a systematic approach to training.
c The NNCs related to inspections of operating equipment, posting the current CNSC licence, and regulatory agency notification.
d The NCC related to change control process for Design Review and Risk Assessment.
e The NCCs related to critical equipment inspections and testing, and preventative and corrective maintenance.
f The NCCs related to radiation warning signs, dosimetry, radiation protection instrumentation and equipment, ventilation systems, and contamination control.
g The NCCs related to safety shower inspections, emergency equipment inspections, housekeeping and access, labeling, and WHIMIS compliance.
h The NCCs related to pond liner maintenance and corrective actions implementation related to environmental protection.
i The NCCs related to equipment maintenance and testing records, training requirements for emergency response team members, fire door operation, compressed gas cylinder storage, and ensuring fire extinguishers are checked monthly.
j The NCCs related to contaminated waste management.
k The NCCs related to shipping documents and placards, transport of dangerous goods certificates, and dangerous goods safety marks.

In 2024, Cameco paid an Administrative Monetary Penalty for not having informed the CNSC of missing the deadline to implement CSA N393-13, Fire Protection; the action to implement remains open and Cameco is providing CNSC staff monthly updates. Overall, the performance of the emergency management and fire protection SCA was still concluded to be SA.

Radiation Average and Maximum Individual Dose Limit

Optically simulated luminescence dosimeters (OSLD) measure external gamma radiation exposure and personal alpha dosimeters (PADs) measure internal alpha radiation exposure from radon progeny and long-lived radioactive dust (LLRD). As from 2014 - 2023, in 2024 no workers exceeded their regulatory annual radiation dose limit of 50 millisievert (mSv). The maximum individual radiation dose to a worker from 2014 to 2024 are complied in the Table 3a in Appendix A and the 2024 maximum for each operation is provided in Table 3b in Appendix A.

In 2024, the maximum individual radiation exposure was 9.06 mSv to a worker at McClean Lake, which is 18.1% of the annual regulatory limit (50 mSv). The maximum total effective dose for this worker is related to having increased overtime hours and working in a higher ambient radiation area, due to qualified staffing shortages (page 56/110 of the 2024 RoR).

The average individual effective dose by operation from 2014 to 2024 is provided in Table 4a in Appendix A and maximum individual dose in Table 4b in Appendix A.

Lost-time Injuries

A lost-time injury is a workplace injury that results in the worker being unable to return to work for a period of time. The lost-time injuries (LTIs) per year for each operation is provided in the Table 5 in Appendix A. Summary provided below for each lost-time incident, including of interest corrective actions taken.

Cigar Lake Operation – reported 0 LTIs to CNSC in 2024

- In 2024, a worker that injured right bicep on December 21, 2023, was informed July 6, 2024, they required surgery; as such, the injury was re-classified as LTIs but aside to 2023.

McArthur River Operation – reported 2 LTIs to CNSC in 2024

- October 26, 2024, during fire training, one trainee took full force of water stream from hose to the face. An off-site medical assessment determined the worker suffered an orbital fracture.
- October 26, 2024, when tightening a riser clamp for an elevated pipe the driver was on reverse thus clamp was released and the pipe dropped 9-inches pinching the worker’s pinky finger.

Rabbit Lake Operation – reported 1 TLI to CNSC in 2024

- May 12, 2024 worker sustained a fracture requiring surgery after falling 1 m when ground gave way beneath their foot.

Key Lake – reported 2 LTIs to CNSC in 2024

- February 27, 2024, worker cut on index finger when drill bit caught their glove requiring off-site medical assessment.
- November 25, 2024, worker sustained small fracture to lower leg and hurt knee requiring off-stie medical assessment when snowmobile tipped onto side.

McClean Lake – reported 2 LTIs to CNSC in 2024

- July 12, 2024, worker's arm was pulled into the rotating shaft while using a lathe machine. Orano implemented corrective actions including:
    - Installed an attachment on the late to minimize the potential for this to happen again
    - Developed a written procedure to capture the previously unwritten procedure and outline safe operations practices.
    - Developed a hazard assessment form for the safe operation of the lathe.
    - Stocked materials to minimize the need to use the lathe and eliminate the need to use the lathe for urgent tasks.
- September 19, 2024, while a worker that fell climbing a berm was on a stretcher, it slipped and the worker rolled out of the stretcher. Orano implemented corrective actions including:
    - Lesson learn for working on slopes and hazard identification communicated.
    - Work Instruction updated.
    - Retraining.
    - Tie-down on ambulance floor was removed to prevent the safety handlebar from lifting before catching on the safety hook.

Releases to the Environment

Soil and vegetation may be affected by atmospheric deposition of particulate containing absorbed metals and radionuclides associated with onsite activities or the release of mine-contact water. Licensees monitoring contaminant concentrations in water, air, soil and terrestrial vegetation to verify that operational impacts are below regulatory limits.

- Soil and terrestrial vegetation sampling around the operations were below regulatory limits.
- Atmospheric releases are compliant with their environmental programs and provincial standards. As reported on page 9/110 of the 2024 RoR, in 2024, all results were well below the limit set by the environmental quality guidelines. Additionally, refer to the Unauthorized Release / Reportable Releases to the Environment below.
    - As would be expected, air monitoring for radon gas near tailings management facilities and waste rock piles shows results higher than the regional background level of 25

Bq/m^3. However, concentrations fall to background levels within a short distance of the facility boundary (i.e., less than 2 km).

As reported on page 9/110 of the 2024 RoR, All water used by uranium mine and mill facilities must be treated before being discharged back into the environment.

- All water used by uranium mines and mill facilities must be treated before being discharged back into the environment. As reported on page 9/110 of the 2024 RoR, in 2024, all discharged water met the discharge requirements, ensuring that people and the environment near the facilities are safe.

Environmental risk assessments (ERAs) identified releases of molybdenum, selenium, and uranium as having the potential for adverse environmental effects at uranium mines and mills.

- From 2017 to 2024 the average concentration of molybdenum in effluent for all five operations were well below the most stringent Action Level[1] of 1 mg/L. In the absence of federal or provincial effluent discharge limits for molybdenum, the CNSC required licensees to develop facility-specific effluent controls within the codes of practice of the environmental protection programs. The most stringent action level is 1 mg/L. Table 6 in Appendix A summarizes the data from 2014 to 2024. The maximum average molybdenum concentration between 2017 and 2024 was 0.213 mg/L, which was report at Rabbit Lake in 2021, and this concentration is 21.3% of the 1 mg/L Action Level. For 2020 to 2023, the maximum annual average concentrations were reported for Rabbit Lake, at 0.184, 0.213, 0.163 and 0.114 mg/L, respectively. For 2024, the maximum annual average concentration was reported for McArthur River at 0.147 mg/L.

