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CMD 22-H5.1B

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Supplementary Information

Written submission from Cameco Corporation

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

Commission Public Hearing

March 24, 2022

Renseignements supplémentaires

Mémoire de Cameco Corporation

À l'égard de

Cameco Corporation, Projet Beaverlodge

Demande de modification du permis de Cameco visant à retirer 18 propriétés du projet Beaverlodge du contrôle de la CCSN

Audience publique de la Commission

24 mars 2022

Canada

1.0 Purpose

On July 14, 2021, Cameco Corporation (Cameco) submitted an application to the Canadian Nuclear Safety Commission (CNSC) for the release of 18 decommissioned Beaverlodge properties from licensing and to amend WFOL-W5-2120.1/2023 to reflect those changes. In support of that application, Cameco submitted Commission Member Document (CMD): 22-H5.1 on December 8, 2021.

The purpose of this document is to provide supplementary information regarding Cameco's engagement efforts and the underlying technical studies that support our licence amendment application, to address general comments provided to the CNSC in written submissions from intervenors. In particular, responses are provided to specific questions raised by the Ya'thi Néné Land and Resource Office (YTNLRO) in CMD: 22-H5.15, regarding the Beaverlodge Hab Area Evaluation.

2.0 Engagement Activities

Cameco has long-standing relationships with residents of the Athabasca Basin and the broader Northern Administrative District. A variety of well-developed tools are used to communicate information to northern residents as well as other interested groups. Engagement activities occur formally through Cameco and government-sponsored committees, through meetings with local communities or their elected representatives and informally through various activities, such as site tours, community visits and general public information sessions. Cameco will continue to engage with the people to listen to and address their questions and concerns. Our intent is to provide meaningful engagement and opportunities to comment or ask questions about the decommissioned Beaverlodge properties as well as for Cameco to respond to issues raised.

Since 2009, when the Beaverlodge Management Framework was developed and reviewed by stakeholders (i.e., the Northern Saskatchewan Environmental Quality Committee and Uranium City residents and leaders), Cameco has consistently described the end goal as receiving a release from CNSC licensing and transferring the decommissioned Beaverlodge properties to the Institutional Control (IC) program. It is standard practice for Cameco to update interested groups on IC progress and plans at annual public meetings in addition to a variety of *ad hoc* engagement methods throughout the year (e.g., articles, meetings).

Specific to the current request to release 18 properties from CNSC licensing and facilitate IC transfer, Cameco notified interested groups that this request had been initiated via an article in the Summer 2020 Newsletter published by YTNLRO. Following this publication, regular meetings and engagement took place at which more detail on the request was discussed and at which YTNLRO and members from the communities that YTNLRO represents were present. This included virtual public meetings, through which positive feedback was received from participants, including a community member from Camsell Portage who appreciated the ease of attending a virtual public meeting compared to in person ones in the past.

Following the 2019 hearing, it has also been Cameco's intent that ongoing engagement activities augment our efforts to gain a better understanding of the area's history and First Nations and

Métis peoples' traditional land use. The list below provides engagement activities conducted in 2020 and 2021 for this purpose. It should be noted that face-to-face engagement is Cameco's preferred method for engagement whenever possible, however, the below activities were adapted in response to the COVID-19 pandemic and continued to provide opportunities to share information and elicit feedback from interested groups.

- Virtual public meetings in Uranium City, shared via social media, opportunity to watch at later dates with Dene translation.
- Virtual site tours to provide reconnection to the area virtually (recognizing the remoteness and access restrictions) with Dene translation.
- Fact sheet distributed in community and posted online.
- Environmental Risk Assessment summary posted online.
- Meeting with Fond du Lac (FDL) Leadership and Elders with Dene translation.
- Local site tours with YTN reps and Métis Nation of Saskatchewan Local 50 president.
- Vegetation/moose study with youth.
- Dene translations for the Beaverlodge Sites website.
- Requests to engage with land and resource users from ACFN.

Cameco has a variety of feedback mechanisms to provide interested groups opportunities to comment or ask questions about the decommissioned Beaverlodge properties as well as for Cameco to respond to issues raised. These include but are not limited to:

- Question and answer sessions at public meetings.
- Communication through community Athabasca Joint Engagement and Environmental Subcommittee members.
- Community representatives on the Northern Saskatchewan Environmental Quality Committee.
- Social media channels.
- Public inquiry features on beaverlodgesites.com, cameco.com and cameconorth.com websites.
- Cameco's Sustainability and Stakeholder Relations staff through their satellite offices in the Athabasca Basin First Nations communities. Cameco contacts are also available through the Cameco Northern and Beaverlodge websites.

Cameco has and will continue to work through its CNSC approved Public Information Program and provide a variety of opportunities for engagement and ensuring information is made available to interested groups. The YTNLRO has previously commented that they remained "generally well informed" and "was pleased with the level of communication between CNSC, Cameco and [YTNLRO]" as noted in YTNLRO's intervention in the Regulatory Oversight Report meeting held on December 12, 2018, and intervention dated September 6, 2019, respectively. The intent of all of Cameco's engagement efforts is to have a dialogue with and elicit feedback from the participants. The opportunity always exists for the sharing of local or traditional knowledge.

