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Oral presentation

Written submission from the Athabasca Chipewyan First Nation

In the Matter of the

Cameco Corporation, Beaverlodge Project

Application for the Licence Revocation and Transfer of Properties to Saskatchewan Institutional Control Program

Commission Public Hearing

January 30, 2025

Exposé oral

Mémoire de la Première Nation des Chipewyan d'Athabasca

À l'égard de

Cameco Corporation, le projet de Beaverlodge

Demande de révocation de permis et de transfert de propriétés au programme de contrôle institutionnel de la Saskatchewan

Audience publique de la Commission

30 janvier 2025

Canada

Written Submission from

Athabasca Chipewyan First Nation

In the matter of:

Application to release the final set of decommissioned Beaverlodge mine and mill site properties from CNSC licensing for acceptance into Saskatchewan's Institutional Control Program, resulting in the revocation of its waste facility operating licence

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Section 1: Introduction

1.1 Executive Summary

1. Athabasca Chipewyan First Nation ("**ACFN**") provides these submissions in response to the above-named matter from Cameco Corporation ("**Cameco**").
2. For reasons explained in this submission and in our supporting documents, ACFN does not support Cameco's application to release properties currently associated with the Beaverlodge mine and mill site ("**Beaverlodge**") from Canadian Nuclear Safety Commission ("**CNSC**") licensing to transfer them to the Government of Saskatchewan (the "**Province**")'s Institutional Control Program ("**ICP**").
3. The following submission briefly summarizes ACFN's key concerns regarding Cameco's application. Based on a review of Cameco's application materials that have been conducted with the assistance of technical advisors, it is clear that the Beaverlodge properties are not yet ready to be released from CNSC licensing and further work is required by the Applicant before the Beaverlodge properties can be transferred to the ICP.
4. We further refer the Commission to the attached technical reviews for additional details and technical recommendations:

    Appendix A: Monique Dube, *Technical Review of Cameco Corporation Application- Beaverlodge Mine Decommissioning* (the "**Dube Review**").[1]

    Appendix B: Megan Thompson, *Technical Review of Cameco Corporation's Beaverlodge Mine Sites Request to Revoke the Current Licence and Release Project*

[1] Monique Dube, "Technical Review of Cameco Corporation Application- Beaverlodge Mine Decommissioning" (1 December 2024) Cumulative Effects Environmental Inc **("Dube Review")**

to the Institutional Control Program - surface water quality and aquatic ecosystems (the "**Thompson Review**").[2]

Appendix C: Towagh Behr, *Re: Decommissioned Beaverlodge Properties Long-Term Monitoring Plan* (the "**Behr Review**").[3]

Appendix D: Mandy Olsgard, *Cameco Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program – Health Risk and Toxicology Review* (the "**Olsgard Review**")[4]

5. ACFN further intends to participate in the hearing on January 30, 2025 and will make an oral presentation in support of our submissions.

1.2 Background

6. Beaverlodge operated from 1952 to 1982 in northwestern Saskatchewan, near Uranium City. It is located within the traditional territory of the Denesoline, and was built and operated without the consent or involvement of ACFN and other First Nations who have resided on these lands since time immemorial. We have since been subject to the risks associated with the Project on both our health, and on our Aboriginal and treaty rights.
7. Beaverlodge was operated by a federal Crown Corporation known as Eldorado Mining and Refining Limited ("Eldorado") between 1952 and 1982. Reflecting the inadequate environmental regulatory framework that was in-place at the time, the mine and mill operated without proper procedures to ensure the protection of the natural environment. Mill tailings were placed in naturally occurring waterbodies, but the treatment of mine

[2] Megan Thompson, "Technical Review of Cameco Corporation's Beaverlodge Mine Sites Request to Revoke the Current Licence and Release Project to the Institutional Control Program - surface water quality and aquatic ecosystems" (26 November, 2024) Thompson Aquatic Consulting. (**"Thompson Review")**

[3] Towagh Behr, "Re: Decommissioned Beaverlodge Properties Long-Term Monitoring Plan" (11 December 2023) Kwusen Research & Media. ("**Behr Review")**

[4] Mandy Olsgard, "Cameco Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program –Health Risk and Toxicology Review" (10 December 2024) Integrated Toxicology Solutions Ltd. **("Olsgard Review")**

water and water exiting the tailing management area did not commence until 1971 and 1976, respectively. Decommissioning did not begin until the site closed in 1982.

8. As a result, at least 5,800,000 tonnes of tailings have been deposited into waterbodies that are a part of the Fulton Creek Watershed. Leaving the residual tailings *in situ* was deemed to be preferred to removing or capping the tailings, as those actions would have resulted in even greater environmental damage.[5]
9. Cameco is the current operator and CNSC licensee for the mine site. Of the nearly 70 separate properties on the Beaverlodge site area that were under the original licenses, only 43 properties have been released from CNSC licensing. Many of the released properties have been transferred into the Institutional Control Program operated by the Province of Saskatchewan.

1.3 Current Regulatory Process

10. 27 properties remain within the CNSC-issued licence. These sites make up the former mill site, open pits, tailings- management areas and underground mine features of the Eldorado uranium mine, and other historical uranium mining operations. Cameco has applied for the release of these remaining properties, and licence revocation so they can be transferred to the ICP or free-released.
11. In 2014, CNSC staff presented the Commission with the Performance Objectives and criteria necessary to determine the eligibility of a Beaverlodge site to be released from CNSC licensing and, where appropriate, transfer to the ICP. The Performance Objectives for all Beaverlodge licensed properties are that they are safe, secure, and stable/improving. Safe and secure refers to the land, whereas stable/improving is in reference to water quality:
    A. Safe - The site is safe for general public access. This objective is to ensure that the long-term safety is maintained.

[5]Dube Review s 3.1.

B. Secure - There must be confidence that long-term risks have been assessed by a qualified person and are acceptable.

C. Stable/Improving - Environmental conditions (e.g. water quality) on and downstream of the decommissioned properties are stable and continue to naturally recover as predicted.

12. To determine if a property is meeting the performance objectives, certain site-specific performance indicators that have been accepted by the Commission have to further be met.[6] While those indicators and the corresponding management framework have not been reproduced in this submission, they have been considered during ACFN's review of Cameco's application.

1.4 Athabasca Chipewyan First Nation

13. ACFN are a Denesoline people known as the K'ai Taile Dene, meaning "people of the land of the willow," a reference to the delta of the Peace and Athabasca Rivers.
14. Beaverlodge is located within ACFN's traditional territory. and many of ACFN members come from, reside in, and exercise their Treaty rights within, this region. ACFN has identified over 30 different traditional land-use sites that are located within 10 kilometers of the Beaverlodge properties. Of those sites, the six have been identified as being located within Beaverlodge's footprint.[7]
15. Beaverlodge continues to have significant impact on ACFN's ability to exercise our Aboriginal and treaty rights. As outlined in previous submissions, ACFN members observed the impacts of the mine and its tailings long before the CNSC.[8] Our Elders have stated that once the mine was put in place, we could no longer eat fish from nearby lakes as they

[6] See: Canadian Nuclear Safety Commission, *Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program* (3 October 2024) p 15-17.

[7] Letter from Timothy Bebeteidoh, Athabasca Chipewyan First Nation to Kristin Cuddington, Cameco Corporation (20 August 2023) *Re: Decommissioned Beaverlodge Properties: Feedback on Traditional Land Use Activities*.

[8] Athabasca Chipewyan First Nation, oral presentation, Canadian Nuclear Safety Commission, *In the Matter of the Cameco Corporation, Beaverlodge Project: Application to amend its licence to allow release of 18 Beaverlodge Project properties from CNSC licensing* (24 March 2022), CNSC file no.: CMD 22-H5.13 at 17:32-18:03.

started to "taste like gas," caribou vacated historic habitats, and ACFN trap lines were removed from the area without our permission.[9]

16. ACFN continues to live in the shadow of fish and water consumption moratoriums and advisories. As observed by our Elders and corroborated by independent experts, water from Beaverlodge Lake flows to Athabasca Lake via Martin Lake, Cinch Lake, Crackingstone River, and Crackingstone Bay.[10]
17. Accordingly, ACFN's rights have and continue to be impacted, our ways of life remain disrupted, and our present and future generations have a deep and sustained interest in how the Beaverlodge properties are managed. ACFN has relied on and cared for this region since long before settlers arrived, before Beaverlodge was established, and before our lands were poisoned by projects that were started without our consent. Our people, our lands, and our natural resources ultimately bear the brunt of the impacts from projects that were commenced without our consent, and are now before the CNSC.

1.5 The Duty to Consult and Accommodate

18. As has been affirmed by the Supreme Court of Canada ("SCC") on several occasions, the Duty to Consult and Accommodate ("DTCA") is an essential component of section 35 and is key in fostering reconciliation between Canada's Indigenous peoples and the Crown.[11]
19. Regulatory bodies, such as the CNSC, that exercise final decision-making powers play a significant role in ensuring that the DTCA owed to Indigenous peoples is honourably discharged as their contemplated decision would amount to Crown conduct. [12] As a result, in situations where deep consultation is required, and Indigenous peoples have made their

[9] Athabasca Chipewyan First Nation, oral presentation, Canadian Nuclear Safety Commission, *In the Matter of the Cameco Corporation, Beaverlodge Project: Application to amend its licence to allow release of 18 Beaverlodge Project properties from CNSC licensing* (24 March 2022), CNSC file no.: CMD 22-H5.13 at 17:32-18:03.
[10] Behr Review at p 5.
[11] *Clyde River (Hamlet) v. Petroleum Geo-Services Inc.*, 2017 SCC 40 at para 1.
[12] *Chippewas of the Thames First Nation v. Enbridge Pipelines Inc.*, 2017 SCC 41 at paras 29-37 and *Clyde River (Hamlet) v. Petroleum Geo-Services Inc*, 2017 SCC 40 at paras 31-34.

concerns known, the honour of the Crown further requires the CNSC to explain how it considered and accommodated those concerns.[13]

20. Because of the past, present and future impacts of Beaverlodge on ACFN rights, the duty owed to ACFN is on the deepest end of the consultation spectrum. CNSC is accordingly obligated to ensure that ACFN is fully consulted and accommodated in respect to the present applications.

Section 2: Key Concerns Regarding The Application

2.1 Contamination In Waterbodies

21. At least 5,800,000 tonnes of tailings were deposited into waterbodies associated with the Tailings Management Area ("TMA"), including the Fookes Reservoir, Marie Reservoir and Minewater Reservoir. As a result, nearby waterbodies now contain a number of contaminants including radium and selenium, the effects of which are briefly described below:

    A. **Radium:** Exposure to higher levels of radium over a long period can lead to death and other severe health problems. High levels of radium can cause cancer (especially bone cancer), anemia, (a problem with the blood), fractured teeth and cavities, and growths in the eyes called cataracts. Oral exposure to uranium will cause cancer in humans or animals. and chronic exposure to uranium in drinking water may affect the kidneys.

    B. **Selenium:** Selenium is a naturally occurring trace element in the environment that is nutritionally required in small amounts but it can become toxic at concentrations at higher levels. Selenium is strongly bioaccumulated by aquatic organisms and even slight increases in waterborne concentrations can quickly result in toxic effects such as deformed embryos and reproductive failure in wildlife.[14]

[13] *Clyde River (Hamlet) v. Petroleum Geo-Services Inc.*, 2017 SCC 40 at para 42.
[14] Dube Review s 3.0.

22. Before the Beaverlodge properties are transferred to ICP, it is important for the CNSC to ensure that these contaminants have been sufficiently managed and mitigated. This responsibility is key to ensuring that the CNSC fulfils its responsibilities under both the DTCA, and also as the regulator tasked with ensuring Beaverlodge does not cause unreasonable risks to the environment and to the health and safety of persons.[15]
23. As established below, the contaminants are not yet sufficiently managed and mitigated by Cameco, and the sites are not ready to be released.

2.1(a) *Radium Concentrations Are Still Increasing*

24. One key parameter related to the Performance Objectives is that the surface water quality, as represented by the concentrations of three parameters (selenium, uranium and radium-226), must fall within certain predictive model simulations.
25. None of the monitoring records for the sites associated with the Fookes Reservoir, Marie Reservoir, Minewater Reservoir, or Lower Ace Creek Reservoir properties appear to have met the radium-226 performance objectives. In some of the monitoring locations, the concentrations of radium-226 are still increasing and threaten to overshoot the performance objective range entirely.[16]
26. The concerns with this approach are summarized by the Olsgard Review, which notes:

> "It is scientifically indefensible to consider natural attenuation an appropriate remediation strategy when sources of contamination left in place are predicted to continue deteriorating environmental conditions for over 100 years. As a result, human health and ecological risks related to radium-226 do not yet appear to have been managed to acceptable levels." [17]

[15] *Nuclear Safety and Control Act*, SC 1997, c 9, s 9
[16] Thompson Review p 8.
[17] Olsgard Review p 15.

2.1(b) *The Saskatchewan Environmental Quality Guidelines Have Not Been Met*

27. Cameco asserts that the water quality at the Beaverlodge properties have been managed to acceptable levels. However, at four of these monitoring locations, the concentrations measured in surface water are orders of magnitude above the guidelines found in the Saskatchewan Environmental Quality Guideline (SEQG).[18] The most notable exceedances are related to Radium 226 and Uranium, which exceed the SEQG by up to 17 times the safe level for Ra-226 and 25 times the safe level for Uranium at certain site properties.[19]
28. The monitoring locations where these exceedances have been noted include the Fookes Reservoir Properties, the Marie Reservoir Properties, the Minewater Reservoir Area, and Bolger 1 (which also exceeds national guidelines for surface water protection and drinking water guidelines).[20]
29. Cameco states that it did not apply the SEQG because the relevant properties are within the TMA, and instead proposes to adopt a lower standard.
30. ACFN does not accept this approach, and submits that it should be rejected by the CNSC. As noted in the Dube Review:

> *"It is unclear why an environmental water quality guideline for the protection of aquatic life would not apply to demonstrate a site is safe and will not affect environmental or human health especially in the context of removing a license that assures such protection. It is not sound rationale to claim a TMA is environmentally safe and yet fails to meet environmental protection guidelines."*[21]

31. The same concerns are cited in the Olsgard Review, which also correctly notes that the SEQGs are legally binding standards when referenced in legislation, regulations, permits, or in the Saskatchewan Environmental Code.[22]

[18] Thompson Review p 9.
[19] Thompson Review p 9.
[20] Dube Review s 5.0.
[21] Dube Review s 5.0.
[22] Olsgard Review p 13.

32. Accordingly, before a site is released to the province, it is imperative for the CNSC to ensure that the SEQGs will be achieved. This requires Cameco to take additional steps to remediate the site to bring it into compliance with the SEQGs.

2.2 Concerns Regarding Country Food

33. Cameco submits that country food consumption can safely continue in the Beaverlodge properties if the water and fish consumption guidelines are followed.[23]
34. The consumption guidelines referenced by Cameco recommend limited consumption from certain water bodies, and no consumption from others, including several waterbodies within the properties that are part of the current application. ACFN disagree with this approach. As correctly noted in the Dube Review, "in the context of Rights and the practice of Rights by Indigenous Peoples, the use of consumption advisories for water and fish is a violation of Rights in and of itself".
35. In addition to the infringement of ACFN rights that would result from Cameco's proposals, we note that Cameco's methodology for measuring and monitoring contamination within country foods is also flawed, as further noted below.

2.2(a) *The Baseline Analysis To Evaluate Safe Consumption Of Food Is Incorrect*

36. To support their conclusions concerning the "safe consumption" of contaminated country foods, Cameco has used a comparative analysis of samples to "natural background," and invites the CNSC to conclude that that contaminant concentrations are "similar to baseline levels and regional reference ranges." However, the baseline data referenced by Cameco it is based on fish monitoring from 2023. This 'baseline' represents 71 years of uranium operations on our traditional territory, and is not 'natural background'. It is the result of

[23] Cameco Corporation, *Application for the Licence Revocation and Transfer of Properties to Saskatchewan Institutional Control Program* (10 October 2024) s 4.4.1.

extensive and ongoing contamination, and is not an acceptable or defensible baseline to evaluate the safe consumption of food.[24]

2.2(b) ***The Monitoring Timelines For Fish Does Not Allow For Adaptive Management***

37. ACFN's experts agree that invertebrates are a key vector for contaminants to spread across lake ecosystems, and testing fish that consume invertebrates can help track the spread of contamination across different lakes within the impacted region. However, Cameco is only proposing to do such sampling only once in ten years.
38. As highlighted in the Olsgard Review, this will be insufficient to allow for adaptive management. Delayed detection and delayed management responses are likely to result impacts on human health in the face of ongoing contamination.[25]
39. Adequate monitoring in the face of known risks is a best practice. The CNSC should not permit substandard monitoring to occur.

2.2(c) ***Exposure Pathways Need To Be Better Evaluated***

40. ACFN further notes that Cameco's current evaluation and monitoring criteria do not properly account for all exposure pathways related to ACFN members and other Indigenous traditional land use users. For example, it does not include consumption advisories and tissue residue limits for highly valued and consumed semi-aquatic medicinal plants, such as wild mint, and wildlife, such as moose, which may accumulate contaminants through direct contact with surface water, sediments, and other prey which have been exposed to the ecosystem.[26] Before release of the Beaverlodge sites is contemplated by the CNSC, this issue must be adequately addressed.
41. Cameco's approach for evaluating the safety of country foods for the purposes of a release into the ICP needs to be revisited. Under Cameco's current approach, an unacceptable

[24] Dube Review, s 4.2.
[25] Olsgard Review p 9.
[26] Thompson Review p 9.

number of risks would be downloaded onto Indigenous land users, including ACFN members, who are exercising Aboriginal and treaty rights. This cannot be permitted, and must be addressed.

