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Written submission from Cameco Corporation

Mémoire de Cameco Corporation

In the Matter of the

À l'égard de

Beaverlodge Project

Site Beaverlodge

Application to amend the Waste Facility Operating Licence to allow for the removal of 20 properties at the Beaverlodge Project from its licence

Demande pour modifier le permis d'exploitation d'une installation de gestion des déchets pour permettre le retrait de 20 propriétés du site Beaverlodge de son permis

Commission Public Hearing

Audience publique de la Commission

October 2, 2019

Le 2 octobre 2019

Canada

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Executive Summary

Following the implementation of the Province of Saskatchewan's Institutional Control (IC) Program, the Beaverlodge Management Framework (the Framework) was developed to provide a clear scope for the management of the decommissioned Beaverlodge properties and a systematic process for assessing potential residual site-specific risks to facilitate the transfer of Beaverlodge properties to the IC program. The Framework was developed cooperatively between Cameco Corporation (Cameco) and the Joint Regulatory Group (JRG) consisting of the Canadian Nuclear Safety Commission (CNSC), the Saskatchewan Ministry of Environment (SkMOE), Department of Fisheries and Oceans (DFO) and Environment and Climate Change Canada (ECCC) in 2009. The Framework has also been reviewed with public stakeholders, including the Northern Saskatchewan Environmental Quality Committee (EQC), as well as residents and leaders of the Uranium City community.

During the 2013 CNSC licence renewal process for the Beaverlodge properties, Cameco presented the Framework to the Commission. The stages of the Framework included gathering detailed site information, assessing potential remedial options, selecting the final remedial options to be implemented, and determining how their performance would be evaluated.

In following the Framework, Cameco developed the *Beaverlodge Path Forward* Report (Path Forward) to establish an agreed upon remediation plan paired with evaluation criteria and the expected timeline for transferring properties into the IC program. The Path Forward confirmed that natural recovery paired with additional site specific remedial options was the best long-term management scenario for the properties. The remedial options that were selected were considered to be good engineering practices and expected to result in localized improvements in water quality.

On May 27, 2013, the Commission accepted the proposed Path Forward and issued Cameco a 10-year licence to proceed with the selected remedial work and to continue management of the properties. The Framework and the Path Forward help form the objective of the licensing basis of the 10-year licence granted by the Commission, with the goal of ensuring human health and ecological risk are managed to acceptable levels to facilitate release from CNSC licensing over the course of the licence term. As a condition for transferring properties to the IC program, the properties are required to meet established performance objectives, and obtain a release from CNSC licensing. Thus, once properties meet the conditions for release from CNSC licensing they will be considered for transfer to the Province of Saskatchewan's IC program.

The Path Forward included criteria to establish that risks have been managed and that the properties would be eligible for transfer to the IC program. The criteria consisted of the overall performance objectives of "safe, secure and stable/ improving". To facilitate release from licensing and transfer to the IC program, Cameco proposed advancing properties in a staged approach. The group of properties now planned for release includes 20 decommissioned properties that saw little to no mining activity. Cameco has verified

that the properties meet the performance objectives and, as such, are eligible for release from CNSC licensing.

In accordance with the Path Forward, Cameco submitted an application on April 8, 2016 and April 6, 2018 requesting that 14 and six decommissioned Beaverlodge properties, respectively, be: (1) formally released from further decommissioning and reclamation activity by the SkMOE; (2) released from licensing by the CNSC; and, (3) accepted into the provincial IC program by the Saskatchewan Ministry of Energy and Resources (SkMER).

Following consultation with stakeholders and the submission of responses to SkMOE, CNSC and SkMER comments on both applications, the Province issued a letter of intent on February 9, 2017 (D. Kristoff to M. Webster) and April 5, 2019 (G. Bihun to M. Webster) stating that Cameco had adequately addressed all comments and that Cameco has fulfilled the requirements and obligations described in the approved Path Forward for the 20 properties. These letters are intended to serve as notice to Cameco and the CNSC that SkMOE will grant a Release from Decommissioning and Reclamation under the condition that the properties are released from CNSC licensing. The issuance of the letter by SkMOE follows the same process undertaken in 2009 when five former Beaverlodge properties were released from CNSC licensing and accepted by SkMER to the Province of Saskatchewan's IC program.