- From 2017 to 2024 the average selenium concentration in effluent for all five operations was below the licensed maximum monthly mean effluent Discharge Limit of 0.6 mg/L. Table 7 in Appendix A summarizes the data from 2014 to 2024. The maximum average selenium concentration between 2017 and 2023 was 0.042 mg/L reported at McClean Lake Operation in 2020, which is 7% of the guideline. For 2020 to 2023, the maximum average concentrations were reported for McClean Lake, at 0.042, 0.021, 0.014 and 0.016 mg/L, respectively. For 2024, the maximum annual concentration was reported for Key Lake at 0.012 mg/L.

- From 2017 to 2024 the average uranium concentrations in effluent for all five operations was below the licensed maximum monthly mean effluent Discharge Limit of 2.5 mg/L and the CNSN Interim Objective of 0.1 mg/L. Table 8 in Appendix A summarizes the data from 2014 to 2024. In 2017, the maximum average uranium concentration was 0.07 mg/L reported at Rabbit Lake, which is 2.8% and 70% of the Discharge Limit and Interim Objective, respectively. For 2020 to 2022, the maximum average concentrations were reported for Key Lake, at 0.026, 0.024 and 0.022 mg/L, respectively. For 2023 and 2024, the maximum annual concentration was reported for Key Lake at 0.017 and 0.015 mg/L, respectively.

- From 2017 to 2023 the average concentration of radium-226 in effluent for all five operations were well below the license-authorized Effluent Discharge Limit of 0.37 Bq/L. Table 9 in Appendix A summarizes the data from 2014 to 2024. The maximum average concentration was 0.09 Bq/L

[1] Administrative Level represents the upper range of design specifications for a specific parameter. Reaching an administrative level is not reportable to the CNSC but triggers an internal review of controls in place by the licensee.

reported at Key Lake in 2019, which is 24.3% of the Effluent Discharge Limit. For 2020 to 2024, the maximum annual average concentrations were reported for McArthur River at 0.049, 0.029, 0.025, 0.051 and 0.044 mg/L, respectively.

Environmental Action Level and Regulatory Limit Exceedances

Exceeding an Action Level indicates a potential loss of control of the environmental protection program, which is based on the approved facility design envelop, and it triggers notification to the CNSC, an immediate investigation, subsequent corrective action and preventative measure in order to restore the effectiveness of the environmental protection program. An exceedance of an action level does not imply a potential risk to the environment.

In 2024, all treated effluent released to the environment from licensed uranium mining and milling activities met the effluent discharge limits for: arsenic, copper, lead, nickel, zinc, total suspended solids (TSS), unionized ammonia and pH. In 2023, at McClean Lake Operation had three related action level exceedances at the JEB Water Treatment Plan exceeding the Metal and Diamond Mining Effluent Regulations (MDMER) lower limit for pH and the Environmental Code of Practice (ECOP) action level for total suspended solids (> 15 mg/L) and unionized ammonia (> 0.45 mg/L). Corrective action was implemented by Orano. In 2024, there were no environmental action level and/or regulatory limit exceedances reported over the 2024 calendar year for Key Lake, McArthur River, McClean Lake and Rabbit Lake Operations.

Cigar Lake in 2024 reported 1 action limit exceedance to the CNSC, described below, and 0 regulatory limit exceedances.

March 4, 2024, a pond of treated effluent with a total volume of 3,931 m^3 was released to Seru Bay in Waterbury Lake. The molybdenum concentration of the pond fill composite sample was reported as 0.06 mg/L, below the action level, at release. The molybdenum concentration of the pond release composite sample was 1.36 mg/L, exceeding the action level of 1.1 mg/L. The elevated concentration was due to a process upset in the treatment plant. Immediate action included adjusting the minimum ferric sulphate addition rate to improve pH control.

Corrective actions included completed training analysis to identify improvements within the training process and developing a data entry checklist that includes worker verification of data entry and upload of analytical results and updated the data upload work instructions. The data entry checklist includes worker and supervisor verification that records have been entered accurately and a requirement to report adverse trends for in-process mine water treatment samples. CNSC staff reviewed the updated Cameco documentation and data entry/review process in a follow-up inspection to verify the implementation of these corrective actions and their adequacy.

Radiological Action Level Exceedances

In 2024, there were no radiological action level exceedances at McClean Lake and Rabbit Lake Operations.

In 2024, Cigar Lake reported 2 radiological action level exceedances of the weekly radiological action level of 1 mSv).

- September 17, 2024, there was an exceedance of the weekly action level; a worker was assigned a committed effective dose of 3.01 mSv. It was determined the worker was supplied contaminated breathing air while working inside a recycle water tank using a welding power air-purifying respirator (PAPR) on September 13, 2024. Cameco completed a cause investigation; the worker had failed to properly reattach the filter housing, resulting in a gap allowing for unfiltered air to be blown into the breathing zone.
- September 19, 2024, there was an exceedance of the weekly action level; uranium sample assigned a worker a committed effective dose of 4.41 mSv. Cameco completed a cause of investigation; the worker was working inside a clarifier tank using a PAPR but following an incorrect procedure for removing the respirator and personal protective equipment (PPE).
    - Cameco implemented several corrective actions following these two events, including coaching workers on the proper decontamination procedures to be followed. The implementation of corrective actions was verified by CNSC staff during compliance inspections in 2025.

Key Lake reported 3 radiological action level exceedances of the weekly radiological action level.

- January 2024, 2 workers working inside horizontal calciner room wearing passive air purifying respiratory protection. The final dose assessments determined effective doses of 1.21 mSv and 1.76 mSv, which exceeded the weekly action level. CNSC staff reviewed and accepted Cameco's corrective actions.
- September 2024, 4 workers working inside the calciner requiring PAPR. The final dose assessment resulted in weekly effective dose of 1.4 mSv, above the weekly action level of 1 mSv. CNSC staff reviewed and accepted Cameco's corrective actions.

McArthur River reported 2 radiological action level exceedances of the weekly radiological action level.

- January 2024, 2 workers backfilling a mined-out stope during different shifts and completing different tasks. Some ventilation equipment was removed to do their tasks. Radon progeny is the most likely cause of elevated levels on their PAD; quarter 1 dosimetry results were 5.1 and 5.8 mSv. The corrective actions included the redesign of the standpipe used for backfilling to allow for ventilation to remain in place during manual checks and revision of existing work instruction. CNSCC staff reviewed and accepted Cameco's corrective actions.