The following is a summary of the engagement related to the decommissioned Beaverlodge properties conducted by Cameco with the rights holders and/or YTNLRO since 2009. Information highlighted in **bold** shows specific, detailed engagement on the decommissioned Beaverlodge properties. Large scale engagement activities such as the Community-Based Environmental Monitoring Program or the Eastern Athabasca Regional Monitoring Program, the Uranium City Country Food Study (2010/2011), and the 2014 Uranium City Land Use study are not included in the summary. The 'Participants' data includes documented representation by organizations or communities, including the communities YTNLRO represents. Other participants may also have attended any particular event in the list. Participants can also "*wear more than one hat*" and may have attended on behalf of more than one organization.

DATE	ENGAGEMENT DESCRIPTION
Feb. 18, 2009	**Hearing:** Application to Renew the Beaverlodge (BVL) Mine and Mill Site Waste Facility Operating Licence and to Exempt Five Decommissioned Sites **Participants included:** Fond du Lac First Nation
June 17 and June 18, 2009	**Workshop: Remedial Options Workshop (intro, common understanding, identification of methods, develop scenarios, assess scenarios, identify info gaps, design, and prioritize studies)** **Participants included**: Athabasca Working Group (AWG), Uranium City, Fond du Lac First Nation, Hatchet Lake First Nation, Stony Rapids
May 20, 2009	**Public Meeting/Site Tour**: Goal was to communicate with Uranium City residents and Northern Saskatchewan Environment Quality Committee (EQC) the results of the 2009 CNSC meeting, **update the community and EQC on issues around the BVL properties and to organize an advisory group of Uranium City residents to work with Cameco to develop a remedial management plan.** Question/Answer session (QA) **Participants included:** Uranium City, Fond du Lac First Nation
Oct. 7, 2009	**EQC Meeting/Site Tour:** Discussed the 2009 activities. Other topics of discussion included the IC program, results from the remedial options workshop, the decision-making flowchart and future planning. QA.
May 31, 2010	**Public Meeting/Site Tour:** Presented history, properties, and remedial options. QA. **Participants included:** Uranium City
July 13, 2010	**Ad Hoc Meeting**: **Year 1 Country Foods program meeting. Purpose: to describe the long-term objectives of the study, identify potential the foods potentially harvested by residents, explain the interview process and questionnaire form, and meet local residents.** **Participants included:** Uranium City
Oct. 6, 2010	**AWG Meeting:** Presented history, transition phase monitoring, IC program and management framework. QA.
Dec.10, 2010	**EQC Meeting/Site Tour:** Brief overview of the BVL history, **Cameco provided an update of 2010 activities and presented the proposed BVL path forward**
June 6, 2011	**Public Meeting/Site Tour:** BVL general presentation, included presentation of summary of the Year 1 results of Country Foods program to the residents of Uranium City. **Residents were encouraged to provide feedback on the results at the meeting. Short follow-up interviews were conducted at this time to gather more detailed information on the quantity and the locations of country foods harvested on the former BVL properties**. During this visit, community members who were interested in taking part in the summer and fall sample collections for Year 2 of the program met with the project manager from CanNorth to discuss the project in more detail. QA. **Participants included:** AWG, Uranium City
Sept. 27, 2011	**Public Meeting/Site Tour**: Key messages provided by Cameco included history and background, management plan, summary of 2011 activities, water quality results from 2011, and planned activities. QA. **Participants included:** AWG, Uranium City
Dec. 8, 2011	**AWG Meeting:** Discussed 2011 activities and activities planned for 2012, BVL fact sheet distributed **Participants included:** AWG, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation, Wollaston Lake, Stony Rapids, Camsell Portage