2.3 Concerns With Modeling Data

42. According to the documents provided by Cameco, the measured uranium concentrations are exceeding the modeled Performance Objectives at the Bolger 1 property. Cameco has attempted to explain these high concentrations by stating that these concentrations are related to "low flow conditions" and states that they will normalize. However, this is a justification, not an explanation. It should be expected that the modeling used to create the performance objective ranges should have incorporated the effects of low and high flows on water quality, including variability caused by climate change, but it failed to do so.[27]
43. More than half of observed concentrations that overlap the modeled time period meet or exceed the modeled 95th percentile in the modeled ranges. This indicates that the model is not accurate. As summarized in the Thompson Review, the "explanation for the observed uranium concentrations provided by Cameco and accepted by CNSC is therefore inadequate and actually calls into question the accuracy of the modeled performance objectives."[28] As details related to modeling have been kept confidential, ACFN has been unable to review these models independently.[29]

2.4 The Adaptive Management Plan Needs To Be Reviewed

44. If the decommissioned properties are transferred to the ICP, the Province will be responsible for continuing with routine monitoring and maintenance activities to ensure the performance objectives continue to be met. This will include implementing adaptive

[27] Thompson Review p 8.
[28] Thompson Review p 8.
[29] Thompson Review p 8.

management scenarios that are based on predictive models for the next 277 years. However, the plan does not sufficiently address what will happen if the predictions are not accurate.[30]

45. The onus is on the CNSC as the regulator to ensure that predictive modelling correlates with observed data before accepting modelling results. ACFN's concerns related to the reliability of the predictive models currently being used by Cameco must be addressed.[31] This must occur before the Beaverlodge properties are released to ensure that the predictions on which the Adaptive Management Plan are valid before the properties can be released into the ICP.[32]

Section 3: Conclusions

46. It is a fact that Denesoline lands have been poisoned. ACFN elders fear that the lands will never regain the purity that existed before current activities were undertaken.[33] This fear is grounded in our experience of regulatory failures. We know that the Beaverlodge site will be a source of contamination for centuries to come. ACFN's members have already lost their ability to exercise their rights in many of the lakes on the Beaverlodge property as a consequence of contamination, and we continue to experience the impacts of environmental advisories and moratoriums. All of this occurred without consultation or consent.
47. The CNSC is required as a matter of law to ensure that further harms to our Aboriginal and Treaty rights will not occur as a result of the release of these properties from CNSC control.[34] CNSC has a duty to ensure that proper accommodation occurs. CNSC must ensure that Cameco remains responsible and accountable for ensuring that the

[30] Dube Review s 4.3.
[31] Thompson Review p 8.
[32] Dube Review s 4.3.
[33] Athabasca Chipewyan First Nation, oral presentation, Canadian Nuclear Safety Commission, *In the Matter of the Cameco Corporation, Beaverlodge Project: Application to amend its licence to allow release of 18 Beaverlodge Project properties from CNSC licensing* (24 March 2022), CNSC file no.: CMD 22-H5.13 at 17:32-18:03.
[34] *Nuclear Safety and Control Act*, SC 1997, c 9, s 9

contaminants deposited on our traditional territory are properly monitored and managed, and to not release the Beaverlodge properties from CNSC oversight until there is well-supported evidence that this will occur.

48. For the above reasons, ACFN is strongly opposed to the release of the Beaverlodge properties from CNSC licensing or transfer of such properties to the ICP. The attached technical reports provide additional details, questions and recommendations for the Commission's review.

Appendix A

Dube Review

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Cumulative Effects Environmental Inc
Finding the Balance

TECHNICAL MEMO

To: Timothy Bebeteidoh, Regulatory and Environmental Advisor, Athabasca Chipewyan First Nation

From: Dr. Monique Dube, Cumulative Effects Environmental Inc

Subject: Technical Review of Cameco Corporation Application- Beaverlodge Mine Decommissioning

Date: December 01, 2024

1.0 Introduction

At the request of Athabasca Chipewyan First Nation (ACFN) a technical review was prepared for the Canadian Nuclear Safety Commission (CNSC) public hearing to consider an application from Cameco Corporation (Cameco) for the release of the final set of decommissioned Beaverlodge mine and mine site properties from CNSC licensing for acceptance into Saskatchewan's Institutional Control Program (ICP).

Two submissions were reviewed:

1) E-DOCS-#7240287-v3-CMD_25-H3 Submission from CNSC Staff on Cameo Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project Licence to the Institutional Control Program.

2) E-DOCS-#7381117-v1-CMD_25-H3_1 Submission from Cameco Request to Revoke Licence and Release Beaverlodge Project to Saskatchewan Institutional Control Program.

2.0 Context

2.1 ACFN

Athabasca Chipewyan First Nation (ACFN) are an Athabascan-speaking people who call themselves, K'ai Taile Dene, meaning "people of the land of the willow", a reference to the delta of the Peace and Athabasca Rivers. ACFN's traditional territory is located in the Lower Athabasca Region of northeast Alberta and includes all the Delta of the Peace and Athabasca Rivers around Lake Clare and Fort Chipewyan extending into Northwestern Saskatchewan. ACFN's rights, culture and way of life are protected by the Treaty.

ACFN members actively exercise Treaty rights on their traditional lands and carry out traditional activities, as their ancestors have for generations.

Decommissioning of the Beaverlodge mine and associated properties must consider the impact of these properties on ACFN and the long-term, multi-generational consequences to ACFN members and practice of their Rights on their traditional lands.

2.2 Beaverlodge Mine

The Beaverlodge mine and mill site, which operated from 1952 to 1982, is located in northwestern Saskatchewan, near Uranium City situated within historic Treaty 8 and the traditional territories of the Dene, Cree and Métis peoples. Uranium City, with a population of 91, is the only community with year-round access to the decommissioned Beaverlodge properties and is located approximately 8 km to the west. The closest First Nation community is Fond-du-Lac, approximately 80 km east of Uranium City. Fort Chipewyan is situated approximately 179 km to the south-west in Alberta, across Lake Athabasca.

Cameco is the operator and the CNSC licensee for the mine site. Originally, there were 70 separate properties on the Beaverlodge site area. To date, 43 properties have been released from CNSC licensing and either transferred into the province's Institutional Control Program (ICP) or free released depending on the presence of historical mining/milling activities. Clean-up and decommissioning began when the site closed in 1982.

There are now 27 properties remaining within the CNSC-issued licence. Cameco has applied for the release of these remaining properties, and licence revocation.

3.0 Technical Review

The objective of this technical review was to determine if the Cameco application to decommission the remaining properties for this site posed a risk, with specific focus on ACFN.

There are some harsh realities associated with decommissioning uranium mining properties, not the least of which is understanding that historical practices failed to consider present day consequences. For example, historically mill tailings from this operation were placed in nearby naturally occurring waterbodies, with active treatment of mine water and water exiting the tailings management area not being initiated until the early 1970's, approximately 12 years after operations commenced. While these historical practices may have complied with regulatory direction at the time, the impacts and risks of these practices to environmental and human health are much better understood now than they were contemplated then.

Completion of decommissioning activities at Beaverlodge occurred in 1985 relative to several decommissioning objectives (i.e., safe, and stable condition, buildings and structures removed or dismantled, mine openings permanently sealed, physically and radiologically safe and secure, acceptable water quality). Recovery of waterbodies is stated as "naturally occurring" over an extended period. Residual risks with respect to the "naturally recovering environmental conditions in waterbodies" on and

downstream of the decommissioned Beaverlodge properties are managed through the issuance of a Healthy Fish Consumption Guideline by the Saskatchewan Health Authority (SHA) and SkMOE. This guideline provides recommendations to the public regarding consumption of fish and water from Beaverlodge, Martin and Cinch Lakes, as well as other waterbodies associated with the Beaverlodge properties.

The Beaverlodge Management Framework provides the scope for the management of the decommissioned Beaverlodge properties and a risking process against criteria to determine if the properties are of suitable condition to be transfer to the IC Program. There are 5 stages to the Framework with the most notable being to implement remedial options and monitor results and "if the implemented options are successful in achieving the expected benefit or if it is determined that nothing more could reasonably be done to mitigate the residual risks(s) beyond natural recovery, then an application will be made to transfer the property to the IC program."

Cameco's application goes on to state that "none of the options assessed during development of the Path Forward were predicted to significantly accelerate the natural recovery of downstream impacted waterbodies, such as Beaverlodge, Martin or Cinch Lakes."

The criteria or performance objectives Cameco uses to determine the eligibility for release from CNSC licensing are:

- Safe – The site is safe for unrestricted public access. This objective is to ensure that long-term safety is maintained.
- Secure – There must be confidence that long-term risks to public health and safety have been assessed by a qualified person and are acceptable.
- Stable/Improving – Environmental conditions (e.g., water quality) on and downstream of the decommissioned properties are stable and continue to naturally recover as predicted.

These are measured by assessing acceptable gamma levels, plugging boreholes, ensuring mine openings and crown pillars are stable, and the site is free from debris. Water quality is also measured to determine if parameters are within modelled predictions (more on this below). This performance indicator applies to five water quality monitoring and three parameters, radium-226, uranium and selenium. If existing water quality conditions are shown to be within the range predicted by the model, then the performance indicator is met for that station and for the associated decommissioned properties.

We are assuming many other parameters have been measured over time but are not reported in the Cameco application given the focus on the performance indicators, which are extremely limited. We are also assuming that the trophic transfer of parameters including selenium which is known to transfer through food webs affecting fish reproduction for example have been thoroughly investigated. But again, nothing was reported in the application.

Exposure to higher levels of radium over a long period can lead to death and other severe health problems. High levels of radium can cause cancer (especially bone cancer), anemia, a problem with the blood; fractured teeth and cavities, and growths in the eyes called cataracts. Oral exposure to uranium will cause cancer in humans or animals and chronic exposure to uranium in drinking water may affect the kidneys.

Selenium is a naturally occurring trace element in the environment that is nutritionally required in small amounts but it can become toxic at concentrations at higher levels, The narrow margin between beneficial and harmful levels has important implications for human activities that increase the amount of selenium in the environment, Selenium is strongly bioaccumulated by aquatic organisms and even slight increases in waterborne concentrations can quickly result in toxic effects such as deformed embryos and reproductive failure in wildlife.

Cameco monitors the progress of natural recovery and the expected localized improvements from the additional remedial measures implemented at the properties to determine if human health and ecological risks are managed to acceptable levels to allow for a release from licensing.

Cameco conducted a review of the performance indicators for each of the 27 decommissioned properties that are the subject of this application and has concluded that the current condition of the 27 decommissioned properties demonstrates that the properties meet the performance objectives and pose minimal risk to public safety or the environment. Any residual risk they conclude can be managed through advisories for drinking water and fish consumption. They go on to conclude that "As such, it is anticipated that the properties will support traditional activities, such as hunting/gathering of country foods and collection of firewood."

Cameco asserts that based on their modelling, concentrations of these parameters in the Ace Creek Watershed, Fulton Creek Watershed, and downstream are generally expected to gradually improve in the future with the exception of radium-226 in the Tailings Management Area (TMA). Radium-266 concentrations in the TMA and downstream Beaverlodge Greer Lake are expected to continue to increase for the next 15 to 60 years (depending on the waterbody) due to the release of historically precipitated radium from sediments. They go on to state that these impacts are localized and are not expected in the downstream environment.

3.1 Tailings Management Area

Over the lifetime of the Beaverlodge mill, 10,109,605 tonnes of tailings were produced with ~ 5,800,000 tonnes deposited within the TMA. The TMA consists of a number of water bodies in the Fulton Creek Watershed including Fookes Reservoir, Marie Reservoir and Minewater Reservoir. In addition to tailings, Minewater Reservoir and an additional impoundment, Meadow Basin, also received precipitates generated from water treatment activities. Essentially natural water bodies were used to deposit tailings and precipitates over the lifespan of the mine.

When the implications of this were more fully understood, an assessment was done to determine if tailings removal was possible. A decision was made to leave the residual tailings in situ, it was because the disturbance associated with removal or covering of the tailings would have resulted in greater environmental damage. This is a telling statement.

Fookes Reservoir Properties

The Fookes Reservoir Area consists of 12 licensed properties covering 180.4 hectares including the Fookes Reservoir, the Fookes tailings delta, and the Fookes Outlet. Performance indicators related to gamma levels, plugging boreholes, ensuring mine openings and crown pillars are stable, and the site is free from debris were unremarkable for these properties based on the reports reviewed. Water quality at Fookes

Reservoir (Station TL-3) show Ra226 at between 0.8 – 1.8 Bq/L in 2020 with a large range of variability expected based on model predictions to 2300. Health Canada has just released a technical document updating the guidelines for radionuclides in drinking water which is under a 60-day consultation period (Health Canada 2025). The proposed maximum acceptable concentrations for radionuclides in drinking water, specifically Ra226 is 5 Bq/L. The Government of Saskatchewan (2017) applies an environmental quality guideline for 226Ra in surface water of 0.11 Bq/L. The levels at TL-3 are below Health Canada drinking water guidelines but above surface water guidelines in SK. CNSC states "As this station is located with the TMA, Cameco has not compared the results to SK Environmental Quality Guideline of 0.11 Bq/L". If the properties are being decommissioned and are assumed to be safe and protective, then why would there be selective application of environmental guidelines? CNSC explains, "Cameco anticipates that once a more stable flow regime returns that radium-226 concentrations will be within the expected upper bound. CNSC staff have accepted this interpretation, although it is important to note that radium-226 concentrations are predicted to rise for several more decades before they decline."

Based on Cameco's assessment, they conclude all performance criteria for the 12 decommissioned Fookes Reservoir properties have met, human health and ecological risks have been managed to acceptable levels and the properties should be considered for release from CNSC licensing and transfer into the IC Program.

Marie Reservoir Properties

The Marie Reservoir consists of nine licensed properties where ~ 170,000 tonnes of mill tailings were placed within the Marie Reservoir between 1954 and 1957. Mitigations over time have included moving tailings to deeper areas, covering with waste rock to control gamma radiation and to provide protection against direct contact with the tailings. Criteria have been evaluated. Water quality at Marie Reservoir (Station TL-4) show Ra226 below 2.25 Bq/L between now and 2040 based on modelling predictions. This level is below Health Canada proposed drinking water guidelines (5 Bq/L) but above surface water guidelines in SK (0.11 Bq/L). CNSC states "As this station is located with the TMA, Cameco has not compared the results to SEQG". Uranium concentrations decrease from 450 ug/L in 2009 to concentrations of approx. 275 ug/Lin 2025. This exceeds both the CCME guideline for long term exposure of surface water systems (1 ug/L) as well as Health Canada's drinking water guideline of 20 ug/L. Selenium levels are below 3 ug/L at this station again falling below drinking water guidelines of 50 ug/L but above national surface water guidelines of 1 ug/L. CNSC did not comment on the exceedance of Uranium or Selenium over guidelines.

Cameco states that the 9 decommissioned Marie Reservoir properties have met the performance objectives and should be considered for release from CNSC licensing and transfer into the IC program.

Minewater Reservoir Properties

The Minewater Reservoir Area consists of three licensed properties where ~ 101,000 tonnes of mill tailings were placed within the Minewater Reservoir between 1953 and 1954. After 1954 and until 1971, the Minewater Reservoir received mine slimes and sanitary wastes from underground. Between 1971 and 1982, the area was used for settling treated mine water precipitates, while continuing to receive sewage from the Fay underground mine.

Gama surveys show 2 of the 3 properties being considered for release meet criteria in this regard. However, a small area of the URA 6 property along the east flank of the reservoir exceeded the guideline.

A risk evaluation concluded that the incremental dose associated with the URA 6 property, and a reasonable land use scenario resulted in low risk.

RA226 in water at Meadow Fen (Station TL-7) currently measures at 2.25 Bg/L which is predicted to rise over time before falling through "natural" remediation. Again, this is above SK surface water guidelines of 0.11 Bg/L but below Health Canada's proposed drinking water guideline of 5 Bg/L. CNSC states "As this station is located with the TMA, Cameco has not compared the results to SEQG." Uranium is currently at ~150 ug/L and while predicted to continue to decrease over decades, is currently above CCME guidelines for surface water protection (15 ug/L) as well as above Health Canada drinking water guidelines (20 ug/L). Selenium is slightly below 2 ug/Lin 2023 which is above CCME guideline for long term exposure of 1 ug/L. CNSC did not comment on the exceedance of Uranium or Selenium over guidelines.

Cameco asserts in their application that the 3 properties of Minewater Reservoir have met the performance objectives for release from CNSC licensing and transfer into the IC Program.

3.2 Lower Ace Creek

The Lower Ace Creek area consists of two licensed properties (URA 1 and URA 7) where ~3,030,000 tonnes of waste rock from the Fay mine were deposited. For URA 1, performance criteria were met with only slight increases in water quality over guidelines for the parameters reported. Ra226 is currently between 0.03 – 0.08 Bq/L at AC-14 below drinking water (5 Bg/L) and surface water guidelines (0.11 Bq/L). Uranium concentrations currently range between 18-38 ug/L, slightly higher than surface water guidelines (15 ug/L) and drinking water guidelines (20 ug/L). Se at AC-14 is currently measured at 0.5 ug/L or less below national guidelines for the protection of freshwater aquatic life (1 ug/l).

At URA 7, where the majority of the mill related infrastructure existed during operations, showed some gamma radiation risk. Again, Cameco concludes that the incremental dose associated with URA 7 is acceptable based on measured gamma results and a reasonable land use scenario.