Unauthorized Releases / Reportable Releases to the Environment

In 2024, 11 unauthorized releases were reported. CNSC concluded this number is within the normal range for uranium mines and mills, all releases were remediated by the licensees and there were no lasting impacts to the environment. The number of reportable environmental spills per year for each operation is summarized in Table 10 in Appendix A. The spill details are summarized in Table 11 of Appendix A.

One spill reported for the Key Lake Operation in late December was described as increased seepage from a reservoir underdrain system. The reporting did not provide a volume or indicate controls or mitigation implemented to reduce the seepage, but it did describe that groundwater sampling had not indicated a change in historical water quality. The CNSC concluded that corrective actions are still underway including ongoing monitoring and a geotechnical review of the reservoir facility.

Environmental Protection Reviews

The CNSC conducts ERPs for nuclear facilities with potential to interact with the environment, which is a science-based environmental technical assessment of the facility's environmental protection measures. In the 2024 RoR, the ERP process was not discussed.

In the 2023 RoR, the relevant Environmental Protection Review (EPR) completed in 2023 was referred to and links to the Executive Summary provided. For the relevant operations and decommissioned mine site in northern Saskatchewan no ERPs were completed in 2024: Cigar Lake (2021; LINK), Rabbit Lake (2023; LINK), Key Lake (2023; LINK), and McArthur Operations (2023; LINK) and Cluff Lake Project (2022; LINK). At links for Executive Summaries additional links provided that direct reader to additional information.

For all three reviews completed in 2023 the conclusion was the same:

Based on their assessment and evaluation of Cameco's documentation and data, CNSC staff have found that the potential risks from the Operations' radiological and hazardous release to the atmospheric, terrestrial, aquatic and human environments are low to negligible, and that these releases are at levels similar to natural background. Furthermore, human health is not impacted by operations and the health outcomes are indistinguishable from health outcomes found in similar northern Saskatchewan communities.

Environmental Risk Assessment

An ERA of a nuclear facility is a systematic process used to identify, quantify and characterize the risk posed by releases of radiological and hazardous substances and physical stressors on human and non-human biota receptors. The ERA provides a basis for the development of site-specific environmental protection measures, including the Environmental Monitoring Program (EMP). The monitoring results, in turn, are used to update / verify the ERA. Under the CNSC, ERAs are to be reviewed on a 5-year cycle, or more frequently if major facility changes are proposed that would trigger a predictive assessment. As reported on page 65/110 of the 2024 RoR, the Cigar Lake, Key Lake, McArthur River, McClean Lake and Rabbit Lake current ERAs are dated, 2021, 2020, 2020, 2016, and 2020, respectively. All facilities are expected to provide updated ERAs in 2026, with the exception of McClean Lake which is expected to provide an updated ERA in 2025.

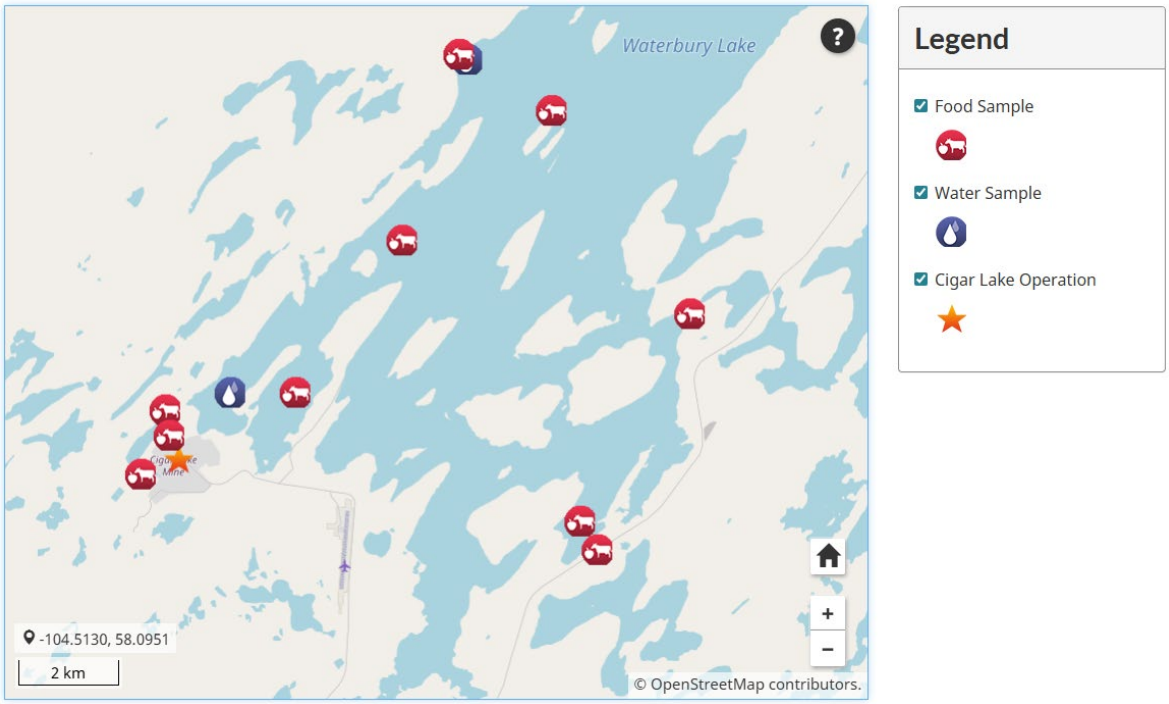
Human Health Risk Assessment

As required by the CNSC, protection of people from hazardous and radiological released from facilities is assessed in a human health risk assessment (HHRA) that models exposure via air, water, soil and traditional foods (e.g., fish, waterfowl, moose). Exposure doses are compared to human health benchmarks; for all facilities, it is concluded that health of persons in areas surrounding the facilities

remain protected. On page 66/110 of the 2024 RoR, CNSC staff conclude that facilities controlled radiation doses to persons at levels well below the regulatory limits and are as low as reasonably achievable (ALARA; fraction of the regulatory public dose limit of 1 mSv/year).

Independent Environmental Monitoring Program

In 2023, CNSC staff carried out the Independent Environmental Monitoring Program (IEMP; LINK) at publicly accessible locations in the vicinity of Beaverlodge, Gunnar and Lorado (LINK). CNSC concluded that the 2023 IEMP results are consistent with the results submitted by Cameco and SRC, supporting that conclusion that people and the environment in the vicinity of Beaverlodge, Gunnar and Lorado sites are protected and that there are no anticipated health impacts from the sites, provided the Saskatchewan Healthy Fish Consumption Guideline is followed regarding fish and water consumption. In 2024, the IEMP included sampling in the vicinity of Cigar Lake Operations (LINK).