Given that Cameco has fulfilled the requirements and obligations described in the Path Forward for these properties and the Province has provided notice that it will grant a Release from Decommissioning and Reclamation under the condition that the properties are released from CNSC licensing, Cameco is therefore requesting that the CNSC release the 20 properties from CNSC licensing, making them eligible for transfer to the Province of Saskatchewan for long-term environmental stewardship under the IC program or free-released depending on the presence of historical mining/milling activities.

1.0 Introduction

1.1 Purpose

On behalf of Canada Eldor Inc. (CEI), Cameco Corporation (Cameco) holds the Beaverlodge Waste Facility Operating Licence (WFOL-W5-2120.0/2023), which expires May 31, 2023. The financial liabilities associated with the management of the Beaverlodge properties are held by the Government of Canada and managed by CEI. The licence authorizes Cameco to possess, manage, and store the nuclear substances that are associated with the decommissioned Beaverlodge properties located in the Province of Saskatchewan, as shown in Figure 1-1 contained in Appendix A of the licence. As detailed in the Beaverlodge Licence Conditions Handbook (CNSC 2014), the authorized activities include:

- Maintenance activities associated with the decommissioned facilities.
- Environmental monitoring.
- Implementation of the remedial options identified in the Path Forward Report (Cameco and SENES 2012).

The Beaverlodge properties are divided into five main areas: the Hab Mine Site; the Dubyna Mine Site; the Bolger/Verna Mine Site; the Lower Ace Creek Area; and, the Tailings Management Area. There are also three smaller areas, one called Eagle Area, and two located at the Martin Lake Area. Each of the main areas is made up of a number of smaller properties. As presented to the Commission during the 2013 re-licensing process (Cameco 2013a), Cameco has applied a staged approach to assess and prepare these decommissioned properties for transfer into the Province of Saskatchewan's Institutional Control (IC) program for long-term oversight. It is anticipated that all remaining Beaverlodge properties (65 including the 20 subject to this request), will be transferred to the IC program by the end of the licence period (May 31, 2023) or free-released depending on the presence of historical mining/milling activities. To facilitate this transfer, properties must receive a release or exemption from any and all licences that are issued by associated regulatory agencies (*The Reclaimed Industrial Sites Regulations 2007*).

In following the Beaverlodge Management Framework (the Framework; Cameco 2009) and the Beaverlodge Path Forward Report (Path Forward Report; Cameco and SENES 2012), which were accepted by the Commission during the 2013 re-licensing hearing, Cameco has demonstrated that 20 decommissioned properties described herein have met the performance objectives of safe, secure and stable/improving. On February 19, 2019, in accordance with the *Nuclear Safety and Control Act* (NSCA; 1997), Cameco requested the release of these properties from licensing by the Canadian Nuclear Safety Commission (CNSC) and the amendment of WFOL-W5-2120.0/2023 to reflect those changes. This Commission Member Document (CMD) provides information that Cameco will present to the Commission at the public hearing in support of this request.

1.2 Background

1.2.1 Site History

The decommissioned Beaverlodge uranium mine/mill site and associated properties, located northwest of Beaverlodge Lake in northern Saskatchewan (Figure 1.2-1), were operated by Eldorado Mining and Refining Limited (Eldorado) between 1952 and 1982. During active mining, the primary focus of activity was on an area northeast of Beaverlodge Lake where the Fay, Ace and Verna shafts were developed to access the underground ore body. Over the 30-year production period, the majority of the ore used to feed the mill came from these areas. A smaller portion of ore (about 5%) was mined from a number of satellite mines mostly located within the Ace Creek watershed that were developed and operated for shorter periods of time.