Dec. 15, 2011	**ROR/Update:** Cameco and CNSC staff provided Commission members with update on the implementation of the BVL Management Framework.
April 3 and April 4, 2012	**Workshop: Remedial Options Workshop. Objective: Obtain informed, clear, and documented feedback about the predicted benefits and estimated costs of a range of remediation options, from a cross-section of stakeholders.** **Participants included:** Uranium City, Fond du Lac First Nation
June 4, 2012	**Public Meeting/Site Tour:** Discussed Remedial Options Workshop, country foods study, CNSC hearing in Oct 2012, regional health studies. QA. **Participants included:** AWG
Sept. 25, 2012	**EQC Meeting/Site Tour:** General presentation and site tour. QA.
Jan. 15, 2013	**Public Meeting/Site Tour: Cameco presented the path forward and performance objectives regarding additional remediation of the decommissioned BVL properties. QA**. **Participants included:** AWG**,** Uranium City, Stony Rapids, Fond du Lac First Nation, Black Lake First Nation, Hatchet Lake First Nation
Feb. 20, 2013	**AWG Meeting:** Update on public hearing for BVL **Participants included:** AWG, Fond du Lac First Nation, Hatchet Lake First Nation, Black Lake First Nation, Uranium City, Stony Rapids, Wollaston Lake
April 4, 2013	**Hearing:** CNSC hearing, **Fond du Lac First Nation oral intervention: "*supports the renewal of Cameco's licence for the decommissioning of the Beaverlodge mining site for a period of 10 years*".**
Sept. 24, 2013	**EQC Meeting/Site Tour: Cameco presented an update on BVL, including a summary of April 4, 2013 hearing, the Remedial Options Workshop, the Path Forward and related Performance Indicators.** QA. **Participants included:** Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation, Stony Rapids
Dec. 11, 2013	**AWG Meeting: BVL update** and discussion around creek diversion **Participants included:** AWG, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Stony Rapids
Feb. 26, 2014	**EQC Meeting: Described the history, the BVL management framework, and the path forward for managing the site, with the goal of transferring the property to IC.**
June 16, 2014	**Public Meeting/Site Tour:** Presentation at this meeting focused on the path forward for re-establishing Zora Creek and described the work that would restrict access to the nearby Bolger waste rock pile. Also discussed other path forward projects being implemented in 2014 (gamma, crown pillar assessment, assess mine openings) QA. **Participants included:** Uranium City
Oct. 1, 2014	**ROR/Update:** CNSC Staff Update on BVL. This update contained the planned Path Forward timelines and the applicable Performance Indicators. CNSC expressed its satisfaction with this information.
Oct. 8, 2014	**EQC Meeting:** Presentation included background information and current and future activities occurring on the site. The activities discussed included the re-establishment of Zora Creek, the site-wide gamma survey and assessment of crown pillars.
Dec. 12, 2014	**AWG Meeting: BVL Management framework, path forward and activities** **Participants included:** AWG, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Stony Rapids
Feb. 19, 2015	**AWG/ Athabasca Joint Engagement and Environment Subcommittee (AJES) Meeting: Presentation on the current and future activities at the BVL sites such as an update on the work to re-establish Zora Creek and remediation and monitoring activities.** **Participants included:** AWG/AJES, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Wollaston Lake, Stony Rapids
May 19, 2015	**Public Meeting/Site Tour:** Beaverlodge management framework and update on current/future activities identified in the Path Forward. Focused on the plans to prepare 15 properties for transfer to IC and site activities. QA. **Participants included:** Uranium City, Hatchet Lake First Nation, Stony Rapids, Black Lake First Nation, Fond du Lac First Nation,
May 26, 2015	**EQC Meeting:** Brief summary was provided to all EQC members regarding the work to re-establish Zora Creek and remediation and monitoring activities.

Oct. 1, 2015	**ROR/Update:** CNSC Staff Update on BVL activities completed since 2014. Including an update on the selected remedial options being implemented. Also included was a statement regarding gamma surveys and the completed land-use study with Uranium City. CNSC Staff supported the conclusions from these studies. **Stated the goal of preparing the sites for transfer to the IC by 2023.**
Sept. 20, 2016	**Public Meeting/Site Tour:** Discussed the 2016 activities for the decommissioned BVL properties and the plans for transferring some of these properties to the provincial IC program. Also discussed the plan and schedule for transferring all properties to IC by the end of the licence tern (2023). QA. **Participants included:** Uranium City
Oct. 26, 2016	**AJES Meeting:** Q4 AJES Meeting **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation
Dec. 1, 2016	**AJES Meeting:** Q4 AJES Meeting, **engagement plans for BVL in 2017** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation
Dec. 14, 2016	**ROR/Update:** CNSC Staff Update on BVL. Included **statement that Cameco has transferred 5 properties to IC and intends to transfer the remaining properties by 2023.**
Jan. 13, 2017	**Ad Hoc Meeting: History of BVL and overview of the IC and plans for release** **Participants included:** YTNLRO
May 30, 2017	**Public Meeting/Site Tour:** Overview of the IC, Path Forward, Performance Objectives and Indicators and plans for current release to IC. Also discussed plans to transfer remaining properties to IC during current licence term. **Participants included:** YTNLRO, Uranium City, Fond du Lac First Nation, Hatchet Lake First Nation
Nov. 13, 2017	**AJES Meeting:** AJES Q4 Meeting - engagement plan discussion, **including BVL** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Fond du Lac First Nation
May 29, 2018	**Public Meeting/Site Tour:** Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties to IC and the schedule for transferring all properties by 2023. **Primary goal of the 2018 engagement process was to discuss the 2017 activities completed on the decommissioned BVL properties and the 2018/2019 plans for transferring properties to the IC** **Participants included:** Uranium City.
June 6, 2018	**Workshop:** Interactive workshop with Athabasca Basin communities to build capacity - from the beginning of mining to the end. Province of Saskatchewan presented on the IC program and Beaverlodge was specifically discussed. **Participants included:** YTNLRO, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation
Nov. 28, 2018	**EQC Meeting:** Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties and schedule for transferring all properties by 2023. Discussed Performance Indicators and Stage 2 transfer (20 properties)
Dec. 12, 2018	**ROR/Update:** BVL update, noted IC progress and plans, discussed how land use and local knowledge was used. YTNLRO applied for and received intervention funding. The oral intervention stated: "*The YTNLRO is generally well-informed about the activities and undertakings of the uranium mining operations located in the Athabasca Basin and appreciate participating at events such as this. We acknowledge the participation of the CNSC in meetings and communications with both our organization and northern community members. YTNLRO highly values the beneficial relationships that have been created throughout this collaborative process. We highly value this collaborative process and working relationships with both the CNSC and the mining companies.*" **Participants included:** YTNLRO, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
June 4, 2019	**Public Meeting/Site Tour**: Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties at hearing in October 2019 and the schedule for transferring all properties by 2023. QA. **Participants included:** YTNLRO, Uranium City, Fond du Lac First Nation
July 9, 2019	**EQC Meeting:** Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties at hearing in October 2019