3.3 BOLGER 1

The BOLGER 1 property is located along the southeast shore of Verna Lake and contains the decommissioned Bolger open pit mine which operated intermittently between 1958 and 1980 and was the largest pit at the Beaverlodge site. Performance indicators were unremarkable with the exception of water quality based on the application submitted by Cameco. Water quality measured downstream of BOLGER 1 at outflow of Verna Lake (Station AC-6A) showed current concentrations of RA226 at 0.09 – 0.15 Bq/L, Uranium ranging between 200 – 400 ug/L and Selenium at 0.25 ug/L. Ra226 is close to or at surface water guidelines for SK, Se is below national surface water guidelines of 1 ug/L and drinking water guidelines of 50 ug/L. Uranium however is much higher than national surface water protection guidelines (15 ug/L) and above drinking water guidelines (20 ug/L). CNSC states "Due to low water flow conditions, only 2 samples were collected by Cameco in 2023, and the average uranium concentration was 252 ug/l whereas the upper bound was 249 ug/l based on interpolation of the predicted results between 2020 and 2040. Cameco indicated that the uranium concentrations will fall back into their modelled predictions once water flows return to normal. CNSC staff have accepted this explanation. The uranium concentrations in the next monitoring station downstream were below SEQG and continue to decrease.

Despite these exceedances, Cameco concludes that the decommissioned BOLGER 1 property has met the performance objectives, human health and ecological risks have been managed to acceptable levels, and the property should be considered for release from CNSC licensing and transfer into the IC program.

4.0 Other Items for Consideration

4.1 Indigenous Engagement

Cameco states that an Indigenous Engagement Report will be submitted to CNSC staff that summarizes the Indigenous engagement activities completed regarding this request for a licence decision. It is difficult to file an intervention informed by Rights Holders when engagement reports are not provided or linked to the application. Given the significance of Cameco's request and the long-term implications to the health, wellness and practice of Rights by communities, the engagement conducted by Cameco, and the response to that engagement, is critical for consideration and for transparency.

4.2 Impacts on Fish and Traditional Foods

The application briefly describes a risk assessment of traditional food samples stating that consumption of country foods does not present health risks to Uranium City residents, provided the fish consumption advisories in place are followed. It speaks of comparative analysis of samples to "natural background" and reports concentrations being "similar to baseline levels and regional reference ranges". This is language often left to interpretation as the practice of unbiased comparative analysis is so poorly understood.

For example, the application states that in response to input received through engagement with community members and rights holders, a fish monitoring program was completed in Beaverlodge, Martin and Cinch Lakes in 2023 to act "as a baseline for future comparisons of fish data". In no way is conducting fish monitoring in 2023, after 71 years of operation, a baseline.

Regardless, it is unclear if over the decision and regulatory management of this project if the use of water and food restrictions through consumption advisories was ever contemplated as an appropriate mitigation action. In the context of Rights and the practice of Rights by Indigenous Peoples, the use of consumption advisories for water and fish is a violation of Rights in and of itself.

"Residual risks with respect to the naturally recovering environmental conditions in waterbodies on and downstream of the decommissioned Beaverlodge properties are managed through a Healthy Fish Consumption Guideline issued by the SHA and SkMOE. This guideline indicates that members of the public can safely consume a total of five servings of lake trout/northern pike or two servings of white sucker/lake whitefish, per month, from Beaverlodge, Martin and Cinch Lakes. The guideline recommends avoiding the consumption of fish from Nero, Marie, Meadow, Minewater and Greer Lakes, and from lower Ace Creek (between Ace Lake and Beaverlodge Lake)."

"Therefore, living a traditional lifestyle and consuming country foods from the area, while respecting the water and fish advisories, can continue to be done safely".

4.3 Adaptive Management Concerns

If the decommissioned properties are transferred to the IC Program, SkMER will be responsible for continuing with routine monitoring and maintenance activities to ensure the performance objectives continue to be met. Essentially "the people" take over the this/these properties from the operator, Cameco. One consideration, given so much of the recovery of this site is predicted based on models running out for 277 years from today, as well as "natural remediation", is the accuracy of impact predictions and the process for triggering actions if monitoring shows the predictions are not accurate. For example, what happens if the decrease in radionucleotides and uranium takes far longer than predicted? Or what happens if cancer rates increase due to consumption of fish and waters in the area?

Long-term monitoring programs as proposed (Section 4.9.1 of the application) outline the adjustment of monitoring frequencies depending upon results. The surface water monitoring program follows a graduated approach, with the potential for reduced monitoring frequency if recovery is occurring as expected. Water monitoring is proposed every 3 years initially, with the potential to reduce monitoring to every 5 years if the performance indicators are being met after 15 years. The reliance on the current performance criteria is the basis for adaptive management as opposed to being inclusive to other unexpected consequences that might arise is concerning. The current performance criteria are very basic, have not all been met, and frankly, do not convince this reviewer that they are protective given the on-going exceedance of guidelines used nationally and provincially.

5.0 Conclusions

Based upon review of Cameco's application and CNSC's response, this reviewer is of the opinion that the following decommissioned properties should not yet be transferred to the ICP:

Fookes Reservoir Properties show Ra226 is above SK surface water guidelines. Cameco did not apply this guideline stating that it is within the TMA (Tailings Management Area). It is unclear why an environmental water quality guideline for the protection of aquatic life would not apply to demonstrate a site is safe and will not affect environmental or human health especially in the context of removing a license that assures such protection. It is not sound rationale to claim a TMA is environmentally safe and yet fails to meet environmental protection guidelines. If a more stable flow regime is needed for compliance, then this should be demonstrated for a reasonable period of time, especially under conditions of climate change before a license is removed. Expectations based on model projections is not sound rationale.

Marie Reservoir Properties also show Ra226 above surface water guidelines in SK. Cameco did not compare their results to this guideline stating that it was within the TMA. As stated above, for a site to be considered environmentally safe, it should be compared to environmental protection guidelines.

RA226 in water at Meadow Fen (Station TL-7) in the *Minewater Reservoir Area* is also above SK surface water guidelines although again, because it is within the TMA, Cameco did not compare the results to this protection guideline. U is also currently above CCME guidelines for surface water protection as well as above Health Canada drinking water guidelines. CNSC did not comment on the exceedance of U or Se over guidelines.

Finally, the *BOLGER 1* property shows uranium concentrations at outflow of Verna Lake (Station AC-6A) to be significantly higher than national surface water protection guidelines and drinking water guidelines. While low flow conditions reduced sample sizes, suggesting that the levels will return to model predictions, which may still be significantly above guidelines, is a hypothesis that remains to be tested.

Based on the reported findings from Cameco, the site is not stable and improving based on water quality concentrations relative to surface water protection guidelines and drinking water guidelines. Hence, the criteria have not been met to remove the license related to these properties.

While the operational practices at Beaverlodge reflected the environmental regulatory framework in place at the time, the understanding of environmental and human health risks associated with RA226, uranium and selenium (not to mention many other parameters that were not reported on in the application) has significantly advanced over time. Our understanding of risks today must drive how regulatory uncertainties and knowledge gaps of the past are managed.

The risks to the environment and to people are significant, especially those that live off the land. There is a long-term legacy of exposure for at least the next 276 years (based on modelled projections) which equates to more than 11 generations. There must be further improvements in water quality and fish to verify that the modelling predictions are on a trajectory as predicted. This is especially important given the projected increases in some of the parameters being monitored. Exposure based on increasing concentrations of Ra226 and uranium over time is expected to get worse before it gets better. There is a responsibility for Cameco to at least monitor to the asymptote of that trajectory before the people of the province pick up the responsibility of the operator.

Cameco made a commitment to Indigenous Peoples that their Rights would not be impacted with the development of the resource and the environment would be restored to practice traditional lifestyles again and in the absence of harm. The assertion that nothing more can be reasonably done to mitigate the residual risks beyond natural recovery and therefore the property should be transferred to the IC program, negates the accountability the operator has for monitoring, adaptive management, and to ensure active restoration of Rights for Indigenous Peoples affected by this mine site.

Managing residual risk through consumption advisories for drinking water and fish is a perfect example. Indigenous peoples in the region were not limited in their practices on the land, were not limited in their consumption of water nor in their consumption of fish prior to when this mine commenced operation. That is the baseline. Rights have been and continue to be impacted through consumption advisories; consumption advisories that are in place because of the levels of contamination and mobilization of contaminants through the food web due to Cameco's operations. Consumption advisories are not an appropriate mitigation activity in the context of Rights. Until monitoring demonstrates advisories can be lifted, the site remains impacted and the risks to environmental and human health remain. As such, the site cannot be transferred to the ICP program as criteria have not been met.

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Health Canada (2025). Guidelines for Canadian Drinking Water Quality: Radiological Parameters. Guideline Technical Document. Consultation Period ends January 10, 2025. https://www.canada.ca/en/health-canada/programs/consultation-guidelines-canadian-drinking-water-quality-radiological-parameters/document.html

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Appendix B

Thompson Review

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Technical Review of Cameco Corporation's Beaverlodge Mine Sites Request to Revoke the Current Licence and Release Project to the Institutional Control Program - surface water quality and aquatic ecosystems

November 26, 2024

To: Timothy Bebeteidoh
Dene Lands and Resource Management
Athabasca Chipewyan First Nation
Fort McMurray, AB

From: Megan Thompson, Ph.D., R.P. Bio., P. Biol.
Thompson Aquatic Consulting
Calgary, AB

Introduction

At the request of Athabasca Chipewyan First Nation Dene Lands and Resource Management (DLRM), Thompson Aquatic Consulting has completed this technical review of the application for the release of the final set of decommissioned Beaverlodge mine and mill site properties in northern Saskatchewan from Canadian Nuclear Safety Commission (CNSC) licensing. This includes review of the following documents:

1. Cameco Corporation. 2024. Request for a Licensing Decision: Revocation of the Beaverlodge Waste Facility Operating Licence, WFOL-W5-2120.0/2025.
2. CNSC. 2024. A Licence Revocation: Cameco Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program.

The application is for release of the sites from CNSC licensing and transfer of the sites to the Saskatchewan Institutional Control Program.

This technical review also includes the following documents, as required:

3. Canada North Environmental. 2023. Decommissioned Beaverlodge Mine Site Long-Term Monitoring Program.
4. Kingsmere Resource Services Inc. 2023. Final Closure Report: Beaverlodge Properties: URA 7, URA 1, BOLGER 1 Tailings Management Area Properties.
5. Cameco Corporation. 2022. BVL-FLM Facility Licensing Manual.

Background and General Comments

The focus of the application for the CNSC license revocation is 27 properties that make up the former mill site, open pits, tailings management areas and underground mine features of the Eldorado uranium mine and other historical uranium mining operations. The 27 properties are part of a larger group of remediated mine properties known as the Beaverlodge properties, and will be the last of these properties to have CNSC licenses revoked and to be entered into the Saskatchewan Institutional Control Program.

Cameco, the CNSC and other stakeholders worked to develop the performance indicators with regulatory acceptance criteria that must be met to show that the sites have met the overarching performance objectives of safe, secure and sable/improving sites. Water quality is one of these indicators, with the objective of "stable/improving". (see figure below, reproduced from Cameco Corporation 2024).

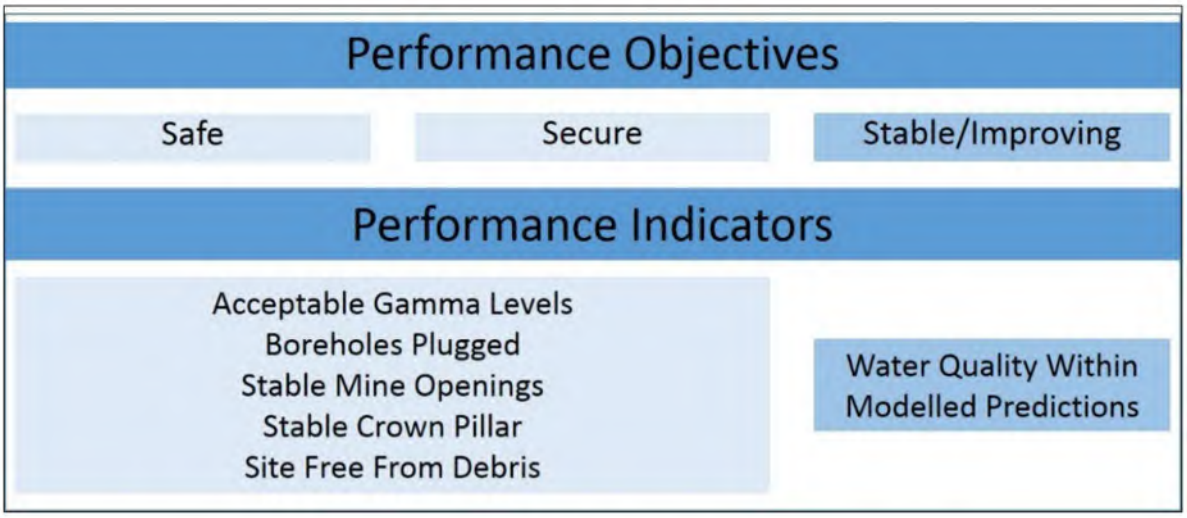
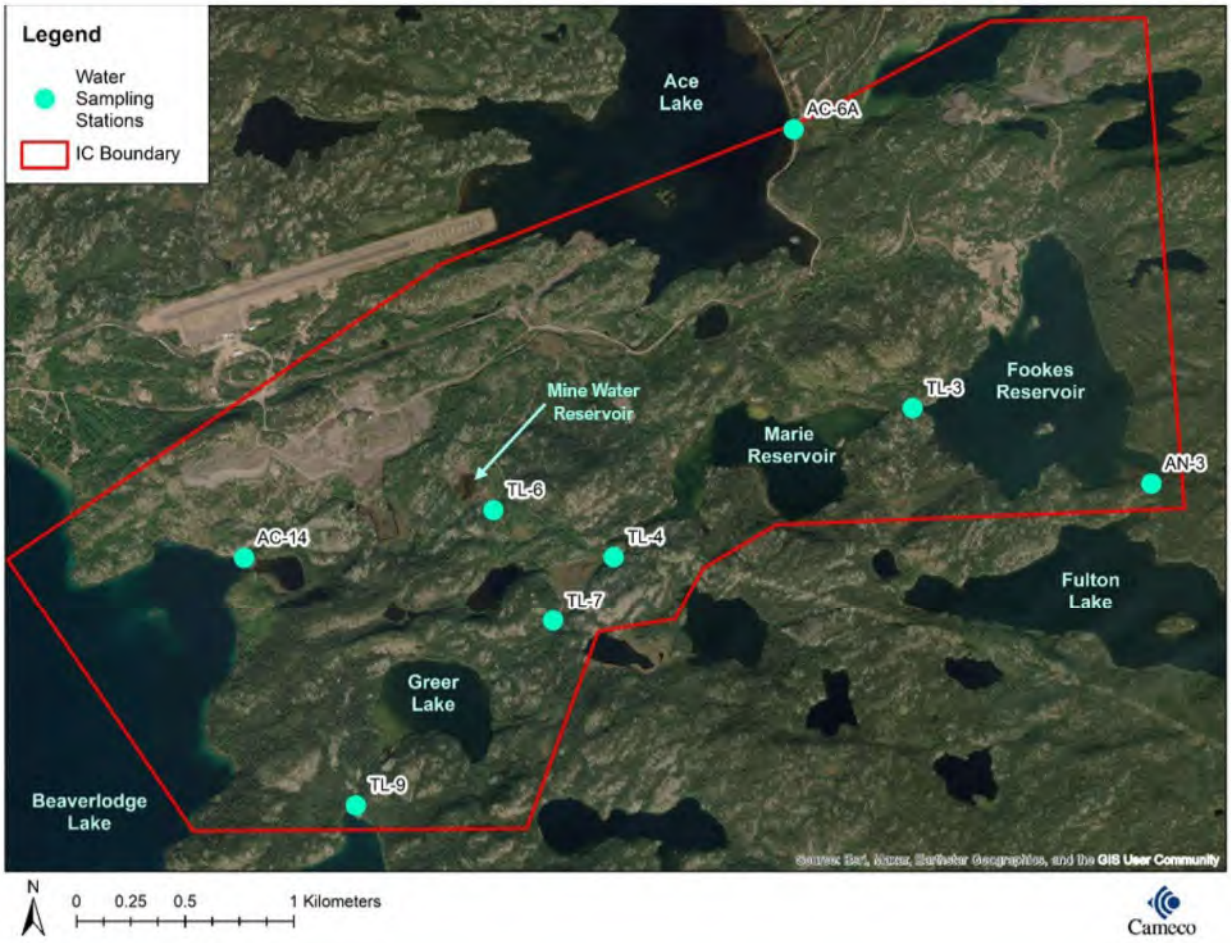


Figure 1.1-3: Performance objectives and underlying indicators.

Specifically, surface water quality, as represented by the concentrations of three parameters (**selenium, uranium and radium-226**), must fall within the predictive model simulations. These modeled values were produced for five surface water quality monitoring locations at or downstream of the properties. For some locations and parameters, the modeled concentrations show a continued increase for some time period before the concentrations stabilize (e.g., radium-226 in the TMA and Greer Lake)(Cameco Corporation 2024, section 2.6). As explained by Cameco Corporation, "*If existing water quality conditions are shown to be within the range predicted by the model, then the performance indicator is met for that station and for the associated decommissioned properties*." (Cameco Corporation 2024, section 2.6, p. 14). The water quality monitoring stations associated with the 27 properties that are the subject of the

current application are shown in the figure reproduced below (reproduced from Cameco Corporation 2024).