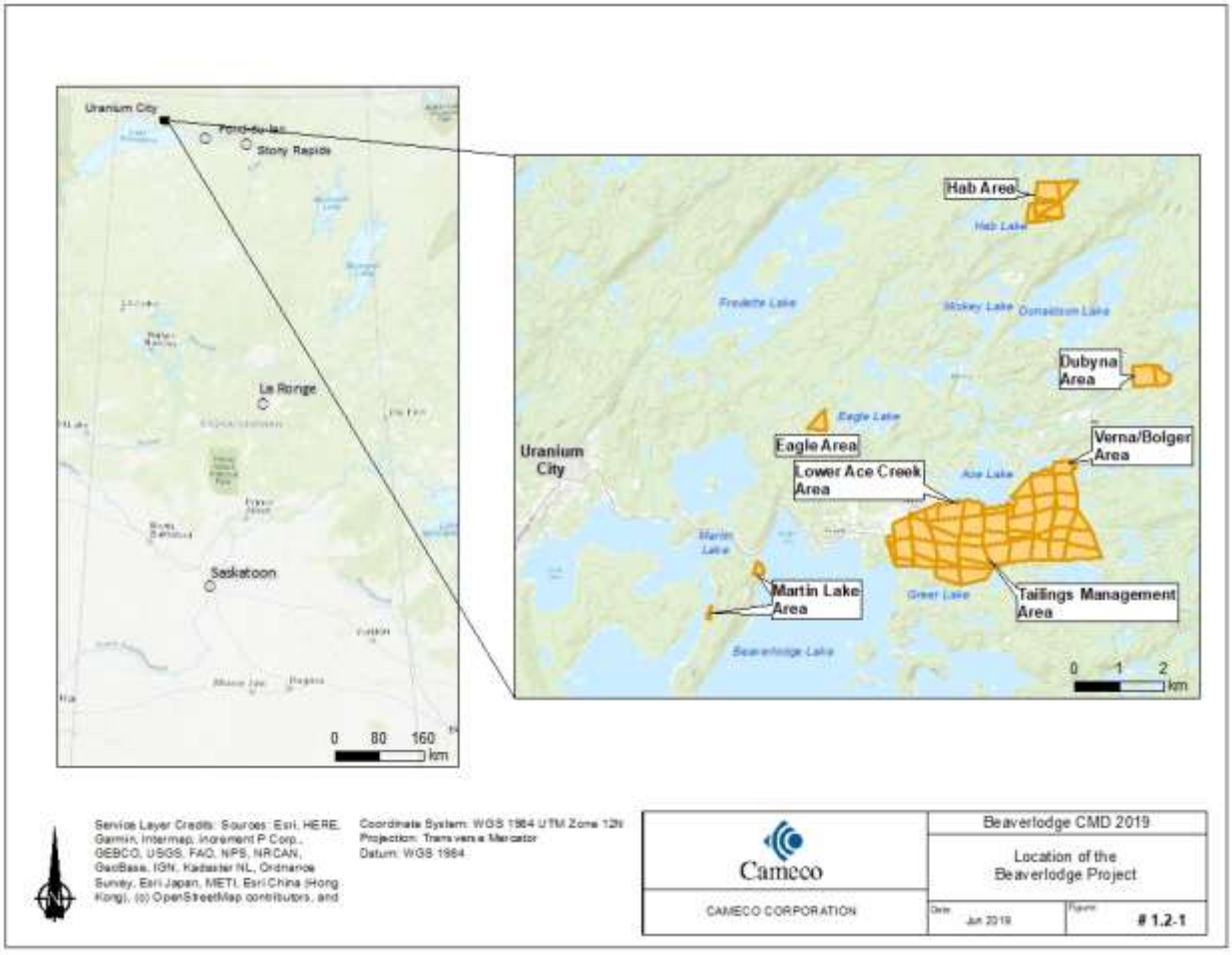

Figure 1.2-1 Location of the decommissioned Beaverlodge mine and mill site with currently licensed areas highlighted

Production from these areas continued until 1982 when the operation was shut down in preparation for decommissioning. A decommissioning plan was developed in

coordination with both the federal and provincial regulators. Following approval of the plan, decommissioning activities were initiated in 1982 and completed in 1985. To meet the accepted decommissioning objective of the time (i.e., safe and stable condition, with activities based on good engineering practice of the day), buildings and structures were removed or dismantled, all mine openings were permanently sealed, and the sites were expected to naturally recover over the long term. Since that time, environmental monitoring has been ongoing to ensure the area remains safe and that environmental conditions improve over the long term.