	and schedule for transferring all properties by 2023. Provided at the regularly scheduled NSEQC meeting. Discussions focused on the request to release 20 of these properties from CNSC licensing
Aug. 20, 2019	**Ad Hoc Meeting**: YTNLRO and many CNSC reps to answer questions, Cameco present as back-up. **Discussion focussed on 2019 release of 20 properties.**
Aug. 30, 2019	**Intervention:** AJES supported the application
Sept. 4, 2019	**Ad Hoc Meeting: Discuss 20 properties for release in 2019 with Basin leadership and YTNLRO.** **Participants included:** YTNLRO, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation, Wollaston Lake, Stony Rapids
Sept. 6, 2019	**Intervention:** Written intervention for the Stage 2/20 properties hearing: *"Ya'thi Néné has been pleased with the level of communication between the CNSC, Cameco and our office."*
Oct. 2, 2019	**CNSC Hearing:** YTNLRO oral intervention with Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation leadership
Dec. 5, 2019	**AJES Meeting:** AJES Q4 meeting - engagement plan discussion, **including BVL** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
April 22, 2020	**AJES Meeting:** AJES Q2 Meeting – **engagement plan update for BVL** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Black Lake First Nation
June 29, 2020	**AJES Meeting:** AJES Q2 Meeting - **engagement plan update for BVL** **Participants included:** YTNLRO, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
Summer 2020	**Article:** YTNLRO Newsletter: **BVL Update, notes that Cameco is initiating the process for release of Stage 3 properties in 2021**
Sept.10, 2020	**AJES Meeting**: AJES Q3 meeting - engagement plan update, included discussion of BVL **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation
Nov. 13, 2020	**Online Content (e.g., social media, website):** The invite for the 2020 public meeting was made public **on Yá'thi Néné's social media channel** to help promote the event.
Nov. 18, 2020	**Public Meeting/Site Tour:** Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties at hearing in October 2019 and schedule for transferring all properties by 2023. Focus was to discuss intention to release and **transfer properties in 2021**. Follow-up questions were received from YTNLRO. **Participants included:** YTNLRO, Uranium City, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation, Camsell Portage, Stony Rapids, Wollaston Lake
Nov. 20, 2020	**Online Content (e.g., social media, website):** Meeting recording and virtual tour links distributed to all invited participants as follow-up after the meeting via email and on Cameco social media pages.
Dec. 17, 2020	**AJES Meeting**: Q4 AJES Meeting, 2021 plans and 2022 activities as part of engagement **highlights included discussion of BVL.** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
March 11, 2021	**Online Content (e.g., social media, website)**: **At YTNLRO's request, Cameco translated the public meeting recording in Dene and both English and Dene virtual tours were posted online (social media and website)**
June 1, 2021	**Ad Hoc Meeting**: Fookes Delta Community Driven Program (presentation and school field trip). **Participants included:** Uranium City, Fond du Lac First Nation
June 29, 2021	**AJES Meeting:** Q2 AJES Meeting, engagement plans. Public Meeting/Site Tour for BVL planned for November. **Discussed 2020 update and 2021 plans getting sites ready for release.** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Stony Rapids, Wollaston Lake, Hatchet Lake First Nation, Black Lake First Nation
Summer 2021	**Article:** YTNLRO Newsletter - Fun at Fookes Delta - BVL and Fookes Delta history
Sept. 21, 2021	**Ad Hoc Meeting**: Site tour, discussed BVL background and **Stage 3/18 properties release and IC transfer** **Participants included:** YTNLRO, Uranium City