Figure 2.6-1: Water quality monitoring stations associated with the applicable 27 decommissioned properties



According to the Cameco submission (2024), site AN-3 at the Fulton Lake outlet is meant to represent background water quality for the watershed. Site TL-9 is located downstream of the TMA, at the Greer Lake outflow to Beaverlodge Lake. Site TL-6 Is an intermediate location, at the Minewater Reservoir outlet, but has no performance objectives. The five target water quality monitoring sites to which performance indicators apply are outlined in the table below, with the areas and properties that Cameco has assigned to each site:

Water Quality Site	Associated Area	Associated Properties
TL-3	Fookes Reservoir Properties (Tailings Management Area)	GC 3, EXC GC 3, GC 5, GC 1, GORE 1, NW 2, NW 1, LEE 4, GORE 2, LEE 3, EXC LEE 3 and LEE2

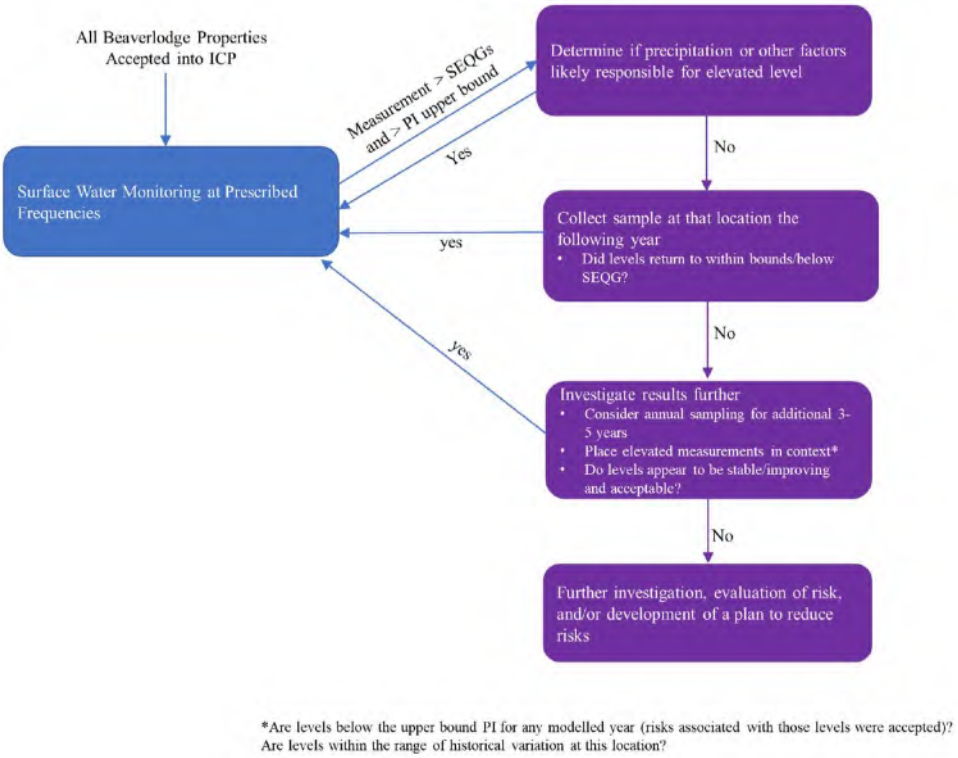
TL-4	Marie Reservoir Properties (Tailings Management Area)	EXC ACE 17, ACE 17, EXC ACE 18, ACE 15, EXC ACE 14, GORE, EXC GC 2, GC 4, and EXC GC 4
TL-7	Minewater Reservoir Properties (Tailings Management Area)	URA 6, EXC URA 6, and ACE 19
AC-14	Lower Ace Creek (Former Mill Site)	URA 1 and URA 7
AC-6A	Bolger (historical mine)	BOLGER 1

According to Cameco Corporation, all three water quality parameters fall within modeled predictions at all five of the identified water quality monitoring locations. Specifically, Cameco Corporation explains that "*the **trend** of measured concentrations of these parameters fall within the range of modelled predictions…*" (e.g., Cameco Corporation 2024, section 3.1.1.2, p. 25)(emphasis added).

As explained by CNSC (2024), "*Applicable waterbodies can be considered stable/improving when the water quality monitoring data trends are within the range of upper and lower bounds on the predictions. Realistic high and low values of the model assumptions were used to generate the range of upper and lower bounds. If the results are found to be within the predicted range or lower, they will be considered stable/improving. If the monitoring data trends fall above the predicted range, CNSC staff will require Cameco to complete a reassessment of the risk.*" (Section 2, p. 17)

At the same time, the Beaverlodge Mine Site LTMP document points out that the modeling was based on annual average values only, and that individual monitoring data points may be outside of the range some fraction of the time (Canada North Environmental 2023). The LTMP includes an evaluation plan for surface water quality monitoring results, shown below (Canada North Environmental 2023, Appendix A, Figure A1).

Figure A.1 Summary of Proposed Beaverlodge ICP Long-term Monitoring Plan Surface Water component, evaluation of monitoring data



*Are levels below the upper bound PI for any modelled year (risks associated with those levels were accepted)? Are levels within the range of historical variation at this location?

It is worth noting that the water quality performance objectives for some parameters at some locations are above the Saskatchewan Environmental Quality Guideline (SEQG) value, in some cases by an order of magnitude or more.

Specific Comments

1)	**Water quality performance objectives not met**
Reference	Cameco Corporation 2024, Section 3.0, p. 19-61
Rationale / Review Comments: Cameco's submission, as well as the CNSC submission (2024), affirm that the trend in water quality at all of the five designated monitoring locations fall within the modeled ranges that serve as the performance objective for the Beaverlodge properties. However, no trend lines or even averages for monitoring data are shown in the water quality figures provided (see figures below). Examination of some of the figures showing the concentration of radium-226 at the monitoring locations indicate that the observed concentrations exceed the 95th percentile of the modeled ranges, and may continue to do so, especially as they are currently increasing over time at three of these locations. The figures in question are reproduced below:	

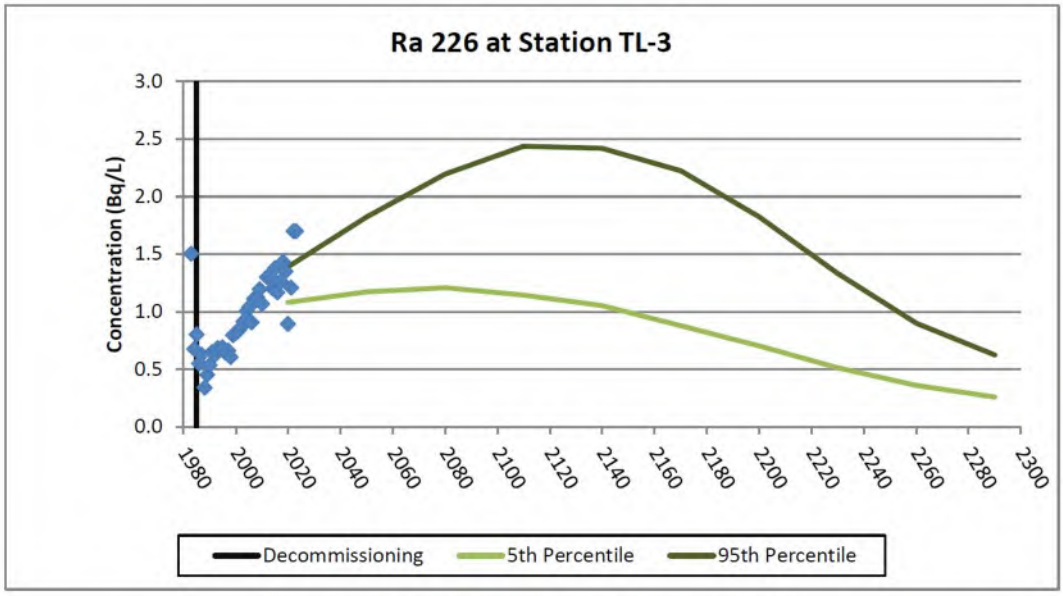


Figure 3.1-3: Ra-226 Performance Indicator at TL-3

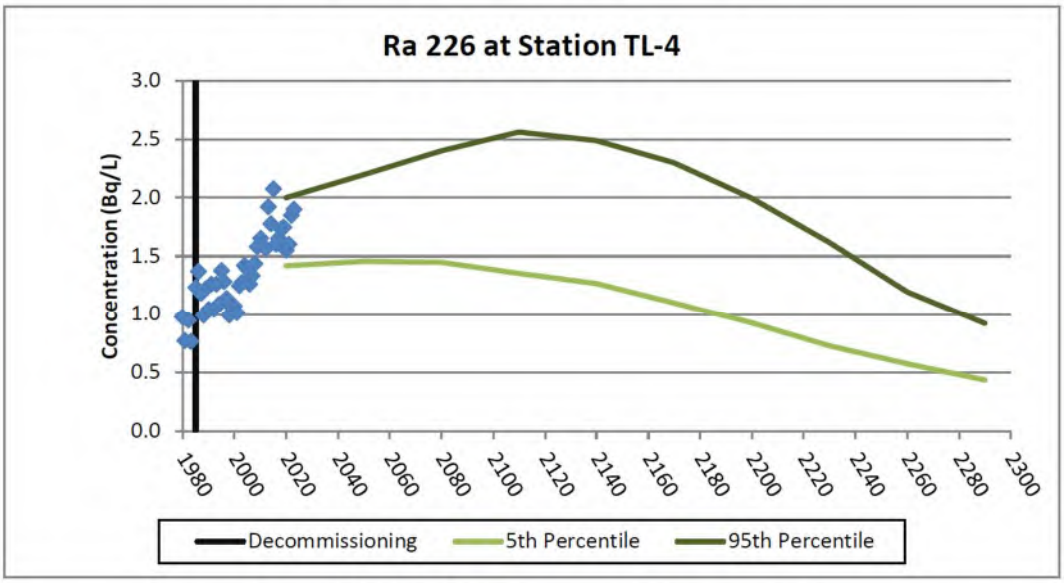


Figure 3.1-7: Ra 226 Performance Indicator at TL-4

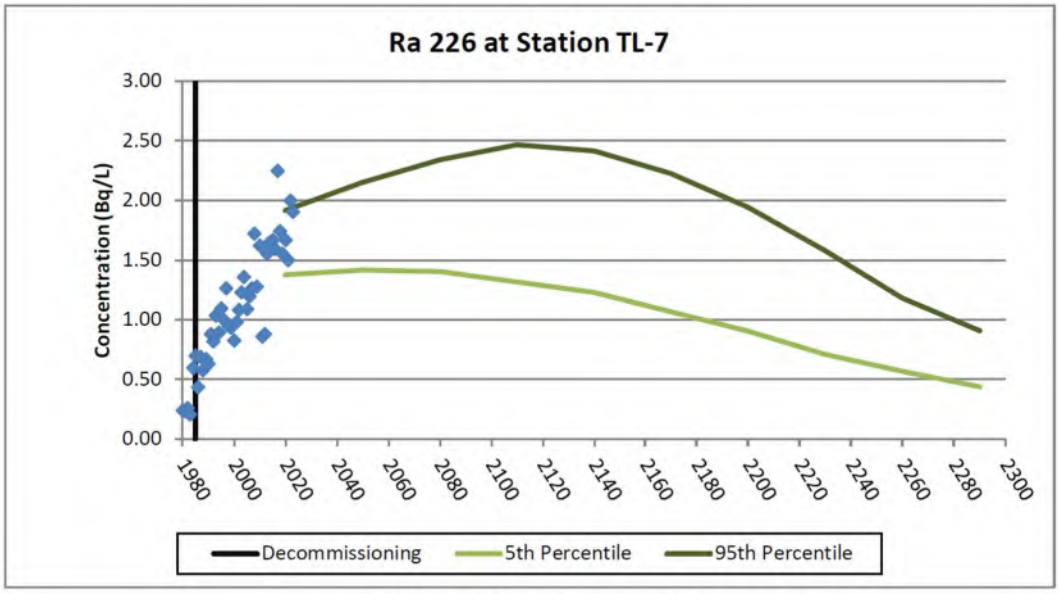


Figure 3.1-11: Ra-226 Performance Indicator at TL-7

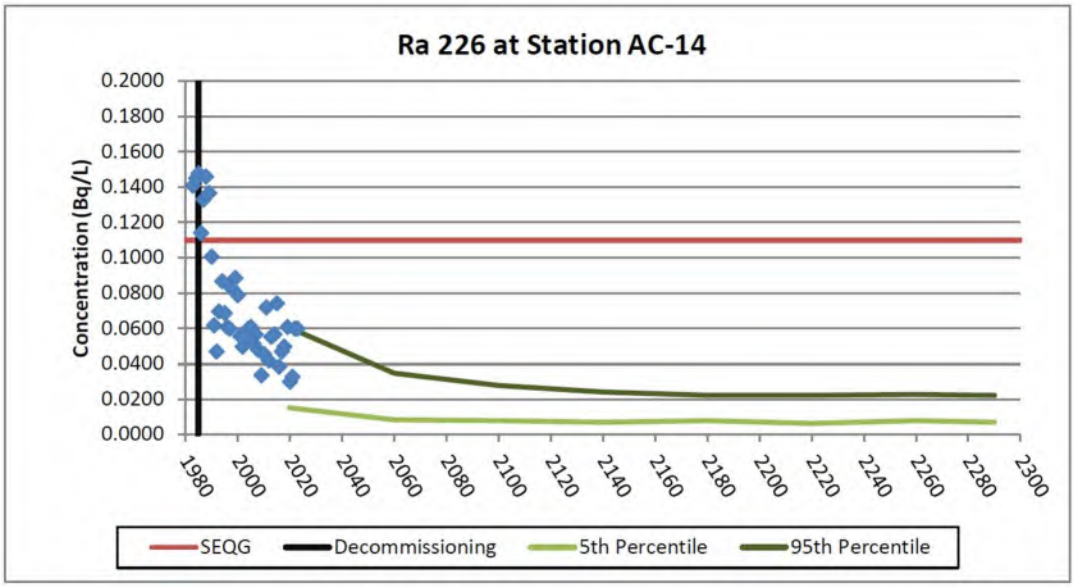


Figure 3.2-2: Ra-226 Performance Indicator at AC-14

In addition, measured uranium concentrations are exceeding the modeled performance objectives at the Bolger property (figure reproduced below):

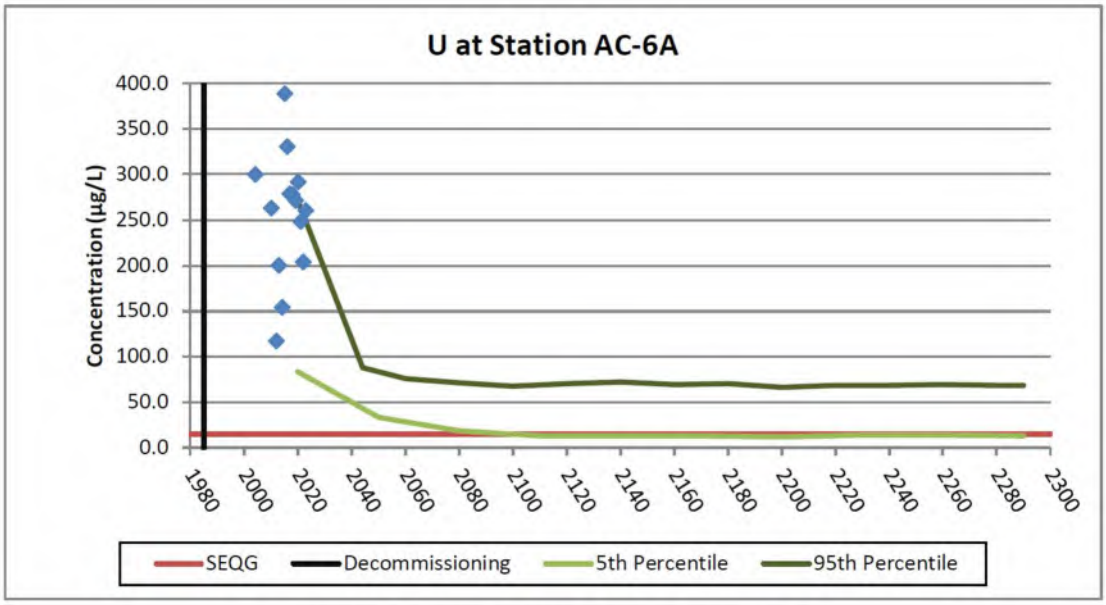


Figure 3.3-3: U Performance Indicator at AC-6A

It is difficult to know from these figures to what degree the measured concentrations are exceeding the performance objective, since no average or trend line is provided for the individual measured observations. Furthermore, the overlap between the measured and modeled concentrations is only about two or three years. A zoomed-in image for the overlapping years, as has been provided for uranium and selenium at some sites, would be very helpful. Notwithstanding these issues, from the figures provided, none of the monitoring records for the sites associated with the Fookes Reservoir, Marie Reservoir, Minewater Reservoir or Lower Ace Creek Reservoir properties appear to have met the radium-226 performance objective. Especially for the first three of these monitoring locations, the concentrations of radium-226 are still increasing, and could overshoot the performance objective range entirely. The assertion by Cameco and the acceptance by CNSC that the performance objective has been met is not supported. At a minimum, additional years of monitoring should be conducted to ensure that the performance objectives have been met and that no further mitigations and/or remediation are required at the Beaverlodge properties.