Results indicate that concentrations of radioactive and hazardous materials in the environment were within natural background levels. Radioactivity levels (radiological contaminants) and concentrations of hazardous contaminants in surface water samples were within natural background levels (CNSC 2014) and below the Canadian Council of Ministers of the Environment guidelines for the protection of aquatic life and the Province of Saskatchewan's drinking water quality standards. For radiological contaminants in fish, Labrador tea and berries, results were compared to CNSC screening levels to ensure human health is protected. Consumption is not expected to result in any adverse health effects from radiological contaminants as, with the exception of polonium-210 in fish, measured levels were below screening levels. Polonium-210 measured levels in fish from exposure and reference stations were within regional background range of 0.02 to 14 Bq/kg fresh weight and were consistent with the results from the Eastern Athabasca Regional Monitoring Program (EARMP).

For hazardous contaminants, conservative screening levels represent the concentration required for a representative person (adult of child) to ingest 1/10th Health Canada's tolerable daily intake (TDI) for multiple ingestion pathways (i.e., water, fruit, vegetables, fish/meat). With the exception of selenium in fish, the measured concentration in fish, berries and Labrador tea were below screening levels. The measured concentration of selenium in fish at both the exposure and reference stations were within the regional background concentration range (0.12 to 3.03 mg/kg fresh weight). CNSC concludes that the IEMP results support the conclusions from the EARMP and Cameco's monitoring programs that country foods in the vicinity of the Cigar Lake Operation are safe to eat.

As in 2023 IEMP, there is a Focus on Heath section where the CNSC reviews public health reports from norther Saskatchewan's relevant health authorities and conducted health studies of uranium works to provide further independent verification that the health of people living near the Cigar Lake Operation are protected. Utilizing information from Saskatchewan Population Health and Evaluation Research Unit, the Saskatchewan Health Authority, the Northern Inter-Tribal Health Authority, and the Saskatchewan Cancer Agency (https://www.nitha.com/; https://www.saskhealthauthority.ca/; http://www.saskcancer.ca/research-article/cancer-surveillance), the section identifies that:

- Lung cancer is the leading cause of cancer mortality and is most common type of cancer diagnosed in Canada and Saskatchewan.
- Lung cancer incidence rate in northern Saskatchewan higher than in Saskatchewan as a whole for the 20-year period from 1995 – 2014.
- Other leading causes of cancer incidence and mortality in Saskatchewan were: colorectal, female breast and prostrate cancer. The incidence and mortality rates of these 3 cancers have increased over the last 20 years in northern Saskatchewan (Philips et al. 2017).
- On average, First nation communities in Saskatchewan score lower than non-First Nation communities on community well-being components such as income, housing, labour force activity, and education (NITHA 2017).
- Higher smoking rates (for non-traditional to use) in northern Saskatchewan impact cancer rates in comparison to the provincial average (Irvine & Quinn 2019). Some northern Saskatchewan First Nation communities reported the smoking rate to be 79%.
    - Decreasing tobacco use and second-hand smoke exposure could reduce preventable cancer cases in Saskatchewan by half (Irvine & Quinn 2019).
- For those who have limited exposure to tobacco smoke, radon exposure above the Canadian radon guideline (200 Bq/m^3) is the leading cause of lung cancer worldwide (Cross-Canada Survey of Radon Exposure 2024).
    - In the health region where Cigar Lake is located, the radon level is 86.1% of homes were below the radon guideline, similar to homes nationally at 93% below guideline and homes in Saskatchewan at 84.3%.

An Eldorado study examining worker health for Port Radium and Beaverlodge mines was references; workers employed between 1932 and 1980 were followed up with from 1950 to 1999. A total of 618 lung

cancer death (Lane, et al. 2010[2]; LINK). The study found that, overall, those workers were healthier than the general Canadian male population, except in the case of lung cancer. Lung cancer incidence and mortality rates were much higher in uranium workers. The risk of lung cancer increased with increased workplace radon exposure (radon decay product [RDP]; Radon Progeny [RnP]). This knowledge led to radiation protection regulations to reduce workplace radiation levels.

In 2017, the CNSC, the Government of Saskatchewan, the University of Saskatchewan, the uranium industry and other stakeholders launched the Canadian Uranium Workers Study (CANUWS) access to information is available online (LINK). This study includes all uranium workers from northern Saskatchewan and will provide information on the long-term health effects of workplace radiation exposures. The final study report is expected in 2026. For more information, access the CNSC Health Studies page (LINK).

Eastern Athabasca Regional Monitoring Program

The Eastern Athabasca Regional Monitoring Program (EARMP; 2024/2025 Community Report available at LINK) is a well-recognized environmental monitoring program designed to gather data on long-range environmental information and potential cumulative impacts downstream from uranium mining and milling facilities.