Sept. 22, 2021	**Ad Hoc Meeting**: Follow-up site tour **Participants included:** YTNLRO, Uranium City
Oct. 13, 2021	**Online Content (e.g., social media, website):** Virtual tour posted online
Oct. 14, 2021	**AJES Meeting**: Q3 AJES Meeting, **discussed application to release Stage 3/18 properties into IC program in 2022 as part of engagement highlights**. Focus for 2021 has been getting sites ready for release. **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
Nov. 2, 2021	**Public Meeting/Site Tour**: **Discussed BVL Management Framework, Path Forward Plan and Performance Objectives and Indicators. Reviewed current plan to transfer properties at hearing in October 2019 and schedule for transferring all properties by 2023/2025. General update on the transfer of properties at hearing planned for March 2022. After meeting AJES rep for the Permanent Resident Organization asked for property map, Cameco provided.** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Fond du Lac First Nation, Black Lake First Nation, Hatchet Lake First Nation
Nov. 5, 2021	**Online Content (e.g., social media, website):** Meeting recording and virtual tour links distributed to all invited participants as follow-up after the meeting via email and on Cameco social media pages.
Nov. 15, 2021	**Ad Hoc Meeting: Meeting in Dene with FDL leadership, elders and land and resource users to discuss the transfer of properties in 2022. Also, land use around the BVL sites.** **Participants included:** YTNLRO (invited, did not attend), Fond du Lac First Nation
Dec. 8, 2021	**AJES Meeting:** AJES Q4 Meeting, **discussed application to release Stage 3/18 properties into IC program in 2022 as part of engagement highlights.** **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Hatchet Lake First Nation, Fond du Lac First Nation, Black Lake First Nation
Dec. 15, 2021	**ROR/Update**: BVL update on IC progress including clearly noting that "Cameco has applied for a licence amendment to release an additional 18 into the Saskatchewan ICP." **YTNLRO oral intervention.**
Feb. 3, 2022	**Intervention:** AJES Intervention - Supported application for 2022 hearing
Feb. 10, 2022	**AJES Meeting:** AJES Q1 Meeting, discussed application to release 18 properties into IC program in 2022 as part of engagement highlights. Also, Cameco responded to YTNLRO's request - does not support a delay. **Participants included:** YTNLRO, Uranium City, Camsell Portage, Wollaston Lake, Stony Rapids, Black Lake First Nation
Feb. 22, 2022	**Intervention:** YTNLRO - Not supportive of 2022 hearing
Winter 2022	**Article: YTNLRO Newsletter. BVL update on the history and planned transfer of the properties in 2022. YTNLRO newsletter is translated into Dene and focus is Athabasca Basin.**
March 2, 2022	**EQC Meeting:** BVL history, recent activities (2019 NSEQC intervention), BVL process and upcoming hearing to release 18 decommissioned properties

Acronyms:

AJES	Athabasca Joint Engagement and Environment Subcommittee
AWG	Athabasca Working Group
BVL	Beaverlodge
CNSC	Canadian Nuclear Safety Commission
EQC/NSEQC	Northern Saskatchewan Environment Quality Committee
FDL	Fond du Lac
IC	IC Program
QA	Question and Answer
ROR	Regulatory Oversight Report

3.0 Beaverlodge Site Gamma Radiation Risk Evaluation

The 2015 Beaverlodge Site Gamma Radiation Risk Evaluation was conducted by third-party experts, ARCADIS Canada Incorporated. The purpose of the evaluation was to estimate potential risks to members of the public from exposure to residual radiation on the decommissioned Beaverlodge properties with areas that exceeded the accepted decommissioning criteria. For the current request, those properties include: ACE 1, ACE 9, ACE 14 and ACE MC.

The assessment utilized information collected through interviews with Uranium City residents in 2014 regarding the current and expected land use of the decommissioned properties. The focus of this assessment was on residents of Uranium City as they live in close proximity (approx. 8 km) to the decommissioned properties.

Interviews were completed with the residents of 21 out of 34 occupied households, representing 62% of potential respondents. The participating households represented a broad cross section of Uranium City residents, including Indigenous and non-Indigenous land-users. More specifically, this included four active trappers, the majority of traditional land-users in the area, as well as community Elders.

In general, the reported use of the decommissioned properties was quite low, as the maximum reported and expected future land use did not exceed 50 hours per year. While the interviews focused on local residents and land users, the 2015 evaluation conservatively assessed potential exposures to ensure it was robust enough to address other potential current and future land users from the Athabasca Basin and beyond.

The evaluation was completed following guidance from the International Commission on Radiological Protection (ICRP), Canadian Nuclear Safety Commission (CNSC), Health Canada (HC), United States Environmental Protection Agency (U.S. EPA) and the International Atomic Energy Agency (IAEA). Prior to initiating the work, the methodology was submitted to and accepted by the CNSC staff and the Saskatchewan Ministry of Environment.

A conservative approach was utilized in the evaluation to account for a wide range of potential land-uses and traditional activities. Using this approach, an exposure scenario evaluated a radiation dose risk for individuals visiting the individual areas, while assuming the individual would spend all of their time in the location with the highest measured gamma radiation level - as opposed to moving around the decommissioned properties, as would normally be expected. A cumulative scenario was also included that summed the maximum individual doses from all reported use of the decommissioned properties, and compared that value against the CNSC public dose criterion of 1 mSv/yr.

In addition to these conservative land use assumptions, the use of the maximum measured gamma values in the assessment is more conservative than recommendations provided by the IAEA, which suggest using average values for both gamma radiation and land use when performing risk-based evaluations. Further, while IAEA guidance supports the use of population averages to determine exposure scenarios, this assessment conservatively assumed the land use reported by each individual.

Potential radiation exposures to members of the public were compared against several national and international benchmarks. In accordance with ICRP recommendations, a dose criterion of 0.3 mSv/yr was selected as the criterion when there was potential for an individual to visit more than one location. Further, the CNSC public dose criterion of 1 mSv/yr was also used to evaluate the cumulative dose from potential exposures at all of the decommissioned properties.