In the case of the high concentrations of uranium measured at the Bolger 1 property monitoring location, Cameco asserts and the CNSC accepts that "slightly elevated" concentrations in 2023 are the result of low flow conditions in the channel being monitored. However, the probabilistic modeling used to create the performance objective ranges would have incorporated the effects of low and high flows on water quality, including variability caused by climate change. Furthermore, the modeled range encompasses all but the most extreme conditions for that monitoring locations (5th through 95th percentiles). It is surprising then, that more than half of observed concentrations that overlap the modeled time period meet or exceed the modeled 95th percentile. The explanation for the observed uranium concentrations provided by Cameco and accepted by CNSC is therefore inadequate and actually calls into question the accuracy of the modeled performance objectives. Unfortunately, the

details of the modeling have been kept confidential, so that it cannot be reviewed here (see the 2024 CNSC staff submission CMD 25-H3.REF, Section 10).

Despite these exceedances of the performance objectives, Cameco asserts and the CNSC accepts that the water quality at the associated Beaverlodge properties is stable or improving, and that human health and ecological risks have been managed to acceptable levels. Considering the issues raised above and the fact that, at four of these monitoring locations, the concentrations measured in surface water are orders of magnitude above the corresponding Saskatchewan Environmental Quality Guideline (SEQG)(shown as red lines in some of the figures above), the risks to human health and ecological risks do not yet appear to have been managed to acceptable levels. There is also little assurance provided by the monitoring data that performance objectives will be met in the coming decades.

Information Requests:

a) Please provide zoomed-in figures for the radium-226 figures, focused on the years of overlap between the monitoring data points and modeling ranges.
b) If trends for the monitoring data have been calculated, please add these lines to the figures for radium-226 discussed above. If no trend has been calculated, please explain why.
c) Please add an annual average point for the monitoring data to the figures for radium-226 discussed above, if sufficient observations per year have been made.
d) Please explain the assertion that the water quality performance objectives have been met for radium-226 and uranium, where the measured concentrations exceed the modeled 95th percentile concentration.
e) Please confirm, did the modeling used to create the performance objective ranges account for the effect of flow variation on water quality? Furthermore, did this modeling also account for the effects of climate change over the next centuries? IF not, why?
f) Please share comprehensive water quality methods, approaches and outputs for review by ACFN.
g) Once the above steps are complete, please complete a reassessment of the risk posed by surface water quality for these monitoring locations and associated properties, as described in the CNSC submission and in the Beaverlodge Mine LTMP plan.

2)	**Water quality background**
Reference	Cameco Corporation 2024, Section 3.0, p. 20

Rationale / Review Comments:

There is a background water quality monitoring site (AN-3) located upstream of the target water quality monitoring locations. No data from this site are shared in the Cameco or CNSC submissions.

Information Requests:

a) Can the background water quality data from site AN-3 be shared, for comparison with downstream locations?

b) Has the background water quality data from site AN-3 been shared elsewhere?

3)	**Drinking water and fish consumption guideline**
Reference	Cameco Corporation 2024, Sections 4.4 and 4.5, p. 65-68
Rationale / Review Comments: Several risk assessment and monitoring programs have determined that country food consumption can safely continue in the Beaverlodge properties if the water and fish consumption guidelines are followed. The consumption guidelines recommend limited consumption from certain water bodies, and no consumption from others (including several on the properties that are part of the current application). While there are pictures of signs that have been installed at some lakes in the submission documents, and there is also mention of the guidelines being maintained by Saskatchewan government agencies, it is still unclear how and with what success the guidelines will be consistently implemented for the next several years or decades.	
Information Requests: a) What are the details of the implementation plan for the consumption guidelines that apply to the remaining Beaverlodge properties over the long term? Is it limited to signage and notifications from responsible agencies? What evidence is there that the proposed approach will be effective?	

Appendix C

Behr Review

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Memorandum

Re: Decommissioned Beaverlodge Properties Long-Term Monitoring Plan (LTMP)

Attention:
Timothy Bebeteidoh

From:
Towagh Behr, Anthropologist/Director of Research & Operations
Kwusen Research & Media Ltd.

Date:
December 11, 2023

Regarding:
Decommissioned Beaverlodge Properties Long-Term Monitoring Plan (LTMP)

1. INTRODUCTION

In October 2023, Athabasca Chipewyan First Nation (ACFN) contracted Kwusen Research & Media (Kwusen) to lead interviews with a small number of ACFN community members regarding Cameco's Long-Term Monitoring Plan (LTMP) for the Decommissioned Beaverlodge Properties, with a focus on identifying priority areas for water quality and fish monitoring. The objectives of the interviews were as follows:

1. To provide ACFN community members with high-level information about Cameco's fish and water monitoring to date[1]; and
2. To identify areas where ACFN members would like monitoring to take place as part of the Decommissioned Beaverlodge Properties LTMP.

One Kwusen staff member and one ACFN staff member co-conducted three interviews with three ACFN community members (hereinafter referred to as "Respondents"). Two interviews were conducted in Fort Chipewyan, with a third interview conducted remotely with a Respondent who was unable to participate in an in-person interview. Respondents were asked to identify areas where they would like fish or water quality monitoring to take place on a Google Earth map projection. The interviews focused on the Decommissioned Beaverlodge Properties and surrounding area (see Figure 1 below), although Respondents shared information about other areas as well. Kwusen staff recorded all interviews and uploaded spatial data and video recordings to ACFN's research database, the Community KnowledgeKeeper (CKK).

The findings of the interviews, which are considered in further detail in Section 3 of this memorandum, may be broadly summarized as follows:

1. Respondents are deeply concerned about the long-term and ongoing environmental impacts of the Decommissioned Beaverlodge Properties. They

[1] This information included the location of Cameco's water sampling stations, fish sampling locations, and proposed road closures, as shown in Cameco's LTMP questionnaire and PowerPoint presentation (both documents were provided to the memo authors by ACFN).

consider several areas around the former mine to be unsafe for consuming fish.

2. Respondents identified the direction of water flow from the Decommissioned Beaverlodge Properties area through the lakes and rivers in the study area and made knowledgeable evaluations about which areas may be most significantly impacted based on these water flows. Specifically, they observed that water from Beaverlodge Lake flows to Athabasca Lake via Martin Lake, Cinch Lake, Crackingstone River, and Crackingstone Bay.[2] They consider these water bodies to be priority areas for both fish and water monitoring.
3. Respondents are deeply concerned about the long-term environmental impacts of the Decommissioned Beaverlodge Properties in relation to other cumulative impacts from oil sands development, particularly on Lake Athabasca.
4. Respondents wish to be informed about and have input on Cameco's long-term monitoring plans for the Decommissioned Beaverlodge Properties. They would also like Cameco to provide additional information about how existing water quality/fish monitoring sites were chosen.

The following sections of the memorandum provide additional information about the limitations and results of the study. Recommendations are presented in Section 4.

[2] Their knowledge about the direction of water flow from Beaverlodge Lake to Lake Athabasca is corroborated by the publicly available National Hydro Network dataset (https://search.open.canada.ca/openmap/a4b190fe-e090-4e6d-881e-b87956c07977).

Figure 1: Study Area

Watercourses

Waterbodies

Created: November 2023; Coordinate System: NAD83 / UTM zone 12N; Map Scale: 200000

Data Sources: Athabasca Chipewyan First Nation, Government of Canada, Esri, DeLorme.

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By:

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2. STUDY LIMITATIONS

The small scope and short timeline for this study should be kept in mind when reviewing the results presented in Section 3. These limitations are described further below:

Small Number of Respondents: Due to time constraints, only 3 ACFN community members were interviewed for the current study. This represents less than 1% of ACFN's total membership. Considering that office-based and virtual interviews were conducted for relatively short periods of time and cannot record all of the relevant knowledge from a single respondent, let alone the broader community, the data collected represents an extremely small sample of ACFN's knowledge of the study area. The breadth of knowledge recorded in such a small number of interviews is reflective of the importance of the study area to ACFN, as well as the need for additional research to ensure that ACFN's knowledge and concerns are adequately reflected in the Decommissioned Beaverlodge Properties LTMP.

Limited Scope of Study: Due to time constraints, only the data collected during the three interviews is reported on in this memorandum. Over the course of previous studies, ACFN Respondents have identified dozens of traditional use areas in and around the study area, ranging from cultural/spiritual areas to subsistence sites, habitation sites, wildlife and ecological sites, and more. Given the scope and limitations of the current study, these are not reported on in this memo, but they provide important context for the knowledge and concerns shared by Respondents. ACFN has a long history of practicing Traditional Land Use (TLU)[3] in and around the study area, which is an important part of Treaty No. 8 Territory.

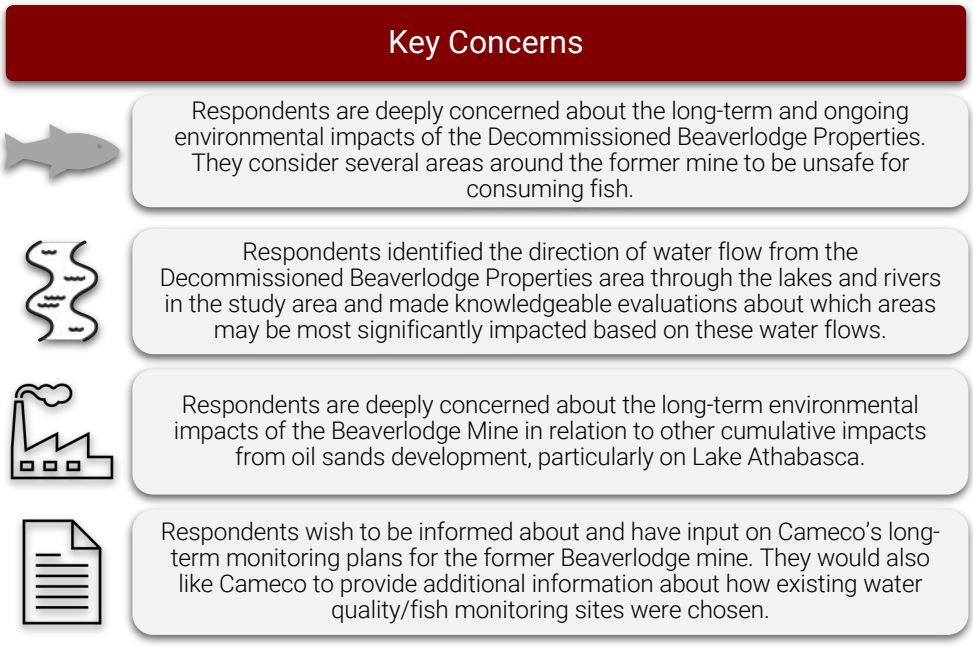
Lack of Site Visits: Due to time and budget constraints, none of the proposed monitoring sites have been visited. The purpose of ground truthing/site visits would be to verify the location of potential monitoring sites, to identify additional specific areas for monitoring, and to verify the need for specific types of monitoring at each location (i.e., which species of fish should be monitored in which areas).

These limitations provide context for the following results. The depth of knowledge shared by the small number Respondents interviewed for this study is indicative of the need for continued engagement with ACFN to ensure that the LTMP reflects their knowledge and concerns about the ongoing environmental impacts of the Decommissioned Beaverlodge Properties.

[3] Indigenous people's use of the land for harvesting plants and animals, and for other cultural and spiritual aspects that are an integral part of such practices, based on knowledge, culture, and experience passed on through generations of long-term residence in a particular place/area. We define Traditional Land Use as an expression of multiple Aboriginal and Treaty Rights, and also as a component of the lived Indigenous culture and unique traditional way of life of ACFN.

3. STUDY RESULTS

During interviews, Respondents expressed several key concerns, which are summarized below. The similarity of concerns shared during independent interviews indicates that these concerns are anticipated to be widely held within the ACFN community.



Respondents reviewed the existing fish sampling/water quality station locations shared by Cameco. They noted that additional monitoring should take place downstream of the mine. Specifically, they observed that water from Beaverlodge Lake flows to Athabasca Lake via Martin Lake, Cinch Lake, Crackingstone River, and Crackingstone Bay. They further observed that tailings from the former Lorado Mill Site were deposited on the west side of Nero Lake, which they consider to be unsafe for fish consumption or other traditional uses.[4] Nero Lake also flows into Beaverlodge Lake.

The knowledge shared by Respondents about water flow direction in the study area from Beaverlodge Lake to Lake Athabasca, which is corroborated by a publicly available spatial dataset,[5] is shown in Figure 2 below. Water bodies directly impacted by water flow from Beaverlodge Lake are shown in a dark blue. Respondents were extremely concerned about the impacts of the Beaverlodge Mine on Lake Athabasca, as well as the cumulative impacts of other industrial activities on the lake, which is still used heavily for fish consumption and other traditional uses by ACFN members.

[4] Their knowledge is corroborated by the Saskatchewan Research Council's website, which states that "tailings [from the former Lorado uranium mill] were deposited adjacent to Nero Lake, with some flowing into the lake." See https://www.src.sk.ca/project-cleans/lorado-mill-site.

[5] See the National Hydro Network dataset (https://search.open.canada.ca/openmap/a4b190fe-e090-4e6d-881e-b87956c07977).

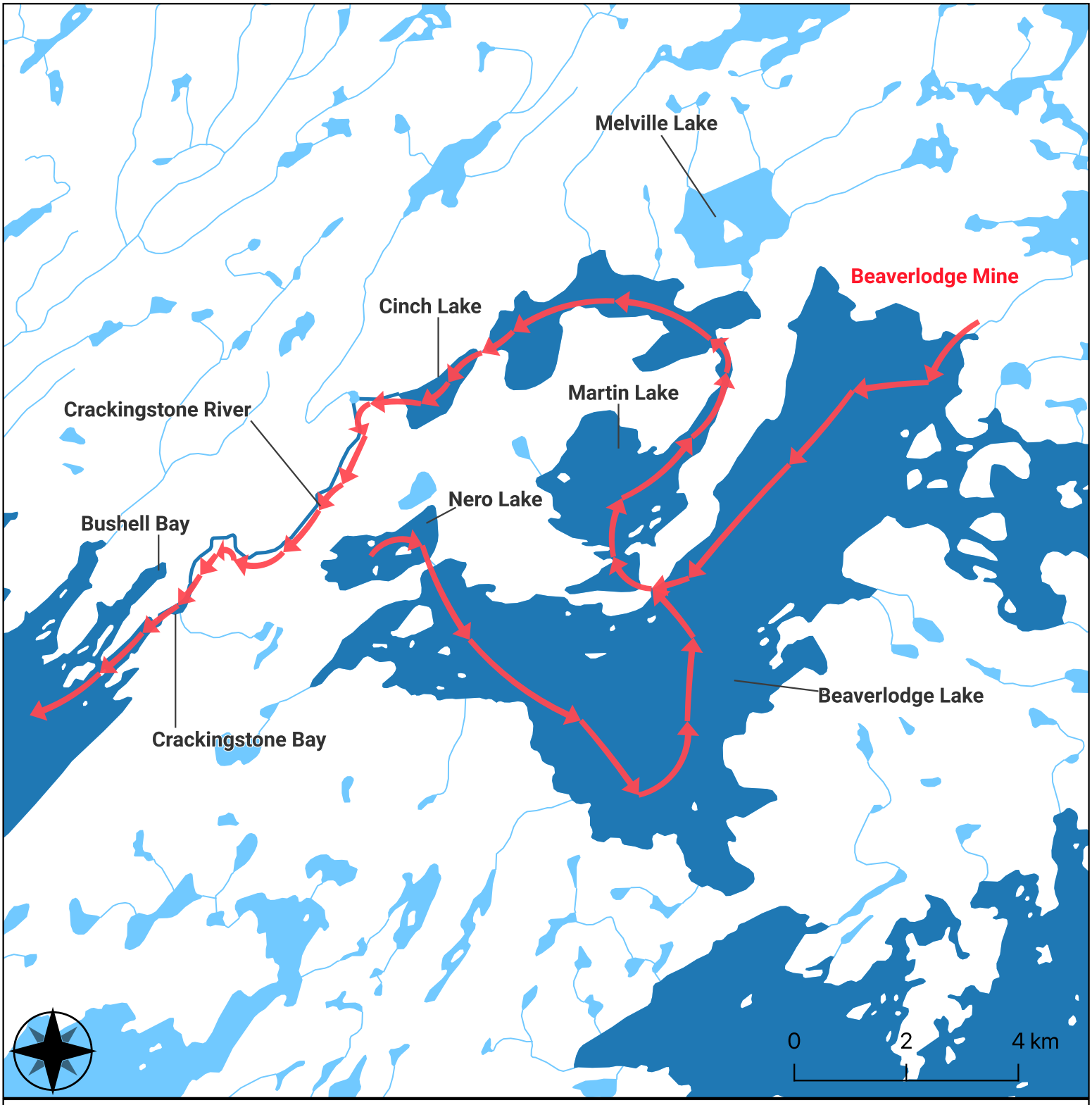


Figure 2: Direction of Water Flow from Beaverlodge Lake to Lake Athabasca

Waterbodies

Water Flow Direction

Watercourses

Created: November 2023; Coordinate System: NAD83 / UTM zone 12N; Map Scale: 95000

Data Sources: Athabasca Chipewyan First Nation, Government of Canada, Esri, DeLorme.