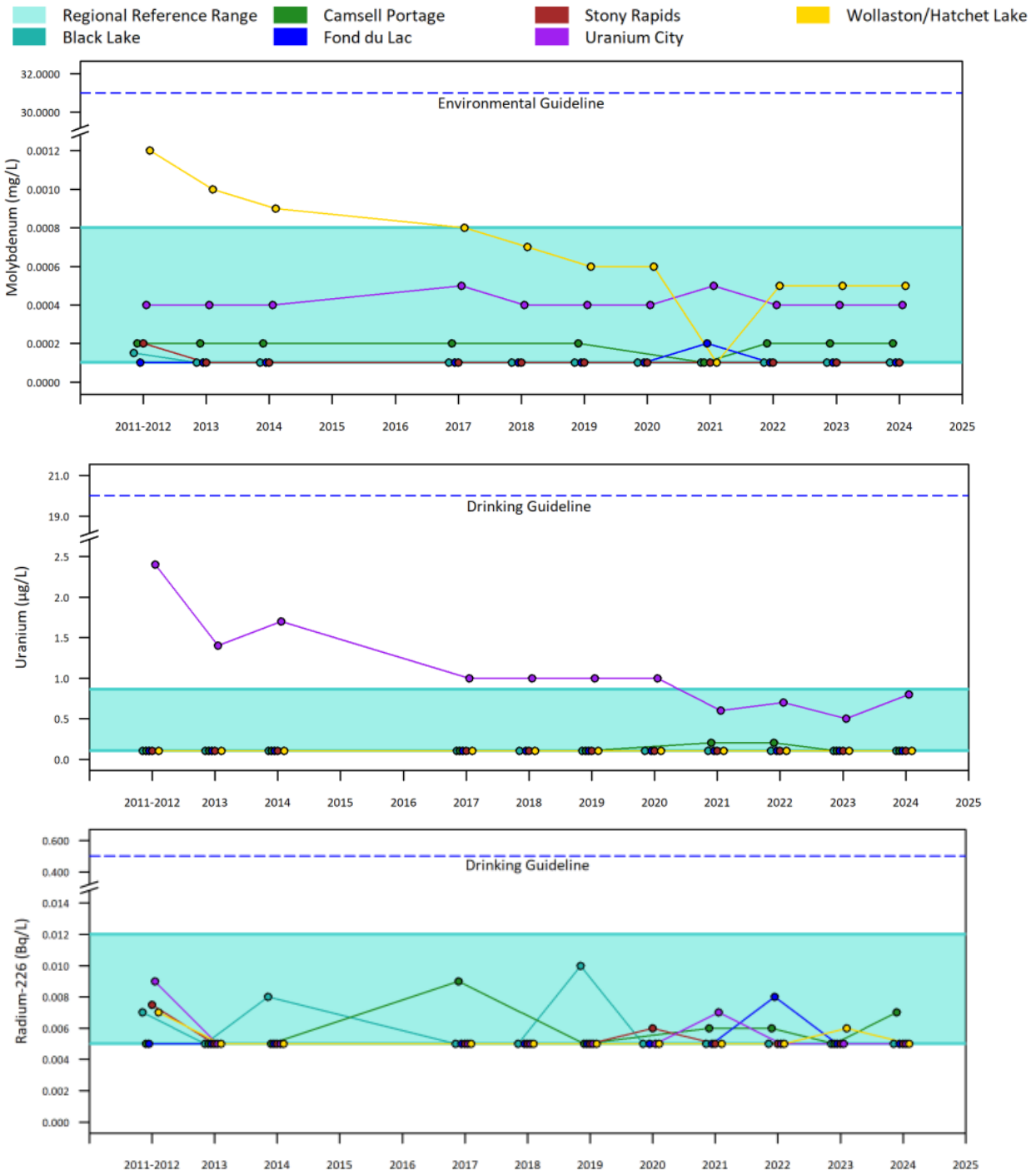
Evaluation of country food data from previous years confirms uranium mines and mills are not affecting the safety of country foods at nearby communities. The results indicated that radiological and non-radiological exposures to residents consuming country foods were similar to exposures of the general Canadian population. The EARMP has proven to be a productive means of involving the community in monitoring the health of their local environment and provides them with confidence in the safety of their traditional foods. The conclusion of the EARMP is that water and country foods are considered safe for consumption.

Analogous to the constituents of potential concerns examined in Releases to the Environment section above, I inserted in text below water quality figures from the EARMP 2024/2025 report, as available[3], for molybdenum, selenium, uranium, and radium-226, as well as polonium-210 that was discussed in the IEMP section above.

[2] Lane, S.D, Frost, S.E., Howe, R.G., and Zablotska, L.B. 2010. Mortality (1950-1999) and Cancer Incident (1969-1999) in the Cohort of Eldorado Uranium Workers. LINK

[3] In the 2024/2025 EARMP, fall water chemistry results for the EARMP community program, 2011 to 2024 selenium levels were consistently <0.0001 mg/L and polonium-210 <0.005 Bq/L as such not graphed.

Mean Level in Water from EARMP Community Study Area 2011 to 2024



Findings from Report Review

I have reviewed the CMD 25-M4 / 2023 RoR identifying questions and comments community members would likely have, taking into consideration my engagement with ERFN and the knowledge and understanding I have of the uranium industry and regulatory requirements. The review was completed in this manner to critically review the 2023 RoR in a concise and culturally aware manner.

Indented text indicates context reiterated from the 2022 RoR from previously identified concerns and ongoing undertainty.

Cigar Lake Operation - Arsenic in Seru Bay Declined from 2016 to 2021 in 2022 and 2023 Again Elevated Above ERA Predictions

In 2016, the Cigar Lake Operation Environmental Performance Report indicated an increasing arsenic trend in effluent released to Seru Bay. While below regulatory limits, arsenic concentrations were above environmental assessment predictions and above concentrations previously measured prior to achieving full ore production. It was stated in the 2020 RoR (CMD 21-M34), the CNSC has verified that arsenic loadings to the environment have decreased steadily since 2016 and stated in the 2021 RoR (CMD 22-M36) CNSC staff have concluded adequate measures have been taken to protect the environment (pg 49 = pg 56/160).

In 2022, however, arsenic levels in effluent were elevated compared to previous years and exceeded the expected and upper-bound benchmarks in the ERA. In Table 12 of Appendix A summarizes arsenic annual average effluent concentration from 2014 to 2024. Note: the concentration in 2022 and 2023 was higher than it was in 2016 when the increasing arsenic trend was identified. In 2023 RoR review ERFN, requested clarification. In a letter from Cameco to ERFN dated December 16, 2024 (Kristin Cuddington to Cheyanna Hunt), it was communicated:

> *Treated effluent performance with respect to arsenic, and other parameters, remains effective at the operation with concentration well below the applicable regulatory limits. Measured arsenic concentrations at the Cigar Lake Operation in 2023 were lower than those reported in 2022, and loadings remain below those assessed in the 2021 ERS. Continued decreases have been observed in 2024, with measured arsenic concentrations lower than previous years.*

Acknowledging concentration alone doesn't determine loadings to the receiving environment, the 2024 annual average arsenic concentration in the Cigar Lake Operation effluent (0.057 mg/L) is lower than that reported in 2016 (about 0.92 mg/L) and lower than values reported for 2016 – 2023.

McArthur River Operation – Molybdenum in Effluent Addressed In 2018 Care and Maintenance from 2018 to March 2022

As described in 2022 RoR, Cameco implemented process changes prior to 2018 during active mining which reduced molybdenum concentrations in treated effluent. The facility was placed into a state of care and maintenance in 2018 and transitioned back to operation in 2022. CNSC staff reviewed the effluent treatment concentrations and confirmed that the McArthur River Operation continued to meet the discharge limits. It was stated that the CNSC will continue to review effluent quality results to verify that effluent treatment performance remains effective.

In a letter from Cameco to ERFN dated December 16, 2024 (Kristin Cuddington to Cheyanna Hunt), it was communicated:

> *Measured concentrations from the 2018 to 2022 period reflected a period of time when the facility was in a safe state of care and maintenance. Since resuming production, measured concentrations have been consistent with historical production values and remain well below those assessed in the most recent Environmental Risk Assessment. As such, treatment effluent performance with respect to molybdenum, and other parameters, remains effective at the Operation.*

In the 2024 the reported annual average molybdenum concentration in effluent released to the environment in Table 4.9.2 (page 62/110 in 2024 RoR) was 0.147 mg/L. As illustrated in Table 6 Table of Appendix A, the effluent concentration is elevated as compared to range from 2018 to 2023 (0.0084 to 0.0112 mg/L) and comparable to concentrations in 2017 (0.146 mg/L).