In 1988, Eldorado Nuclear Limited (the federal Crown Corporation formerly known as Eldorado Mining and Refining Ltd.) merged with the Saskatchewan Mining Development Corporation to form Cameco. At that time, the management of the decommissioned Beaverlodge properties became the responsibility of Cameco, while the Government of Canada, through CEI retained responsibility for the financial liabilities associated with the properties. Since 1988, Cameco has carried out routine environmental monitoring, targeted environmental investigations, maintenance work and targeted remediation, as required, on the 65 separate decommissioned properties. The Beaverlodge Licence WFOL-W5-2120.0/2023 and the Government of Saskatchewan Provincial Surface Lease exercise authority over these properties, which in total cover an area of approximately 669 hectares.

1.2.2 Business Plan

Cameco's objective in managing the decommissioned Beaverlodge properties is to protect the health and safety of the public and environment, and to meet the requirements for transfer of the properties to the Saskatchewan Institutional Control (IC) program. Thus far, five properties have been transferred into the IC program and it is anticipated that all remaining Beaverlodge properties (65 including the 20 subject to this request) will be transferred to the IC program by the end of the licence period (May 31, 2023) or free-released depending on the presence of historical mining/milling activities.

Saskatchewan Institutional Control program

As part of the promulgation of the *Reclaimed Industrial Sites Act* (RISA) and the *Reclaimed Industrial Sites Regulations* (RISR) in 2007, the Government of Saskatchewan implemented the *IC Program for the Post Closure Management of Decommissioned Mine/Mill Properties Located on Crown Land in Saskatchewan* (SkMER 2009). The intention of the Act was to set out the conditions by which the Government of Saskatchewan would accept responsibility for lands that; as a consequence of development and use, require long-term monitoring and, in certain circumstances, maintenance.

In Saskatchewan, the responsible custodian under the IC program is the Ministry or Ministries assigned responsibility for implementing and managing the IC program. The legislative authority to implement and enforce the IC program is the RISA and RISR. To date, the Saskatchewan Ministry of Energy and Resources is the provincial Ministry that has been assigned the responsibility for managing the IC program (i.e., the Custodian).

Activities undertaken by the Custodian under the IC program can range from permanently recording the location of a remediated site to conducting regular inspections, sampling, and maintaining the property. The Custodian also has the authority to address unforeseen events that could potentially arise at a particular site.

The Saskatchewan IC program addresses all aspects of conventional closed mines as well as the uranium-specific issues of radioactive waste management, including those defined in the articles of the International Atomic Energy Agency's (IAEA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, all applicable provincial acts and regulations, and the federal *Nuclear Safety and Control Act* (NSCA). The program includes a formal, publicly accessible registry and document repository.

A site cannot be accepted into the IC program until remediation activities have been completed and the relevant regulatory authorities have issued a release.

Beaverlodge Management Framework

In response to the implementation of the IC program, the Beaverlodge Management Framework (Cameco 2009) was developed cooperatively between Cameco and the Joint Regulatory Group (JRG).

The Framework provides a clear scope for the management of the decommissioned Beaverlodge properties and a systematic process for assessing potential residual site-specific risks to allow decisions to be made regarding the transfer of Beaverlodge properties to the IC program. The accepted Framework has been reviewed by public stakeholders, including the Northern Saskatchewan Environmental Quality Committee, as well as residents and leaders of the Uranium City community. Five general stages (Figure 1.2-2**)** are applied to each property using the Framework and include the following:

- Establish a comprehensive foundation of information upon which residual risks can be assessed.
- Assess the residual risk posed by the properties.
- If necessary, develop and assess reasonable remedial options that could mitigate residual risk on or immediately downstream the properties.
- Implement selected remedial option(s) and monitor results.
- If 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 risk(s) beyond natural recovery, then an application will be made to transfer the property to the IC program.