Values specific to the four properties related to the current application are shown below:

Table 1: Results from the 2015 Gamma Evaluation

Decommissioned Property[a]	Estimated Incremental Annual Dose (mSv/yr)
ACE 1	0.04
ACE 9	0.04
ACE 14	0.04
ACE MC	0.04
ICRP criterion	**0.3**
CNSC Public Dose criterion	**1.0**

[a] Properties were assessed within the Lower Ace Creek (Mill) sub-areas

As detailed above, the results of the risk assessment demonstrated that using these assumptions, the estimated doses to individuals from potential exposures to residual gamma levels on the decommissioned properties was well below both the adopted dose criteria (0.3 mSv/yr) and the CNSC public dose limit (1 mSv/yr).

4.0 Beaverlodge Hab Area Evaluation

During the October 2019 hearing, the Athabasca Chipewyan First Nation (ACFN) posed questions regarding the land-use assumptions and the corresponding risk assessment completed for the decommissioned Beaverlodge properties. Following the hearing, numerous attempts were made to communicate details to the ACFN and solicit their input.

Recognizing their interest in the decommissioned properties, invitations to engagement activities were extended to the ACFN, and multiple communications were sent in an effort to provide information and incorporate their feedback. In addition to the above, invitations to the 2020 and 2021 public meetings were also extended. These attempts were unsuccessful.

The approved 2020 Beaverlodge ERA assessed multiple human receptors with varying land-use assumptions, informed by previously approved ERAs and land-use studies completed in the region. In the assessment, a receptor was included that frequented the Dubyna and Hab areas.

All of the decommissioned Hab properties subject to the 2019 request, and Hab properties in the current request, meet the Guidelines for *Northern Mine Decommissioning and Reclamation, EPB, 381* for residual gamma levels and are therefore safe for traditional or recreational activities. Despite that, in response to the questions raised in the October 2019 hearing, Cameco commissioned an additional assessment to estimate potential risks associated with spending additional time in the Hab area.

Building off the approved 2020 ERA, the additional assessment considered hypothetical human receptors who may spend additional time in the Hab area, consuming food and water collected in the region. These receptors were evaluated in a similar manner to receptors included in the approved 2020 ERA.

The 2021 assessment included a family unit (adult, child, and toddler) spending several weeks in the area and consuming water and food from the region. Available water, fish, and gamma data were incorporated to evaluate the potential risks to land users who may frequent the Hab area.

The assessment found that, consistent with the 2020 ERA, there would be likely no risk to a visitor using the Hab area in this manner and that living a traditional lifestyle and consuming country foods from the Hab area can continue to be done safely.

Regardless of the time spent on the properties practicing traditional activities, community-based monitoring programs have demonstrated that the food remains safe for consumption.

4.1 February 22, 2022 Intervention - Additional questions

In the February 22, 2022 intervention submitted by the Ya'thi Néné Land and Resource Office, additional questions were posed in regard to the 2021 Hab assessment. Responses to those questions are outlined below.

Comment 1: Why were only Verna Lake and Dubyna Lake receptors considered in the analysis?

The 2020 Beaverlodge ERA Verna Lake and Dubyna Lake human receptors were used as the starting basis for the person accessing Hab area, as these areas are similar in that they are all remote satellite mine sites with small waterbodies and similar features (waste rock, etc.). While comparable land use was assumed for the Hab site as the Dubyna/Verna sites, based on the land use survey, it is expected that people would spend less time in the Hab area.

Comment 2: How did study authors determine that "total assumed time in the area… is 2 weeks per year" was an appropriate duration for the analysis?

- ***Does this duration of exposure reflect a reasonable exposure scenario for traditional land users with rights and values within the affected area?***
    - ***If not, why are impacts to traditional land users not being considered?***
    - ***If so, how did the study authors determine what constituted reasonable exposure scenarios for traditional land users? What specific sources of data did they rely on?***

A duration of 2 weeks per year was selected as it is consistent with the amount of time people were assumed to spend at each of the Dubyna and Verna areas in the approved 2020 Beaverlodge ERA. This duration is also consistent with what representatives of the ACFN noted during the October 2019 hearing.

The Uranium City Land Use study demonstrated that Uranium City residents visited this area considerably less, with the highest reported recreational use of the Hab area being 3.25 hours per year. Figure 2 provided in the February 22, 2022 intervention indicates there is a hunting/trapping location to the northeast of the Hab area, but otherwise no indicated use of the Hab area. The overnight sites are some distance away from the Hab area, which aligns with the

previous findings regarding the low use of the Hab area. These results indicate that 2 weeks per year in the immediate Hab area is an even more conservative land use assumption for this area.

Comment 3: The report makes certain assumptions about the sources of drinking water for the "hypothetical receptor", being "Pistol Lake (10%), Beatrice Lake (10%), Mickey Lake (30%), and Donaldson Lake (50%)". What is the rationale behind this apportionment?

The Uranium City Land Use study indicated minimal use of the Hab area, with some reported fishing of Donaldson Lake. As there was no reported substantive use of the Hab area, the drinking water source breakdown is assumed based on waterbody attributes/location.