Northern Saskatchewan Community Cancer Rate Concern

There was a new Section of the IEMP (at least not in the 2022 reports) called Indigenous Nations and Communities' Participation, which includes the subsection Focus on Health. This subsection speaks directly to concerns identified in the 2023 RoR Review Report submitted to ERFN that community members perceive their communities are being exposed to carcinogens due to uranium industry in northern Saskatchewan. The 2024 IEMP relevant to information is summarized above. The 2023 RoR and 2024 RoR referenced IEMPA information validated ERFN community members perception that cancer incidence rates are higher in northern Saskatchewan communities as compared to the provincial average. The health assessment information referenced indicate that tobacco smoke exposure and RDP/RnP exposure increase cancer risk.

As described above and in the Releases to the Environment section of the RoR, radon gas monitoring near tailings management facilities and waste rock piles shows results higher than the regional background level of 25 Bq/m^3 but levels fall to background levels within a short distance (less than 2 km from operations). Ambient radon data is provided for the 5 facilities in Table 13 of Appendix A. I cannot confirm where the monitoring stations are, but all levels are below the 25 Bq/m^3 except for the measured level for Rabbit Lake Operation in 2023 (27.9 Bq/m^3). In 2023 RoR, there was no context provided to the elevated radon level; in 2024 the ambient radon in air at Rabbit Lake Operation is 10 Bq/m^3.

2023 RoR Review Comment / Question Follow-up

Follow-up #1

The information provided in the IEMP in the subsection Focus on health helpful (described above in section Northern Saskatchewan Community Cancer Concern). The information led me to ask the following questions (1) Are smoking rates higher in northern Saskatchewan communities as compared to other areas? (2) Are radon levels higher in northern Saskatchewan communities as compared to other areas? Both questions were spoken to in the 2024 IEMP for Cigar Lake Operations in Focus on Health subsections.

Recommendations

Recommendation #1 – CNSC

The lack of detail for some of the NNCs makes it difficult to reassure the reader the hazard risk level encompassed under the rating of “low safety significance ” is negligible. For example, it was difficult to envision non-compliances related to (a) sufficient number of qualified workers to safely perform duties, (b) regulatory agency notification, or (c) risk assessment where there would not have been the potential for significant risks.

Clarifications / Minor Editorial Items / Requests

Clarification #1 - Cameco

There appears to be some inconsistency in the reported financial guarantees between 2023 and 2024; ERFN questioned the finance guarantee value reported for Rabbit Lake in 2023, it would appear that the there was a copy-paste error where the McArthur River value was reported for McArthur River Operations. In 2024, it would appear there is a copy-paste error where the Key Lake Operation value is reported for McArthur River. Further, there appears to be copy-paste errors on the Rabbit Lake Operation dash board (page 43/110 of 2024 RoR), where the figure caption and text refer to McArthur River.

Clarification #2 – CNSC

There appears to be contradictory statements made in the 2024 IEMP for Cigar Lake Operations.

- With the exception of selenium in fish, the concentration of hazardous contaminants in fish, berries and Labrador tea were below CNSC screening levels of hazardous substances.
- No health effects are expected from consumption of fish due to selenium. This is because the highest concentration of selenium in fish was less than half of the conservative CNSC screening level…

However, further context is provided to qualify the measured levels.

Clarification #3 - Cameco

In relation to the molybdenum in the McArthur River Operation effluent, the average concentration reported for 2024 is 0.147 mg/L which is well below the discharge limit of 1 mg/L but comparable to the concentrations report from 2015 to 2017, before the operation was put into a state of care and maintenance and prior to implementation of improvements to reduce the effluent concentration. It is important for ERFN’s perspective (i.e., not just about protecting the broader aquatic community) to evaluate operational performance not just in terms of the most recent ERA predictions, but the predictions made in the Environmental Assessments (EAs) and/or EA ERAs.

As compared to EA ERA predictions how has the risk to biota receptors in the receiving environment changed in relation to the release of McArthur River Operation effluent? In other words, how do the EA predictions and the most recent ERA predictions compare?

Clarification #4 – Cameco

Some concern was raised regarding the Key Lake Operations December 27, 2024 reportable discharge (Table 11 row 7; Key Lake #5). The information published on Camceo's website (LINK), in Cameco's Reportable Events email (dated January 14, 2025 from Anne Gent), and in the Joint Implementation Engagement and Environmental Committee (JIEES) meeting minute notes for early 2025 provided limited additional information to that in the 2024 RoR. Additional information reviewed provided respectively below.

- Details: January 9, 2025. Reportable Discharge. An increase in seepage flow rates to the Reservoirs #1 And #2 underdrain system was reported on December 27, 2024 as a release to secondary containment. Increased monitoring in this area subsequently indicated an increase in groundwater elevation surrounding the Reservoirs.
  In review the additional monitoring and given the potential for leakage from the reservoirs is impacting surrounding groundwater levels, this even is being classified as a reportable discharge. Provincial and federal regulators have been notified.
  Corrective Action: An investigation into the cause of the discharge is underway along with daily inspections and increased monitoring, including water level and groundwater chemistry. Ground water quality results collected to date, from around the Reservoirs, returned results within historical ranges.
- On December 27, 2024 Key Lake reported an increase in seepage flow rates from Reservoirs #1 and #2 to the underdrain system (reportable incident, release to secondary containment). Water level monitoring of wells around the reservoirs was increased and an investigation was initiated. Following a detailed review of the data, this even was reclassified as a reportable discharge on January 9, 2025.
  Groundwater quality samples were collected from monitoring wells around the reservoirs, and the results were within historical range. The operation has increased monitoring and will continue to assess and evaluate the data. I will keep you updated as additional details become available.
- Reviewed environmental events that have occurred since last meeting.

Recognizing the 2024 RoR does not provide the most recent information, could Cameco provide a brief update: (1) Is groundwater quality in the vicinity of the increased seepage still unimpacted (i.e., within historical range)?, (2) How is the water in Reservoirs #1 and #2 impacted? (3) Has a corrective action plan been developed / submitted / approved, and if not, what is the timeline for a plan?

Conclusion

From my review of the information provided there is no reason to object to the CNSC's conclusions in the 2024 RoR that the operations are being managed effectively in terms of the SCAs. The RoR concludes that adequate protections are in place to protect the environment and humans.