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Based on their knowledge of water flow in the study area, their understanding of which areas are safe to consume fish, and their personal experience living and harvesting in and around the north shore of Lake Athabasca, Respondents identified specific areas where they would like to see continued and/or additional monitoring take place. The following list identifies the location where they want monitoring work completed and provides relevant information about some of these locations:

1. Beaverlodge Lake: Beaverlodge Lake is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine. Given its proximity to the mine and the direction of water flow from the lake to Lake Athabasca via Martin Lake and Crackingstone River, Respondents would like to see continued and additional monitoring in this lake, particularly of pickerel, suckers, and whitefish.
2. Martin Lake: Martin Lake is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine. In addition to impacts from the Beaverlodge Mine, Respondents recalled a tank spill in the 1950s that made Martin Lake unsafe for fish consumption. They further noted that the lake was subsequently stocked with pickerel for sport fishing in the 1960s, and that white fish are also likely present in the lake. They consider both species important for monitoring and would like continued and additional monitoring to take place in Martin Lake.
3. Cinch Lake: Cinch Lake is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine. Martin Lake flows into Cinch Lake, which in turn flows into Crackingstone River. As such, Respondents would like continued and additional monitoring in this lake.
4. Bushell Bay: Bushell Bay is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine. Multiple Respondents identified Bushell Bay as a priority area for water and fish (trout, jackfish, pike) monitoring. They further noted that ACFN members have avoided fish consumption here for over 30 years due to a spill in the 1980s, as well as the impacts of proponents formerly using this area to load uranium into barges. To their knowledge, there is no signage about fish consumption safety in the area. They would like water monitoring and fish monitoring to take place in this bay.
5. Crackingstone Bay/Crackingstone River: Crackingstone Bay and Crackingstone River are important to ACFN and Respondents expect that they have been directly impacted by the Beaverlodge Mine. As Crackingstone Bay is the outlet into Athabasca Lake for water flowing through Beaverlodge Lake, Martin Lake, Cinch Lake, and Crackingstone River, Respondents consider these areas critical for continued and additional monitoring, including of trout, pike, jackfish, and grayling, which are still fished in the river/bay.
6. Milliken Lake: Milliken Lake is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine, as well as other mines in the area. One Respondent reported that their family members catch and release fish in this lake, but are unable to exercise their rights to harvest and consume fish because of concerns about contamination. They would like continued and additional monitoring to take place in this lake so they can understand levels of contamination and make informed decisions about whether it is safe to consume fish.
7. Tazin Lake: Tazin Lake is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine. One Respondent noted

that a family member told them that Tazin Lake was unsafe for fish consumption and other traditional uses and that caribou avoid this area. They would like fish and water monitoring to take place in the lake.

8. Nero Lake: Nero Lake is important to ACFN and Respondents expect that it has been directly impacted by the former Lorado uranium mine and mill site, the latter of which was adjacent to Nero Lake and deposited tailings into the lake. Two Respondents identified Nero Lake as an area of particular concern, noting that it is unsafe for consuming fish. Although Lorado mine was a separate facility from Beaverlodge Mine, Nero Lake flows into the same water bodies (Beaverlodge, then Martin Lake, Cinch Lake, Crackingstone River/Bay, and Lake Athabasca). As such, Respondents would like fish/water monitoring to take place in this lake to better understand how impacts from the former Lorado Mine/mill site are contributing to/interacting with impacts from the Beaverlodge Mine.
9. Locations within Lake Athabasca: Lake Athabasca is important to ACFN and Respondents expect that it has been directly impacted by the Beaverlodge Mine, as well as other mines and industrial developments. Respondents identified multiple locations on Lake Athabasca in proximity to specific anticipated sources of contamination, including the area near the former Goldfields mine (fish in this area include trout, pike, pickerel, whitefish, and murray); Camsell Portage, which Respondents feel has been impacted by Beaverlodge Mine; and the area near Gunnar Mine, where one Respondent witnessed uranium waste (sulphur) on the shore in the early 2000s. In the latter area, the Respondent feels that only catch and release fishing is safe. Although outside the study area, Respondents also identified a key fishing and spawning area on the northern shore of Lake Athabasca near the Saskatchewan-Alberta border. Given the importance of this area to ACFN's food security and TLU, they would like monitoring to take place here as well. In all these areas, Respondents wish to exercise their rights to harvest and consume fish, drink safe water, and practice other TLU activities, but are often unable to do because of perceptions of contamination. Reliable scientific data is important for them to make informed decisions about their health and safety.

The areas identified by Respondents are shown in the map below in red (to maintain a reasonable map extent, some sites like Tazin Lake are not included in the map, nor is the entirety of Lake Athabasca). Given the size of Lake Athabasca and the challenges of identifying specific monitoring sites during a small number of interviews, Lake Athabasca is shown in a red crosshatch. As discussed above, Respondents identified several specific areas on Lake Athabasca where they anticipate there have been direct impacts from the Beaverlodge Mine and other mines and where fish/monitoring should take place. To their knowledge, monitoring has never been conducted at these sites or in Lake Athabasca more broadly, which is deeply concerning to them. Further research is required to identify additional sampling sites at greater distances in the lake.

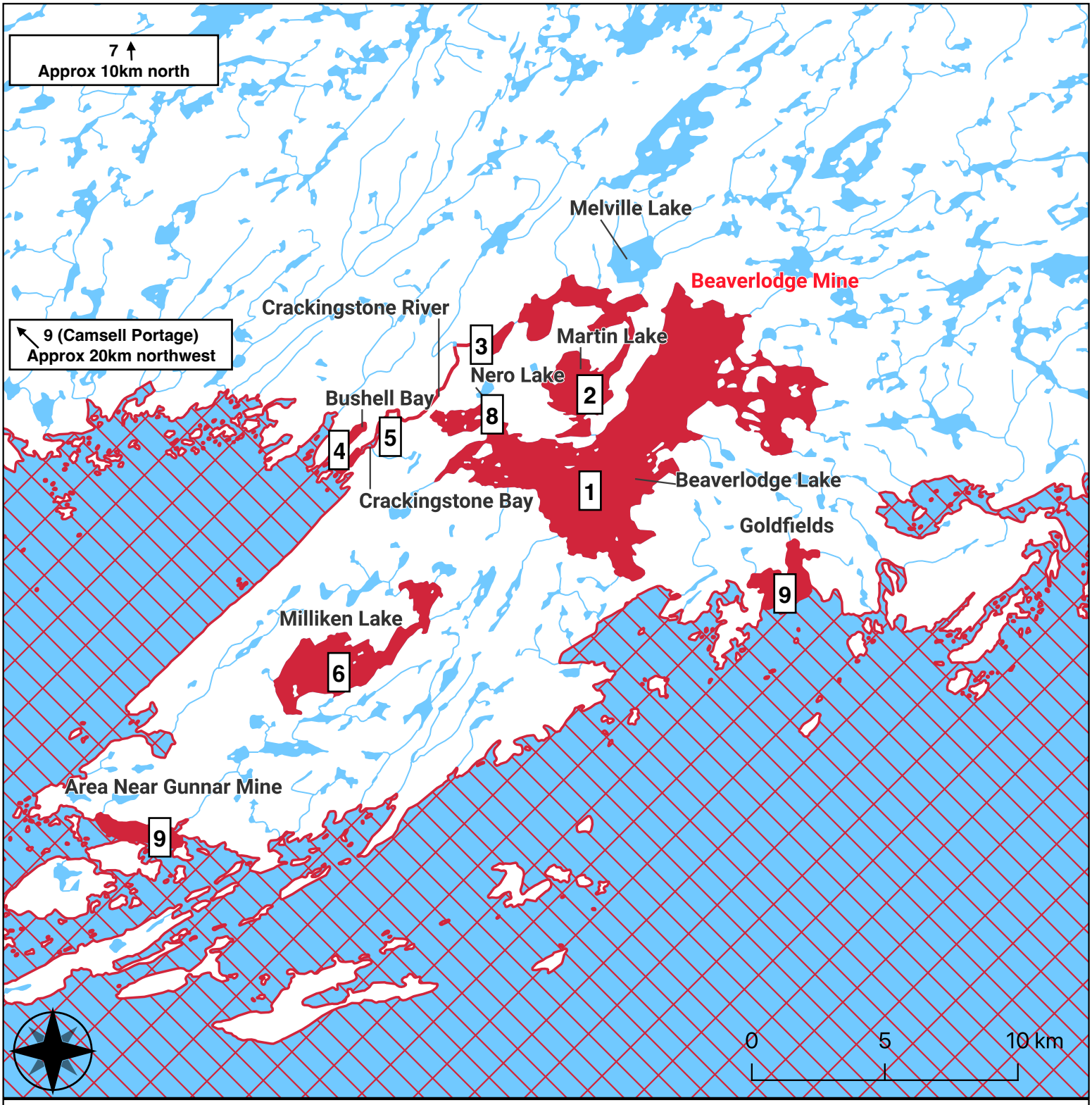

Figure 3: Recommended Fish/Water Monitoring Locations

Waterbodies

Recommended Fish/Water Monitoring Locations

Watercourses

Created: November 2023; Coordinate System: NAD83 / UTM zone 12N; Map Scale: 200000

Data Sources: Athabasca Chipewyan First Nation, Government of Canada, Esri, DeLorme.

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4. CONCLUSION

This memo has reported on the results of interviews conducted with ACFN members for the Decommissioned Beaverlodge Properties Long-Term Monitoring Plan. While a small sample of the ACFN membership participated in the interviews, those that did participate had considerable knowledge of the impacted areas. The depth of their knowledge is evidenced by their understanding of water flows in and around the study area and how these flows should inform monitoring plans, as well as their awareness of which water bodies in the area are unsafe for fish consumption. Based on the results of this study, Kwusen has prepared the following preliminary recommendations:

1. That Cameco work with ACFN to fulfil ACFN members requests for further information about the LTMP by providing additional written documentation about current and future monitoring plans/methodologies, arranging meetings with ACFN members, or other means. Relevant information may include but is not limited to how many locations are planned for water and fish sampling; the anticipated frequency of sampling; how water flow (particularly the flow of water from Beaverlodge Lake to Lake Athabasca as identified by Respondents) will inform monitoring plans; and what types of contaminants and/or other environmental/health concerns are being sampled/monitored;
2. That Cameco conduct monitoring in all locations that ACFN Respondents identified for this study or provide clear rationale as to why some areas will not be monitored;
3. That Cameco provide funding to ACFN to have a third-party consultant with appropriate expertise conduct a scientific review of Cameco's current and planned monitoring practices;
4. That Cameco work with and provide appropriate funding to ACFN so that ACFN monitors can conduct sampling/monitoring work under the direction of ACFN;
5. That Cameco work with ACFN to ensure ongoing community engagement and involvement with the LTMP is supported, which may include but is not limited to further funding for additional interviews to build on the preliminary results presented in this memorandum and/or site visits with ACFN members to identify priority monitoring areas with greater specificity.

We anticipate that ACFN will provide Cameco with further direction as to their preferred next steps. The results and recommendations presented in this memorandum are preliminary and intended to assist ACFN in their ongoing discussions with Cameco regarding the Decommissioned Beaverlodge Properties Long-Term Monitoring Plan.

LIMITATIONS AND TERMS OF USE

This memorandum was prepared for ACFN by Kwusen Research & Media Ltd. All intellectual property rights to the knowledge presented in this memo are held by ACFN. The results and recommendations in this memo are intended to assist ACFN in their discussions with Cameco regarding the Decommissioned Beaverlodge Properties Long-Term Monitoring Plan (LTMP). This memo is not intended to be used by any other parties or for any other purposes. This memo is not suitable or intended to be used in assessment of any other projects or in the assessment of any other existing or future developments in ACFN traditional lands. Any uses, reliance, or decisions made by third parties on the basis of this memo are not condoned by the memo authors and are the sole responsibility of such third parties. This memo was written without prejudice to issues of Treaty Rights, Aboriginal Rights, and/or other interests of ACFN.

Appendix D

Olsgard Review

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Cameco Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program –Health Risk and Toxicology Review.

December 10th, 2024

To: Timothy Bebeteidoh
Dene Lands and Resource Management
Athabasca Chipewyan First Nation
Fort McMurray, AB

From: Mandy Olsgard, M.Sc., P. Biol.
Integrated Toxicology Solutions Ltd.
Edmonton, AB

Introduction

At the request of Athabasca Chipewyan First Nation Dene Lands and Resource Management (DLRM), Integrated Toxicology Solutions Ltd. (ITS) undertook a health risk and toxicology focused technical review of hearing submissions related to Cameco Corporations request for release of the Beaverlodge Property to the Institutional Control Program (Cameco, 2024). The technical review was requested to support ACFN DLRM in future hearing proceedings regarding the Beaverlodge site properties scheduled for January 2024.

Scope of Work and Approach

The scope of the health risk technical review focused on evaluating components of the following documents related to the assessment, monitoring, mitigation, and management of chemical parameters associated with the site properties and potential health risks related to chemical exposure pathways linked to ACFN traditional ways of life (Olsgard, M. et al., 2023).

- Cameco Corporation. 2024. Request for a Licensing Decision: Revocation of the Beaverlodge Waste Facility Operating Licence, WFOL-W5-2120.0/2025.
- CNSC. 2024. A Licence Revocation: Cameco Corporation Request to Revoke the Current Licence and Release the Beaverlodge Project to the Institutional Control Program.

The approved scope included review of additional documents (Kingsmere Resource Services Inc. 2015, Canada North Environmental, 2023) however, due to time constraints this could not completed and is outstanding (in addition to requests for access and review of documents identified in the comments).

The scope also included evaluation of available data by comparison to published guidelines (i.e., Saskatchewan Environmental Quality Guidelines (SEQGs); Canadian Council of Ministers of the Environment (CCME)), practices adopted for decommissioning and remediation at other Uranium mine facilities in Saskatchewan, and ACFN Water Policy "tu bet'a ts'ena" (2023)[1].

Due to time constraints and limited data in the hearing submissions, comparison to the Water Quality Criteria for the Protection of Indigenous Uses (WQCIUs) could not be undertaken and should be addressed in the future (Olsgard, M. et. al., 2023)[2]. The ACFN Water Policy (2023) requires monitoring data collected in ACFN traditional territory to be evaluated by comparison to the WQCIUs which were previously developed to account for ACFN members reliance on and use of surface water and traditional foods and medicines and consider their expectations for healthy and safe aquatic environments to support their way of life. Using foods, medicines, and water from the land is a Section 35 Treaty Right and a higher standard for water quality is needed to protect health of the environment and ACFN members.

The WQCIUs are unique from published surface water quality standards relied on by Canadian jurisdictions (provincial and federal governments) to regulate ambient surface water because they were developed to:

- Identify water use categories inextricably linked to the ACFN way of life and reliance on healthy safe water; traditional foods and drinking water, traditional medicines, aquatic ecosystem health, and wildlife health.
- Address gaps in current standards related to bioaccumulation and biomagnification of persistent substances, human health endpoints, and use of untreated natural water as a drinking water source for ACFN members.
- Account for ACFN members food and medicine consumption habits (i.e., amount, frequency, total consumption rates for consumed species).
- Provide specific criteria by Indigenous use category and generic criteria to protect all uses, to allow for flexibility in application to complex sites while ensuring a wide range of Indigenous water uses and receptors are protected.

Evaluation of the submission content using the methods described above was relied on to identify potential limitations, gaps, and uncertainties which could pose health risks to ACFN members from exposure to contaminants (direct or indirectly via aquatic and terrestrial ecosystems) at the remaining Beaverlodge site properties which should be considered prior to release to the IC Program.

General Review Comments

Two key issues which are likely affecting the management of contamination at the remaining Beaverlodge site properties were identified and discussed below. These issues are likely to limit the effectiveness of assessment and monitoring activities at the site properties to minimize health risks in a reasonable timeframe and support traditional land uses within this generation.

[1] https://acfn.com/wp-content/uploads/2024/04/ACFN_DLRM_Water-Policy-2023-FINAL.pdf
[2] https://acfn.com/wp-content/uploads/2023/10/wqciu_report.pdf

1. **Performance Objectives, indicators and criteria are not risk based and allow for deteriorated environmental conditions that also pose potential risks to human.**

   The approach Cameco has designed to manage surface water quality at the Beaverlodge site properties through comparison to model predictions, without consideration of whether the measured concentrations could affect the health, structure, and function of aquatic ecosystems does not align with that being relied on for decommissioning and remediating other Uranium facilities in Northern Saskatchewan. The Cluff Lake mine (Orano, 2020) relies on site specific decommissioning water quality objectives, that while higher than published guidelines and likely to result in some degree of environmental effects, require the operator to monitor and manage the site using an effects-based approach.

   It should also be noted here that the chemicals of potential concern being monitored and managed at the Beaverlodge site properties (Gamma radiation, Radium-226, Selenium, Uranium) varies from the suite of chemical parameters managed at other Uranium facilities due to potential health risks (i.e., Arsenic, Cadmium, Copper, Cobalt, Molybdenum, Selenium, Uranium; Orano, 2020). While each facility is unique, generally the contaminants associated with Uranium mining are consistent due to the geological conditions required to mine Uranium and the limited monitoring at the Beaverlodge site properties could reduce effective management of contamination and mitigation of adverse health effects.

   Evaluation of the limited data provided in the submissions indicate that the adopted approach of relying on comparisons to model predictions rather than effects/risk based management has allowed concentrations of Radium-226, Selenium, and Uranium in surface water to exceed the SEQGs established for protection of the environment and human health by 2 to 25 times the established value (mg/L) for protection. Due to the reported contamination of surface water and sediments there are fish and water restriction advisories (no use recommended) at each water body on the site properties with the exception of Beaverlodge, Martin and Cinch Lakes where advisories for reduced consumption are in place (2-5 fish depending on species).

2. **Monitoring data indicates performance criteria for safe and secure gamma radiation (safe and secure) and measured water quality within modelled predictions (stable/ improving) are not meeting acceptance criteria at several site properties.**

   Evaluation of the limited data provided in the submissions indicate that the concentrations of Radium-226, Selenium, and Uranium in surface water continue to increase (i.e., unstable) at

certain site properties and that one property has gamma radiation higher than the provincial guidelines. Since the acceptable criteria are not being met, the site properties appear to not meet the requirements for release to the IC Program.