The assumption regarding breakdown of where drinking water is sourced was based roughly on surface area of the considered waterbodies, conservatively adjusted for increased proportion from the waterbodies in the immediate Hab area (i.e., Pistol and Beatrice lakes). The calculated approximate relative surface areas and final breakdown is presented in the table below. Decreasing Donaldson Lake exposure for increased local (i.e., Pistol and Beatrice lakes) exposure is conservative as the lowest concentrations are measured in Donaldson Lake.

Table 2: Drinking Water Source Breakdown

Waterbody	Surface Area (km^2)	Relative Surface Area (approximate)	Final Drinking Water Breakdown
Donaldson Lake	3.15	71%	50%
Mickey Lake	0.61	28%	30%
Beatrice Lake	0.04	0.8%	10%
Pistol Lake	0.01	0.3%	10%

Based on Figure 2 in the February 22 intervention, this drinking water breakdown appears reasonable as the figure indicates overnighting/fishing at Donaldson Lake and fishing at Mickey Lake with no use of Pistol or Beatrice lakes.

Comment 4: On what basis did the study authors determine that "3 hrs/yr" for the purposes of the gamma exposure pathway, reasonably represented the time spent by people who use and occupy the affected areas?

- ***Does the 3 hour per year assumption take into consideration patterns of use by traditional resource users, and YNLR members exercising aboriginal and treaty rights?***
- ***If so, how was it considered? If not, why was it not considered?***

All of the decommissioned Hab properties subject to the 2019 request, and Hab properties in the current request, meet the Guidelines for *Northern Mine Decommissioning and Reclamation, EPB, 381* for residual gamma levels and are therefore safe for traditional or recreational activities.

Areas where gamma radiation exposure would be above background occur only on the areas that were disturbed from the historical operations. Previous surveys demonstrated there are some areas above background located on parts of the Hab waste rock pile.

The conservative assumption utilized in the assessment was that the people in the Hab area would spend 3 hours per year on the areas of the Hab area with the highest gamma rates - in addition to 3 hours per year on the portions of the Dubyna area with the highest gamma values. This assumption is consistent with assumptions made for the Dubyna area human receptors in the 2020 Beaverlodge ERA and is based on the Uranium City Land Use study, which captured land use of local traditional land users and other local residents. This exposure results in a dose rate of 5 µSv/yr, which is well below the dose criterion of 300 µSv and the public dose limit of 1,000 µSv.

Comment 5: Table 3 of the report describes water quality with reference to the "average" level of contamination in affected waterbodies, using the proportional division described above. Justification on the basis of actual patterns of use must be provided. Study authors should describe how averaging contamination levels is statistically defensible.

This weighted averaging was used to represent how drinking water would potentially be obtained by the hypothetical human receptor. The rationale for the drinking water source breakdown is discussed above in the response to Comment 3. The information reported on actual patterns of use for this area indicate minimal use of the area, therefore the breakdown is based on waterbody attributes/location.

Comment 6: In describing "Water and Fish Quality for Calculations" the report refers to the use of "transfer factors" to estimate fish flesh concentrations. What are "transfer factors" in this context?

- ***How were the values of estimated fish flesh contaminant levels in Table 4 arrived at (e.g., actual fish flesh samples, or estimates?)***
- ***What is the scientific and human health justification for relying on averages, rather than the independent values of each lake?***

The transfer factors used to estimate fish concentrations here are the derived relationship between concentrations in paired surface water samples and fish tissue samples. These relationships were derived using water and fish data specifically from the decommissioned Beaverlodge properties and are consistent with transfer factors used for the regulatory approved 2020 Beaverlodge ERA.

The derived Beaverlodge-specific transfer factors were used in combination with available measured surface water concentrations for each specific lake. In this way, estimated fish concentrations were developed for each waterbody. As with the weighted averaging for the water concentrations, the weighted averaging of the fish concentrations accounts for the assumed fish source breakdown (i.e., 50% of fish from Donaldson Lake and 50% of fish from Mickey Lake).

Comment 7: The report is premised on limited duration stays and limited consumption, akin to a tourist visit. At page 6, the report states: "As the receptors [people] are present at the site and drink water/eat fish for a limited time during the summer only, the use of chronic TRVs are not appropriate."

- ***Does the stated assumption take into consideration use and occupancy patterns of traditional land users and YNLR members exercising aboriginal and treaty rights?***
    - ***If so, the basis of that assumption must be described.***
    - ***If not, an explanation must be provided for why risk impacts to traditional land users and individuals exercising constitutionally protected rights are not considered.***
- ***Table 5 describes the TRV for selenium for toddlers as 0.0062 mg/kg/d. Health Canada guidance uses 0.0060 mg/kg/d. This discrepancy must be described.***

As discussed in the response to Comment 2 above, the conservative assumptions around land use were derived based on available land use information obtained from local traditional land users and Uranium City residents. These assumptions align with the information presented in Figure 2 of the February 22, 2022 intervention.

The Health Canada selenium TRV was updated to 0.0060 mg/kg/d after this report was issued. As the 2020 Beaverlodge ERA was completed prior to this update, the previous Health Canada (0.0062 mg/kg/d) was utilized in the assessment. However, if the TRV is updated for these calculations, the toddler selenium Hazard Quotient would change from 0.69 to 0.71, making no change to the conclusions of the evaluation that demonstrated living a traditional lifestyle and consuming country foods from the Hab area can continue to be done safely.