Sincerely,

Robin Kusch, M.Sc.
Environmental Scientist
108 Brookside Drive,
Warman, Saskatchewan
S0K 0A1

Appendix A: Summary Tables

Table 1: Financial Guarantees for the Five Operations from 2014 to 2024

Facility	2014	2015	2016	2017	2018	2020	2021	2022	2023	2024
Cigar Lake	49,200,000	49,200,000	49,200,000	49,200,000	49,200,000	61,790,000	61,790,000	61,790,000	$61,791,233	$61,791,233
McArthur River	48,400,000	48,400,000	48,400,000	48,400,000	48,400,000	42,100,000	42,100,000	42,100,000	42,100,000	$222,500,000
Rabbit Lake	202,700,000	202,700,000	202,700,000	202,700,000	202,700,000	202,700,000	202,700,000	202,700,000	42,100,000	$213,400,000
Key Lake	225,100,000	225,100,000	218,300,000	218,300,000	218,300,000	222,500,000	222,500,000	213,400,000	222,500,000	$222,500,000
McClean Lake	43,074,800	43,074,800	107,241,000	107,241,000	107,241,000	107,241,000	107,241,000	102,098,000	102,098,000	$102,098,000

Table 2: Inspections at Uranium Mines from 2018 to 2024

	2018	2019	2020	2021	2022	2023	2024
Number of Inspections	26	20	17	18	25	22	27
Instances of non-compliance	31	23	11	19	79	93	114
Orders	-	-	-	-	1	1	-

Table 3a: Maximum Individual Radiation Dose per Year from 2014 to 2024

Facility	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2025
Maximum Individual Radiation Dose (mSv)	Rabbit Lake 8.64	Rabbit Lake 9.15	McArthur River 7.02	McArthur River 5.73	Cigar Lake 7.28	McClean Lake 4.7	McClean Lake 4.28	Cigar Lake 6.03	McArthur River 7.14	Cigar Lake 18.92*	McClean Lake 9.06
% Annual Regulatory Limit	17	18	14	12	14	9	9	12	14	37.8	18%

* A value that is 37.8% of the annual effective dose limited of 50 mSv for nuclear energy workers.

Table 3b: Maximum Annual Individual Radiation Dose in 2024 for Each Operation

Parameter	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
Maximum Annual Dose (mSv)	4.89	8.73	2.62	7.58	9.06
% Annual Regulatory Limit	10%	17%	5%	15%	18

Table 4a: Annual Average Individual Radiation Dose for the Five Operations from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
	mSv				
2014	0.16	1.03	1.35	0.63	0.37
2015	0.45	1.00	1.36	0.55	0.89
2016	0.39	0.85	0.85	0.62	1.04
2017	0.34	0.79	0.4	0.66	0.91
2018	0.47	0.15	0.46	0.19	0.9
2019	0.57	0.33	0.75	0.27	0.93
2020	0.38	0.27	0.7	0.35	0.67
2021	0.32	0.25	0.57	0.52	0.79
2022	0.46	0.59	0.70	0.74	0.81
2023	0.42	0.87	0.71	0.91	0.87
2024	0.43	0.81	0.71	0.71	0.93

Table 4b: Maximum Individual Radiation Dose for the Five Operations from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
	mSv				
2019	3.7	2.82	2.73	1.84	4.7
2020	2.82	2.94	2.93	2.11	4.28
2021	6.03	3.06	2.47	3.13	4.89
2022	5	7.14	2.86	6.46	6.86
2023	18.92	8.87	2.80	10.44	8.37
2024	4.89	8.73	2.62	7.58	9.06

Table 5: Annual Lost-time Injuries for the Five Operations from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
	Lost-time Injuries				
2014	1	1	1	0	3
2015	4	0	2	0	3
2016	1	1	1	2	3
2017	0	1	0	0	0
2018	0	0	0	0	1
2019	0	0	1	0	3
2020	0	0	0	0	2
2021	2	0	0	0	3
2022	0	0	1	1	3
2023	2	1	0	4	3
2024	0	2	1	2	2

Table 6: Annual Average Molybdenum Concentration (mg/L) in Effluent from 2014 to 2024 (Discharge Limit = 1 mg/L)

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	0.0303	0.2121	0.2820	0.16	0.0024
2015	0.0763	0.146	0.268	0.1	0.0024
2016	0.0369	0.1851	0.273	0.08	0.002
2017	0.064	0.146	0.139	0.12	0.004
2018	0.103	0.0192	0.18	0.063	0.003
2019	0.1069	0.0084	0.159	0.049	0.002
2020	0.0753	0.0097	0.184	0.0543	0.004
2021	0.0515	0.0084	0.213	0.041	0.003
2022	0.0505	0.0204	0.163	0.0123	0.006
2023	0.0399	0.112	0.114	0.0536	0.014
2024	0.0842	0.147	0.131	0.0581	0.005

Table 7: Annual Average Selenium Concentration (mg/L) in Effluent from 2014 to 2024 (Discharge Limit 0.6 mg/L)

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	0.0009	0.0017	0.0042	0.018	0.0007
2015	0.0041	0.0025	0.0042	0.018	0.0092
2016	00062	0.0037	0.0035	0.017	0.021
2017	0.0042	0.0036	0.0024	0.015	0.011
2018	0.0044	0.0023	0.0026	0.01	0.021
2019	0.0041	0.0024	0.0023	0.01	0.037
2020	0.00345	0.0003	0.0026	0.011	0.042
2021	0.002	0.0003	0.0025	0.01	0.0211
2022	0.0037	0.0005	0.00224	0.009	0.0139
2023	0.0021	0.0047	0.0023	0.015	0.0161
2024	0.0021	0.0033	0.0026	0.012	0.0055

Table 8: Annual Average Uranium Concentration (mg/L) in Effluent from 2014 to 2024 (Discharge Limit 2.5 mg/L)

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	0.0193	0.0097	0.046	0.006	0.0018
2015	0.131	0.0089	0.052	0.008	0.0042
2016	0.0063	0.0055	0.073	0.006	0.004
2017	0.0018	0.0056	0.07	0.011	0.004
2018	0.0005	0.0071	0.032	0.013	0.007
2019	0.0004	0.0086	0.027	0.0243	0.005
2020	0.00018	0.0084	0.021	0.026	0.005
2021	0.00014	0.0079	0.018	0.024	0.0098
2022	0.00025	0.011	0.019	0.0223	0.005
2023	0.00019	0.0074	0.017	0.0049	0.0052
2024	0.00015	0.010	0.015	0.0024	0.0033