Review of the documents indicate that while collaborative approaches to monitoring and assessment are being relied on by Cameco; local Indigenous communities continue to be concerned about the long-term health risks. While consumption advisories are known and adhered to, Cameco has not discussed whether

they are acceptable to the engaged communities (which does not include ACFN), or whether accommodation for impacts to s.35 Rights should be evaluated.

Addressing the detailed comments provided in the next section will require additional time and resources but ultimately lead to risk-based approach to establish performance objectives (indicators and criteria) that will likely return the site properties to the pre-development state sooner than currently being proposed. However, it appears unlikely that health risks can be fully mitigated at the site properties based on the magnitude of SEQG exceedances for the three monitored parameters: Radium-226, selenium, and uranium.

Detailed Review Comments

Review of the 2024 hearing documents identified several technical issues related to health risks and toxicity from the contamination reported at the site properties and how it is being managed as per the approved performance objectives (indicators and criteria) that should be considered prior to release to the IC Program. The background, comments, and information requests identified in Thompson, M. (2024) should also be considered here as they are similar and directly related to the identified toxicity and health risk issues.

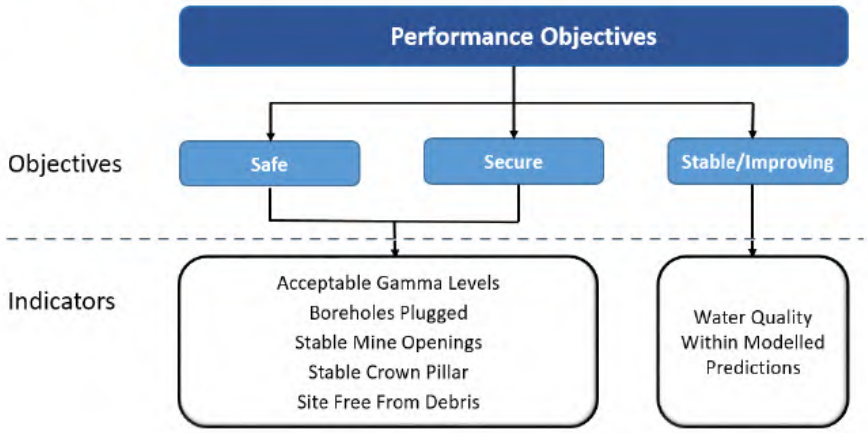
CNSC (2024) Comments

Issue 1: Approved performance indicators do not reflect protection of human health (primary objective of the ICP) for operable exposure pathways for Indigenous traditional land users.

Reference: CNSC 2024; pgs 15-17

Rationale: The approved performance objectives, indicators and criteria do not include indicators for exposure pathways linked to sediment quality or biota (i.e., aquatic and benthic invertebrates, aquatic macrophytes (emergent and non-emergent), semi-aquatic wildlife) (Figure 2.1; CNSC 2024 reproduced below).

Figure 2.1: Performance objectives and indicators



Reliance on management of surface water quality through comparison to modelling predictions is the sole consideration and is unlikely to protect and ensure aquatic ecosystems and habitat are safe for biological receptors.

This approach could limit the protection of human health for traditional land users such as ACFN who rely on plant and wildlife species for their way of life, including:

- consumption as diet items,
- consumption, dermal contact and inhalation from medicinal uses, and
- direct contact with surface water and sediment during hunting, fishing, gathering, and ceremonies.

Considering the degree to which the CNSC has relied on the performance indicators and criteria to conclude the properties are safe, secure, and stable/improving; it is critical that the performance indicators consider protection of ecological and human receptors from all exposure pathways linked to the historical contamination from legacy mining practices. Further, it is unclear why the healthy fish consumption limits are not included in the performance indicators and criteria described in Figure 2.1 and Table 2.1 when they are referred to as part of the long-term monitoring program and relied on for the CNSC determination that the properties can be released (pgs 17 and 19; CNSC 2014). As the performance indicators and criteria do not specifically include the Health Fish Consumption Advisory, this could limit the long-term management of the properties if released to the ICP.

Recommendation/Request: CNSC require Cameco Corporation to update the approved performance indicators and criteria to specifically include the Healthy Fish Consumption Advisory and monitoring components described in section 4.6 (CNSC, 2024).

The performance indicators and criteria should also be updated to reflect protection of Indigenous consumers of traditional foods and medicines that would not be protected through the fish consumption advisory. Specifically, Consumption Advisories and tissue residue limits (mg/kg) should be established for highly values and consumed semi-aquatic medicinal plant (i.e., wild mint) and wildlife (i.e., ducks, moose) species which may accumulate contaminants through direct contact with surface water and sediment and ingestion of prey differently than fish species.

Issue 2: Unclear if all properties (27) meet acceptable criteria for gamma radiation and other performance indicators.

Reference: Section 4 (CNSC, 2024)

Rationale: Table 4.1 indicates that each of the 27 site properties meet the performance indicator for acceptable gamma levels, however, text on pg 23 indicates that "the majority of the properties proposed for release meet the above noted criteria and have an average gamma radiation range of <0.1 µSv/hr to 1.0 µSv/hr above background". It is unclear if each property is meeting the criteria. Further review identified gamma radiation exceedances at Ace Creek site properties.

Recommendation/Request: CNSC update Table 4.1 with quantitative values indicating to status of each property as reported by Cameco (2024). Further, additional performance indicators and criteria for the safety of human health should be added based on responses to recommendations 1 and 2 and the table updated accordingly.

Issue 3: Unsafe health conditions at the majority of site properties as evidenced by water quality concentrations of Radium-226, Uranium, and Selenium exceeding SEQGs for irrigation, protection of aquatic life, and human drinking water sources.

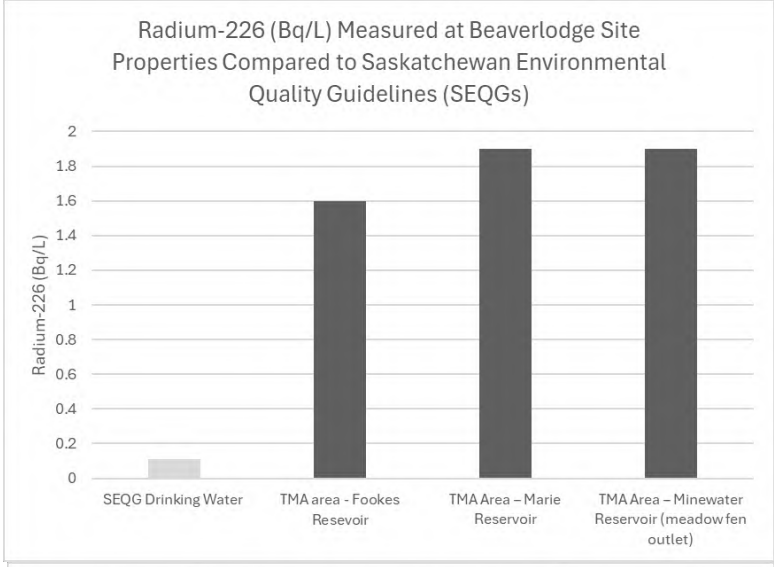
Reference: Section 4 pages 23-46 (CNSC 2024)

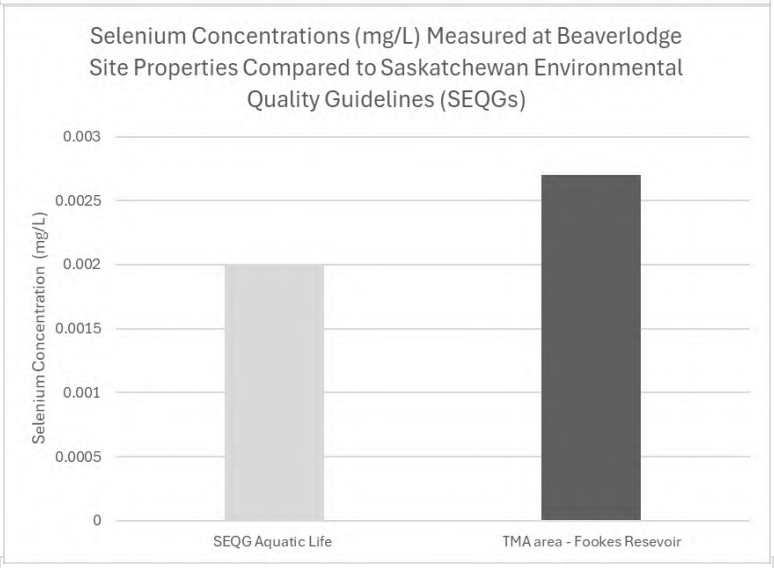
Rationale: The following graphs produced with data reported by CNSC summarized in the table below reported in the hearing submission by Cameco (2024) indicate the magnitude of SEQG exceedances for surface water quality at the various site properties and provide sufficient evidence that the approved performance objectives are not managing or mitigating health risks (unless consumption advisories and use restrictions are followed). The most notable exceedances are related to Radium 226 and Uranium

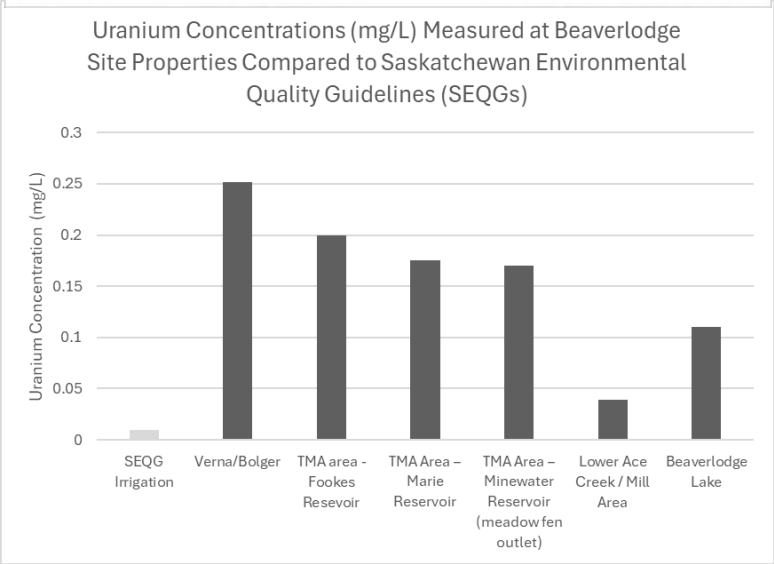
which exceed the SEQG by up to 17 times the safe level for Ra-226 and 25 times the safe level for Uranium at certain site properties.

Recommendation/Request: CNSC require Cameco corporation to modify the performance objectives to an effects-based approach which requires Cameco to monitor and manage the 27 site properties based on observed environmental conditions to minimize and prevent adverse environmental and health effects and risks.

Property	Unit	Parameter	Concentration (average)	Magnitude of reported exceedance (> SEQG)	Data Source (CNSC 2024)
SEQG Drinking Water	Bq/L	Radium-226	0.11		
SEQG Irrigation	mg/L	Uranium	0.01		
SEQG Aquatic Life	mg/L	Selenium	0.002		
Verna/Bolger	mg/L	Uranium	0.252	25.2	Figure 4.3
TMA area - Fookes Resevoir	Bq/L	Radium-226	1.6	14.5	Figure 3.1-3 (Cameco 2024)
TMA area - Fookes Resevoir	mg/L	Uranium	0.2	20.0	Figure 4.6
TMA area - Fookes Resevoir	mg/L	Selenium	0.0027	1.4	Figure 4.7
TMA Area – Marie Reservoir	Bq/L	Radium-226	1.9	17.3	Figure 4.9
TMA Area – Marie Reservoir	mg/L	Uranium	0.175	17.5	Figure 4.10
TMA Area – Minewater Reservoir (meadow fen outlet)	Bq/L	Radium-226	1.9	17.3	Figure 4.13
TMA Area – Minewater Reservoir (meadow fen outlet)	mg/L	Uranium	0.17	17.0	Figure 4.14
Lower Ace Creek / Mill Area	mg/L	Uranium	0.039	3.9	Figure 4.17
Beaverlodge Lake	mg/L	Uranium	0.11	11.0	Figure 4.19 (Cameco 2024)


Radium-226 (Bq/L) Measured at Beaverlodge Site Properties Compared to Saskatchewan Environmental Quality Guidelines (SEQGs)
Radium-226 (Bq/L)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
SEQG Drinking Water
TMA area - Fookes Resevoir
TMA Area – Marie Reservoir
TMA Area – Minewater Reservoir (meadow fen outlet)


Selenium Concentrations (mg/L) Measured at Beaverlodge Site Properties Compared to Saskatchewan Environmental Quality Guidelines (SEQGs)
Selenium Concentration (mg/L)
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
SEQG Aquatic Life
TMA area - Fookes Resevoir


Uranium Concentrations (mg/L) Measured at Beaverlodge Site Properties Compared to Saskatchewan Environmental Quality Guidelines (SEQGs)
Uranium Concentration (mg/L)
0.3
0.25
0.2
0.15
0.1
0.05
0
SEQG Irrigation
Verna/Bolger
TMA area - Fookes Resevoir
TMA Area – Marie Reservoir
TMA Area – Minewater Reservoir (meadow fen outlet)
Lower Ace Creek / Mill Area
Beaverlodge Lake

Issue 4: Unsafe health conditions as evidenced by Healthy Fish Consumption Advisory in Beaverlodge, Martin and Cinch Lakes; unacceptable timelines for sampling in the LTMP.

- 5 servings a month on a regular basis if you are consuming either jackfish (northern pike) or lake trout, or
- 2 servings a month if you are consuming either lake whitefish or white sucker.

Reference: Pg 44 (CNSC 2024)

Rationale: Lake whitefish and white suckers diet is primarily invertebrates indicating accumulation of Radium-226, Uranium, and Selenium from sediments into invertebrates is likely playing a key role in the fate and transport of contaminants within these lake ecosystems, warranting consideration and management of sediment quality in addition to surface water quality (as is the current focus of the LTMP and performance metrics and indicators).

The proposed monitoring of fish tissue residues every 10 years is insufficient to support adaptive management of contaminants in Beaverlodge, Martin and Cinch Lakes and is likely to allow deteriorated water and sediment quality to negatively affect invertebrate and fish populations over the long term with potential long term affects to human health. The trends in surface water quality indicate that active water and sediment treatment is likely required in these waterbodies to address noted contamination in a timely manner and return to safe conditions. Natural attenuation does not appear to be a viable solution to return Beaverlodge, Martin and Cinch Lakes to a state that supports ACFN traditional land use and diets.

Recommendation/Request: RCNSC require Cameco to address recommendation in Issues 1 through 3 and update the CNSC document accordingly.

Issue 5: ERA and detailed quantitative results not available at time of ACFN health risk and toxicology review. Cameco reported predicted risks to ecological receptors occurring for the next 25 years.

Reference: Section 5.1 (CNSC 2024)

Rationale: It is unclear which aquatic and terrestrial species were included in the ERA and whether these are key cultural species in ACFN traditional diets (food items) ore relied on for medicinal and ceremonial (spiritual) uses. It is also unclear how CNSC determined that predicted risks to ecological receptors for over 125 years from exposure to chemical substances in surface water associated with tailings and waste rock is considered safe for the long-term management of the site properties and unlikely to pose a threat to public health. Based on the limited details provided it is also unclear how CNSC determined that monitoring and long-term management of the site properties through surface water performance indicators alone was deemed sufficient when Cameco notes ecological health risks were attributed to concentrations of chemicals in sediments

> "*There remains a low level of risk in some areas due to exceedances of benchmarks for aquatic and terrestrial biota, however based on model predictions, concentrations of non-radionuclides in water and sediment are expected to continue to decrease over time with few exceedances of benchmarks for biota by 2150. A recent update to further validate the modelling using additional fish tissue data collected in 2023 indicates that selenium concentrations are predicted to decrease below benchmarks in all areas by 2100* (CNSC 2024; pg 48)".

Recommendation/Request: CNSC require Cameco Corporation to re-evaluate the Performance objectives, indicators and criteria to align monitoring and management of chemicals with contaminated media associated with predicted health risks.

At a minimum metrics and criteria should be developed for surface water, sediment, and tissue residues in invertebrates, fish, plants, and wildlife. Modifications should focus on reducing contaminant concentrations as quickly as possible to establish safe conditions that support traditional land uses linked to consumption and exposure to surface water, sediment and biota relied on as traditional foods and medicines.

Unsafe conditions and consumption restrictions ranging from 75-125 years at the waterbodies in each site property (as indicated in signage in Figure 4.18) are unacceptable to ACFN and additional treatment should be evaluated to decrease timelines where unsafe conditions have been identified.

Issue 6: Language in CNSC report is misleading with regards to anticipated health impacts.

Reference: CNSC 2024 Section 5.1.1 and 5.1.2

Rationale: As stated by Cameco, there are potential adverse health effects if people consume more fish than advised or consume drinking water. These advisories are in place because concentrations of Radium-226, Uranium, and Selenium exceed SEQG surface water quality guidelines for the protection of aquatic life, irrigation, wildlife and drinking water. Language indicating "safe" conditions used by CNSC and Cameco is misleading and does not specifically state the reasons for the health advisories or the expected duration that people could be at risk from consuming foods and surface water at waterbodies on the site properties. There is also no indication of what health effects may occur if people consume more than the recommended amounts of fish or surface water. Further, there appears to be a lack of consideration for consumption of other traditional foods such as plants and semi-aquatic and terrestrial wildlife which may be consumed in addition to fish. This may have been considered but the HHRA and ERA were not available to support this review. Finally, there is no indication that the Beaverlodge mine site is protected as the site is open and accessible to the public even though Cameco and CNSC are aware of potential health risks if exposure beyond those recommended or considered in the ERA and HHRA occur.