Comment 8: The report assumes that receptors (people) will rely on supermarket-sourced food for the remainder of the year, other than the 4 weeks of fish consumption from Hab area waterbodies. This assumption must be justified with data, and with specific reference to traditional land users and YNLR members exercising Aboriginal and Treaty rights.

This portion of the assessment does not aim to make assumptions on traditional land use; rather, supermarket foods are used to represent food coming from other areas or sources (e.g., food from a grocery store).

An evaluation of country foods sourced from the Beaverlodge area found that exposures as a result of country food consumption are similar to those members of the general Canadian population consuming supermarket foods and do not represent a cause for concern. These results have consistently been demonstrated in other community-based monitoring programs completed in the Uranium City region for the past 20 years. This supports the use of the supermarket foods to represent the rest of the dietary components, regardless of source.

Comment 9: Cameco uses a "Fish ingestion rate" approximately 50% lower than the values recommended by Health Canada. Note that even the values recommended by Health Canada may be lower than appropriate for the particular population at risk in the Beaverlodge Area, as Health Canada's values are recommended for the "Canadian general population".

The fish consumption rates adopted in the approved 2020 Beaverlodge ERA and in the 2021 Hab evaluation were derived using food preferences and portion sizes/frequency information from a

Country Foods Study undertaken in Uranium City, which involved interviewing 115 residents including Elders, traditional land users, and hunters/trappers.

CanNorth was also retained to undertake a series of dietary surveys in communities throughout northern Saskatchewan as part of the ongoing Community Based Environmental Monitoring Program (CBEMP). As a member of the Athabasca Joint Environment and Engagement Subcommittee (AJES), the Ya'thi Néné Lands and Resource Office has continually received information related to CBEMP objectives, sample collection and sample results.

The Uranium City fish consumption rate (selected for use in the Beaverlodge evaluations) is the highest of the recent northern Saskatchewan surveys, and in some cases, double what other communities have reported. The selected fish ingestion rate also falls within the range derived by Chan et al. (2018) as part of the First Nations Food, Nutrition & Environment Study (FNFNES).

Further, updated Health Canada Preliminary Quantitative Risk Assessment (PQRA) guidance (Health Canada 2021) does not provide recommendations for amount of fish that may be consumed and states that specific consumption rates will depend on the nature of the site.

Health Canada has supplemental guidance on human health risk assessment for country foods (Health Canada 2010) which states that "Generally, site-specific country food ingestion rates will only be achieved through a survey of the affected community", such as the country food survey undertaken in Uranium City.

As shown above, the site-specific consumption rates were informed through interviews with Uranium City residents and local land users. The conservative consumption rates are higher than those derived from similar surveys conducted throughout northern Saskatchewan and presented to representatives from the Ya'thi Néné Lands and Resource Office. As such, the information provides a conservative estimate of potential fish consumption rates in the Uranium City area.

4.2 Third Party Expert

The 2020 Beaverlodge ERA and the 2021 Hab Area Evaluation were completed by Canada North Environmental Services Ltd. (CanNorth). Headquartered in Saskatoon, Saskatchewan, CanNorth is 100% Indigenous owned and has been providing environmental services to Canadian industrial and resource developments and government agencies for over 35 years.

CanNorth is a Certified Aboriginal Business through the Canadian Council for Aboriginal Business. The members of the CanNorth Risk Assessment Team have provided professional consulting services in human health and ecological risk assessment for over 20 years and have extensive experience and expertise with respect to all aspects of the ERA process.

As subject matter experts, CanNorth is regularly involved in conducting expert peer reviews of other risk assessments, providing technical training services relevant to ERAs, and actively participating in provincial, regional, and national expert technical committees and working groups. Through these groups, CanNorth leads and contributes to updates regarding ERA methods and

approaches, and the development of environmental quality benchmarks used in environmental site assessments, ERAs, and routine monitoring programs.

Given their extensive history of environmental modelling for the decommissioned Beaverlodge properties, First Nations communities, and uranium mining and milling operations throughout northern Saskatchewan, CanNorth is an industry-leading subject matter expert. Their commitment to excellence is evidenced by the fact they are the only Indigenous-owned company in the world to be IOS 9001:2015 (quality assurance and quality control), ISO 14001:2015 (environmental stewardship and management) and ISO 45001:2018 (health and safety) registered.

5.0 Conclusion

In accordance with the documentation previously provided in support of Cameco's licence amendment application and the supplementary information provided herein, Cameco has comprehensively engaged with interested parties, with a focus on the First Nations and communities in the Athabasca Basin.

The technical studies and risk assessments that have been completed in accordance with the approved Beaverlodge Management Framework have been conducted with the assistance of third-party experts and accepted by regulators. They have been informed by extensive input from local stakeholders and have been completed utilizing conservative assumptions, such that they are representative of a wide range of traditional land users and activities.

This work has clearly demonstrated that the 18 decommissioned Beaverlodge properties, that are the subject of this application, are safe, secure and stable/improving, and will be protective of the environment, as well as public health and safety over the long-term.