Table 9: Annual Average Radium-226 Concentration (Bq/L) in Effluent from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	0.008	0.04	0.01	0.05	0.007
2015	0.01	0.065	0.007	0.07	0.006
2016	0.007	0.082	0.007	0.05	0.006
2017	0.007	0.061	0.007	0.07	0.006
2018	0.006	0.079	0.006	0.07	0.006
2019	0.008	0.051	0.006	0.09	0.006
2020	0.007	0.049	0.006	0.039	0.01
2021	0.007	0.029	0.006	0.017	0.01
2022	0.008	0.025	0.006	0.019	0.014
2023	0.008	0.051	0.005	0.011	0.01
2024	0.008	0.044	0.006	0.01	0.01

Table 10: Annual Reportable Environmental Spills for Five Operations from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	3	1	4	1	2
2015	10	0	2	1	6
2016	5	1	2	1	8
2017	5	2	1	3	3
2018	5	2	1	5	4
2019	3	4	1	8	0
2020	0	0	0	2	4
2021	4	0	4	4	5
2022	2	0	0	5	2
2023	7	1	0	3	2
2024	2	2	0	2	2

Table 11: Summary of Reportable Environmental Spills in 2024

No.	Operation	Spill Description
1	Cigar Lake	2023 to May 24, 2024, a compressor lost its entire 310-pound change of R134A refrigerant. The valve was replaced and the system tested prior to being recharged.
2	Cigar Lake	October 25, 2024, MasterRoc SA 160 tote punctured with forklift resulting 50 Ls onto the ground and the contaminated soil was collected for disposal. An additional 50 Ls leaked from the tote into secondary containment. Procedures for moving reagents from the warehouse to the underground mine was reviewed.
1	Key Lake	March 12, 2024, approximately 100 m^3 of treated effluent was released from the industrial water pipeline underground. Soil and water samples were collected and analyzed. Contaminated materials were deposited in the Key Lake Operation Above Ground Tailing Management Facility (AGTMF). Corrective actions are still being implemented and reviewed by CNSC staff.
2	Key Lake	April 27, 2024, likely due to an ice blockage a drain hose ruptured while draining water containing residual ammonia resulting in ammonia vapor being released to the Vaporized Building then vented to the atmosphere. Corrective actions included replacing the ruptured hose with a specialized hose designed for this task. CNSC staff reviewed and accepted Cameco's corrective actions.
3	Key Lake	May 3, 2024, approximately 150 m^3 of treated industrial water was released to the ground from pipeline due to a cracked valve inside an access hole. The leaking valve was isolated to stop the leak and will remain isolated until repairs can be completed. Water and soil samples were collected from the discharge area. CNSC staff reviewed and accepted Cameco's corrective actions.
4	Key Lake	November 26, 2024, approximately 8 m3 of contaminated water overflowed from the crushing and grinding facility sump to the ground following a power outage. Laboratory analysis completed of liquid samples and soil samples from the discharge area had elevated levels of uranium and radium-226. Contaminated materials were removed and disposed of in the Key Lake Operation AGTMF. CNSC staff reviewed and accepted Cameco's corrective actions.
5	Key Lake	December 27, 2024, Cameco reported an increase in seepage flow rates from reservoirs #1 and #2 to the underdrain system. This event was reclassified as a reportable discharge due to the potential impacts to surrounding groundwater. Laboratory analysis completed on groundwater samples did not indicate a change in historical water quality. Corrective actions are still underway including ongoing monitoring and a geotechnical review of the reservoir facility.
1	McArthur River	June 20, 2024, approximately 170 m^3 of industrial water was released to ground from the industrial water tanks. A valve on discharge line was set to manual and was closed, causing water to continue to flow to the industrial tanks and overfill. Laboratory analysis completed on a composite water sample from the dam on June 20, 2024, was of good quality and met the Saskatchewan Environmental Quality Guidelines. The automatic valve on the discharge to environment line was switched to open and the water was diverted to the environment at the approved discharge point. The corrective actions included the creation of new logic in the Distributed Control System for when the valve is closed or in an alarm state and the industrial water tank levels are above 96%, the pumps will shut down automatically to prevent overfilling. CNSC staff reviewed and accepted Cameco's corrective actions.
2	McArthur River	November 4, 2024, venting from the Air Liquide Argon Tank outside of the Chem Lab area caused by a failed diverter valve on the safety release assembly. The vendor was brought to site and the issue was rectified.

1	McClean Lake	February 13, 2024, approximately 3 m^3 of yellowcake slurry solution was spilled due to a leak in the cone valve at the base of the yellowcake thickener. Orano implemented corrective actions that included: pumping the yellowcake solution back into the Precipitation circuit, removing contaminated solution/soil for disposal into the Sue C contaminated landfill, and the cover for the excavated area was improved and redesigned to keep liquids out of the excavation area in the event of another spill. CNSC staff reviewed Orano's 21-days follow up report and are satisfied with corrective actions implemented.
1	Rabbit Lake	September 25, 2024, workers were clearing vegetation and sediment around the perimeter of the lined mine water pond by pulling a cable to avoid damage to the liner. Sediment and vegetation were strongly affixed to the liner resulting in the liner lifting at 1 point and a welded seam separated creating an exit for water in the liner. The mine water pond water levels were drawn down to expose the damaged seam. The damaged area was isolated from the rest of the pond and released water was recovered. Repairs to the liner were completed by a qualified third party prior to the mine water pond returning to service. The corrective actions were reviewed and accepted by CNSC staff.

Table 12: Annual Average Arsenic Concentration (mg/L) in Effluent from 2014 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2014	0.003	0.0013	0.0056	0.007	0.0005
2015	0.0439	0.0029	0.004	0.006	0.0034
2016	0.0919	0.0011	0.0025	0.007	0.016
2017	0.075	0.0012	0.001	0.008	0.026
2018	0.0603	0.0009	0.0009	0.008	0.03
2019	0.0952	0.0009	0.0009	0.0075	0.058
2020	0.0627	0.0001	0.0090	0.0113	0.036
2021	0.0649	0.0001	0.0012	0.0109	0.044
2022	0.108	0.0001	0.00009	0.0019	0.0521
2023	0.0921	0.0002	0.0003	0.0034	0.0457
2024	0.0567	0.0003	0.00091	0.0037	0.0177

Table 13: Ambient Radon in Air (Bq/m^3) from 2019 to 2024

Year	Cigar Lake	McArthur River	Rabbit Lake	Key Lake	McClean Lake
2019	8.6	10.4	6	10.5	17.4
2020	9.8	9.5	14.6	12.2	9.5
2021	11.2	20.5	20.8	14.8	18.1
2022	10.9	10.8	19.3	6.9	17.9
2023	10.7	15.4	27.9	17.1	17.5
2024	10.8	13.1	10.3	13.6	16.8