The performance indicators and criteria and LTMP do not include monitoring linked to human populations. For example, there is an absence of human health focused performance indicators and criteria (i.e., frequency of human activities conducted at the sites compared to HHRA parameter inputs, public health statistics in local populations/communities (Indigenous and non-Indigenous) using the site properties for conditions linked to chemical specific critical effects/endpoints).

> "*The IEMP results add to the body of evidence that the environment in the vicinity of the Beaverlodge mine site is protected and that there are no anticipated health impacts from the site, provided the provincial guidelines are followed regarding fish and water consumption* (CNSC, 2024; pg 49)".

This is even more concerning given the statement that "community members should not consume fish or drink water from Nero, Marie, Meadow, Minewater, and Greer lakes and from lower Ace Creek between Ace and Beaverlodge lakes" which indicates there are only 3 lakes that Indigenous community members can safely consume fish from by following the Healthy Fish Consumption Guidelines (Beaverlodge, Martin and Cinch Lakes) but that no other lakes or waterbodies in the are safe for consumption of fish. Again, it is unclear how CNSC and Cameco have determined that the site properties are on track to support safe

uses by Indigenous communities. As noted by CNSC, there appears to be monitoring of chemicals tissue residues and community awareness and adherence to health advisories for fish and drinking water consumption however, ACFN does not appear to be one of the engaged communities, so this statement is an overreach.

Concerns related to the use of "safe" language and conclusions by CNSC were identified by YNLR to CNSC staff as well (Section 6.1.1 pg 54). Confusingly, CNSC (2024) state " *'Safe' is one of the performance objectives for the site, but this performance objective is only in relation to the land and is not intended to cover any waterbodies (*pg 54*)"* which conflicts with information presented by CNSC in the document which rely on surface water monitoring data to conclude fish consumption is safe event through selenium concentrations exceeds safe consumption levels in fish tissues *"Despite selenium fish tissue concentration benchmark exceedances, measured selenium concentrations in water quality remain below SEQG and/or modelled water quality predictions at all stations, and consumption of country foods remains safe when respecting the water and fish consumption advisory* (pg 48)."

Recommendation/Request:

- CNSC consider the rationale provided here and update the document to provide independent statements.
- CNSC and Cameco engage ACFN to determine if the fish and drinking water consumption restrictions are acceptable to the community, being adhered to by ACFN community members, and identify any accommodation for impacts to s.35 Rights infringements.
- CNSC require Cameco to modify performance indicators to include chemical specific indicators and criteria for the quality of surface water (mg/L), sediment (mg/kg) and biota (mg/kg) to measure and evaluate "safe" performance objectives aligning with predicted risks from the ERA and HHRA (Figure 2.1; Table 2.1). Proposed indicators and criteria to measure and track "safe" performance objectives must consider, and where technologically feasible, align with the ACFN Water Policy "tu bet'a ts'ena" (2023).

Issue 7: CNSC reconsider conclusions related to regulatory requirements and recommendations (Section 8) until indicators and criteria for safe performance objectives include surface water quality, sediment quality, and biological tissue residues.

Reference: CNSC 2024; Section 8 pg 63

Recommendation/Request: CNSC require Cameco to define indicators and criteria for safe objectives that consider the quality and safe use of surface water, sediment, and biota for dietary, medicinal, and ceremonial activities relied on for ACFN members traditional way of life.

Cameco Corporation (2024) Comments

Issue 8: Beaverlodge Management Framework, Remedial Options (2009 and 2012 workshops), Beaverlodge Quantitative Site Model (QSM), and Ecological Risk Assessment (ERA) has not been reviewed and approved by Athabasca Chipewyan First Nation

Reference: Section 1.1.3.2; 1.1.3.3; 1.1.3.4; 2.6

Rationale: Given the reliance of the request for release of the 27 site properties on previously selected remedial options based on the cited reports and workshops[3], it is imperative that ACFN be provided the opportunity to review and comment on whether the remedial options align with the Nations Water Policy (ACFN, 2023) and would not impact their s.35 Rights.

Recommendation/Request: Prior to transfer of the remaining 27 site properties to the Institutional Control Program (ICP), Athabasca Chipewyan First Nation requests sufficient time and resources to review the following relied on to inform the management of site-specific risks to ensure the Beaverlodge properties:

- Beaverlodge Management Framework (the Framework),
- Beaverlodge Path Forward Report,
- Remedial Options Workshop materials and outcomes (2009; 2012),
- QSM,
- Ecological Risk Assessment
- Traditional Foods and Human Health Risk Assessment
- Performance Objectives, Indicators, and Criteria document, and
- other referenced documents.

Issue 9: Performance objectives, indicators and criteria do not align with Northern Mine Decommissioning and Reclamation Guidelines (Saskatchewan Ministry of Environment, 2008) or LTMP and decommissioning objectives at other Uranium mines in Saskatchewan.

Reference: pg 5

Rationale: Review of provincial guidance for decommissioning and reclamation at mine sites indicates that the approved indicators and criteria for stable/improving performance objectives defined by Cameco in the Framework does not align with the stated objective “the quality of water running off waste rock piles should meet Saskatchewan Surface Water Quality Objectives” (now referred to as SEQGs) (Saskatchewan Ministry of Environment, 2008). Nowhere in the provincial guidance is it recommended or implied that monitoring data should be compared to model predictions other than to verify predictions from the application phase to adapt and improve monitoring. The provincial guidance also explicitly states that decommissioned areas (i.e., waste rock and tailings facilities) should not require any long-term maintenance.

By comparison the Framework relied on by Cameco, as approved by CNSC, does not require comparison of chemical concentrations measured in surface water to provincial guidelines and the modelling

[3] Cameco (2024; pg 7) “Workshop results informed the assessment of potential remedial options and were
instrumental in development of the Beaverlodge Path Forward Report (Path Forward) (Cameco 2012) and establishing the Beaverlodge Performance Objectives and Indicators”

predictions indicts the site will require management and land use restriction for ~ 125 years to prevent risks to human health from chemical exposures.

Further to this, other mines such as Cluff Lake (operated by Orano Canada Ltd) rely on site specific decommissioning water quality objectives to assess performance (under the long-term monitoring and maintenance plan. While this approach may allow for deteriorate conditions that could increase environmental effects observed in water bodies from elevated concentrations of contaminants, it is risk based and preferred to relying on comparison to predicted modelling data that does not consider monitoring or preventing to minimize health risks and adverse effects (Orano Canada Inc., 2020; Integrated Toxicology Solutions Ltd., 2023)

Since the SEQGs are legally binding standards when referenced in legislation, regulations, permits or the Saskatchewan Environmental Code (code) (Saskatchewan Government, 2014), it is unclear how the site properties are meeting the requirements for remediation and release to the ICP[4] given the following:

- Monitoring data indicates gamma radiation and concentrations of radium 226, selenium, and uranium are exceeding provincial standards and SEQGs (see table and graphs presented in CNSC comment Issue 3).
- Monitoring data at the following sites indicate visually increasing or stable trends in concentration. Note results of statistical trend analysis were not provided so it is unclear if trends are being detected, but visually stable trends indicate that concentrations of chemicals are not decreasing over time through natural attenuation (the selected remediation).
    - Fookes Resevoir
        - Ra-226 increasing and predicted to continue increasing for the next ~125 years (max concentration ~2150); exceeding SEQG (Figure 3.1-3)
        - Uranium stable to increasing since 2020; exceeding SEQG (Figure 3.1-4)
        - Selenium stable to increasing since 2016; exceeding SEQG (Figure 3.1-5)
    - Marie Resevoir
        - Ra- 226 increasing and predicted to continue increasing for the next ~85 years (max concentration ~2110); exceeding SEQG (Figure 3.1-7)
        - Uranium stable since 2018; exceeding SEQG (Figure 3.1-8)
        - Selenium stable since 2012; exceeding SEQG (Figure 3.1-9)
    - Minewater Resevoir
        - Ra- 226 increasing and predicted to continue increasing for the next ~85 years (max concentration ~2110); exceeding SEQG (Figure 3.1-11)
        - Uranium stable/fluctuating since 2011; exceeding SEQG (Figure 3.1-12)
        - Selenium stable since 2013; exceeding SEQG (Figure 3.1-13)
    - Lower Ace Creek – URA 1
        - Uranium stable/fluctuating; exceeding SEQG (Figure 3.2-3)
    - Lower Ace Creek – URA 7
        - Gamma radiation exceedance
        - URA 1 water quality applies to URA-7
    - Bolger 1
        - Uranium increasing/fluctuating; exceeds SEQG (Figure 3.3-3)

[4] Cameco (2024; pg 5) “A site cannot be accepted into the IC Program until remediation activities have been completed and the relevant regulatory authorities have issued a release”

The LTMP and Framework indicators and criteria for performance objectives rely on comparison to predicted concentrations of chemicals in surface water rather than chemical specific SEQGs, an unorthodox approach that does not appear to be risk based, is managing the site properties in a manner that allows for i) exceedances of provincial surface water quality guidelines by up to 25 times the safe exposure level and ii) consumption advisories in place by the Saskatchewan Health Authority (SHA) at water bodies within the site properties.

Reliance on comparison to predicted surface water quality modelling to manage remediation and performance does not appear to be an approved approach for the management of substances of potential concern (SOPCs) in Saskatchewan.

It remains unclear from the rationale provided here showing exceedances of SEQGs between 2 to 25 times higher than the safe values in surface water for protection of aquatic biota, plant health (irrigation), and human health (drinking water), how Cameco concluded "*Human health and ecological risks have been managed to acceptable levels and the properties should be considered for release from CNSC licensing and transfer into the IC Program (*pg 28*)*" at the Fookes Reservoir .

Recommendation/Request: Address Recommendations/ Requests specified in Issues 1 through 5 in CNSC (2024) review comments.

Issue 10: Natural recovery is not a feasible remediation strategy for the Tailings Management Area (TMA) and Greer Lake based on predicted deterioration (increasing concentrations) of Radium 226 concentrations in surface water from contaminated sediment sources for the next 15 to 60 years.

Reference: Section 2.6 pg 14 and 15

Rationale: It is scientifically indefensible to consider natural attenuation an appropriate remediation strategy when sources of contamination left in place are predicted to continue deteriorating environmental conditions for over 100 years (e.g., radium 226 in the TMA area).

Reporting of this information by Cameco as confirmation that water quality is performing as expected and meeting performance objectives, and criteria for surface water quality indicators shows proof that the performance objectives were not identified using a risk-based approach but rather defining a method that would limit treatment to manage contamination. It is unclear to the reviewer how the CNSC, provincial government, ECCC, Health Canada, and Saskatchewan Health Authority approved of the Framework and Next Steps documents as appropriate for managing and preventing health risks on the Beaverlodge site properties (27).

Section 2.6 does not provide the same details as presented in the CNSC hearing materials (2024) which describe concentrations of radium 226, selenium, and uranium measured at monitoring locations. The table and figures presented in Issue 3 to support this review indicate the property areas where surface water conditions are exceeding risk based SEQGs. The magnitude of exceedances indicates that there could be adverse effects on the health, reproduction, and diversity of aquatic biota and communities in these waterbodies due to the reported concentrations.

Recommendation/Requests:

- Cameco work with regulatory agencies and stakeholders and Rightsholders (including ACFN) to define risk-based performance objectives for safe use and environmental conditions and identify indicators and criteria for chemical substances in surface water, sediment, and biota which align with predictions from the ERA.
- Cameco confirm that groundwater is not a receptor of concern from seepage of chemicals from waste rock and tailings by providing monitoring data which indicates levels of contaminants of concern are below SEQGs or background/ natural levels.

Issue 11: Country Foods Assessment and Risk Assessment (2012) and Ecological Risk Assessment (2020) not available at time of review so results could not be verified.

Reference: Section 4.4; CanNorth and SENES 2012; CanNorth 2020 ERA; CBEMP HHRA (Uranium City and Camsell Portage study, 2023)

Rationale: The referenced document contains details related to the fish and drinking water consumption advisories in place at Beaverlodge properties. Review of this document is required to determine if ACFN consumption rates for traditional food and medicinal species would have been adequately considered and if the results would be applicable to ACFN members.

Recommendation/Request: Cameco please provide the cited report (CanNorth and SENES 2012) along with sufficient time and resources to support the review prior to hearing decision.

Issue 12: Performance objectives, indicators, and criteria are not managing remediation of contamination at Beaverlodge properties in a manner that is preventing deterioration of environmental conditions, and the properties should not be released to the IC Program.

Reference: Section 4.5; pg 68.

Rationale: Reporting by Cameco (except below) clearly indicates that conditions at the Beaverlodge properties are not managing human health and ecological risks to acceptable levels and the property should be considered for release from CNSC licensing and transfer into the IC program (as stated in the" Evaluation of Performance Indicators" for the Fookes, Marie, and Minewater Resevoirs sections (see Issue 9).

The following statement by Cameco (2024) do not indicate health risks are being mitigated but rather, restrictions are required to manage environmental conditions which could adversely affect human health. Land use restrictions are a management tool that should be relied on in the short term while active treatment and remediation strategies are evaluated and implemented, they are not intended to be relied on for over 100 years (as predicted by Cameco surface water quality modelling) while leaching of contaminants from sediments to surface water is "naturally attenuated".

- *The results of the assessment for Uranium City and Camsell Portage demonstrated that risks are negligible for people who consume a typical, or a high amount of traditional food while respecting local fish and water quality advisories (pg 67).*
- *Overall, the FDCBP demonstrated that it remains safe to eat moose that use, or eat vegetation from, the Fookes Delta. This is consistent with regional country foods assessments as well as the 2020 ERA that concluded that living a traditional lifestyle and consuming country foods from the Beaverlodge area, while respecting the water and fish advisories, can continue to be done safely (pg 68).*
- *Residual risks with respect to the naturally recovering environmental conditions in waterbodies on and downstream of the decommissioned Beaverlodge properties are managed through a Healthy Fish Consumption Guideline issued by the SHA and SkMOE. This guideline indicates that members of the public can safely consume a total of five servings of lake trout/northern pike or two servings of white sucker/lake whitefish, per month, from Beaverlodge, Martin and Cinch Lakes. The guideline recommends avoiding the consumption of fish from Nero, Marie, Meadow, Minewater and Greer Lakes, and from lower Ace Creek (between Ace Lake and Beaverlodge Lake). The guideline also recommends that people avoid drinking water from those waterbodies as they may contain elements that would not be eliminated by boiling (pg 68).*
- *Consistent with previously accepted assessments, the 2020 ERA concluded that the immediate and downstream environments will continue to gradually recover over time. As show previously, based on reported use of the land, there are not expected to be risks to humans residing near, or consuming food harvested from properties related to the decommissioned Beaverlodge properties. Therefore, living a traditional lifestyle and consuming country foods from the area, while respecting the water and fish advisories, can continue to be done safely (CanNorth 2020) (pg 69).*

Recommendation/Request: Cameco and ACFN engage Health Canada and Indigenous Services Canada to review the health risk and traditional food studies, assessments and monitoring data for each of the Beaverlodge properties and confirm whether the performance objectives, indicators, and criteria are appropriate and can be relied on to safely mitigate and manage human health risks from exposure to contaminants at the properties. Health Canada should also provide direction on whether land use restrictions on traditional foods and drinking water supplies as proposed by Cameco (and approved by CNSC, ECCC, SPH) are acceptable for First Nations.

Issue 13: Proposed program components for LTMP do not consider contamination of sediment, groundwater, aquatic plants and invertebrates and non-aquatic biota. Frequency may be too long to detect deviations from predictions or changes in condition which could increase health risks.

Reference: Section 4.9.1

Rationale: Content in the submission indicates that sediments are likely sources of contamination contributing to elevated concentrations of Ra-226, selenium, and Uranium in surface water bodies. The species-specific fish consumption advisories also indicate that invertebrates are likely contributing to the more stringent advisory for white sucker/lake whitefish (max 2 servings per month) compared to the piscivorous species (lake trout/northern pike).

Recognizing the ERA and HHRA documents referred to in the hearing submission were not available for review and details in these reports may address this concern, there are still concerns that the proposed LTMP may not be focused on the most sensitive indicator of change in surface water bodies and sources of health risks driving the consumption advisories.

Notably Performance Objectives, indicators and criteria and LTMP components do not discuss or consider potential contamination of groundwater and soil from waste rock or tailings management. Again, previous studies may have determined these pathways to be unlikely sources or exposure pathways affected by seepage or direct contact with waste rock and tailings, however, review of these documents is required to confirm the LTMP is representative of potential sources of chemicals.

Recommendation/Request: Based on content in the applications, Cameco update the LTMP to include sediment quality and monitoring chemical tissue residues in aquatic invertebrates as early indicators of changing conditions surface water linked to consumption advisories. See Thompson, M. (2024) review for determination of appropriate monitoring frequencies.

Recommendation: Cameco provide a summary of data (observed and predicted) from previous studies to support exclusion of the following components from the LTMP;

- Verification of contaminants of potential concern and that monitoring should be limited to Ra-226, selenium, Uranium, and
- Verification that elevated concentrations of chemical constituents associated with waste rock and tailings are not currently observed or predicted to be elevated in groundwater and soils associated with the site properties.

Closing

This document was prepared under the direction of a professional biologist registered in the Province of Alberta. Integrated Toxicology Solutions Ltd. trusts that it will provide ACFN DLRM with the information it requires to engage in hearing proceedings related to the Beaverlodge site properties requested for release to the Saskatchewan IC Program.

Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

Mandy Olsgard, M.Sc., P. Biol.
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Integrated Toxicology Solutions Ltd.
Edmonton, AB

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