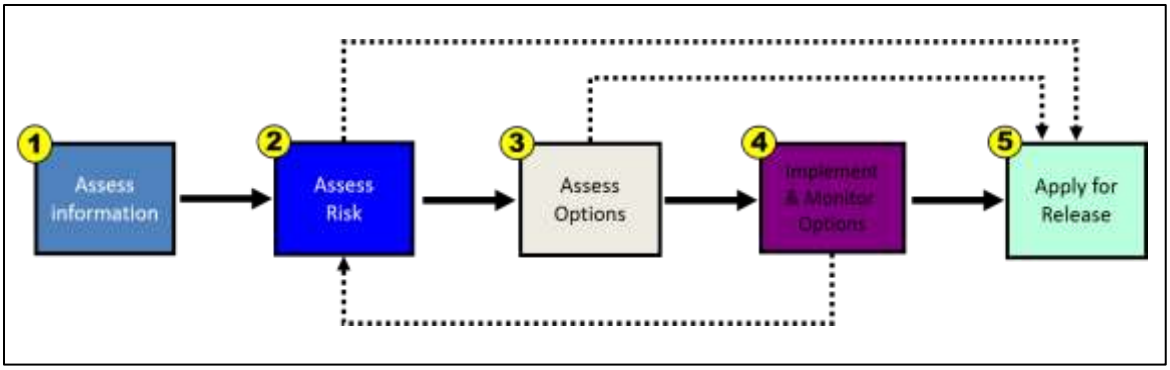

Figure 1.2-2 Simplified Beaverlodge Management Framework.

In progressing through the Framework, Cameco has gathered extensive information regarding environmental conditions and human activities on the decommissioned properties through a combination of routine monitoring and special investigative studies. An example of a special investigative study conducted is the Country Food Study initiated in May 2010. This was a two-year study with a primary objective of determining whether there were any potential human health risks associated with the consumption of country foods gathered in the Uranium City area by local residents. The study involved interviewing community members as well as analyzing samples of wildlife and vegetation voluntarily provided by members of the community (CanNorth and SENES 2012). The study concluded that traditional harvesting of country foods does not present health risks to residents of Uranium City. Results from routine monitoring and special investigative studies like the Country Food Study, combined with historical information, was used to develop the Beaverlodge Quantitative Site Model (QSM; Cameco 2012a).

The QSM is a tool that allows for assessment of ecological and human health risk from a baseline water and sediment quality perspective, which was established based on information gathered in the first phase of the Framework. In addition, the QSM was developed with a feature that allows the simulation of potential remedial activities and comparison of simulated results to the baseline option.

Once the QSM was developed, a Remedial Options Workshop was conducted in 2012, which included participants from Uranium City, including elders, youth and local leadership, as well as representatives of the Northern Saskatchewan Environmental Quality Committee (Athabasca Sub-committee) representing six Athabasca communities. Also in attendance at this workshop were representatives from the JRG, Cameco, and a variety of third party experts. This workshop presented various remedial options, their implementation costs, as well as their expected environmental benefits as evaluated in the QSM. Workshop results informed the assessment of potential remedial options and were instrumental in development of the Beaverlodge Path Forward Report (Cameco and SENES 2012).

Beaverlodge Path Forward Report

The Path Forward Report provides a checklist and schedule of additional remedial activities to be implemented on the decommissioned Beaverlodge properties over the

current 10-year licence period to address residual risk on the properties and prepare them for release from CNSC licensing and transfer to the IC program. In addition, the Path Forward Report also describes the performance objectives by which to assess the effectiveness of the implemented remedial activities. During the development of the Path Forward Report, all stakeholder feedback received during the remedial options workshop was considered.

Once the remedial activities have been implemented, and the properties are shown to meet the site performance objectives set out in the Path Forward Report, an application can then be made for a Release from Decommissioning and Reclamation from SkMOE, release from CNSC licensing and, where applicable, transfer to the Province of Saskatchewan's IC program for long-term monitoring and stewardship.

The Framework and the Path Forward Report were presented to the CNSC during the Beaverlodge re-licensing hearing in 2013 and help form the licensing basis of the 10-year licence granted by the Commission.

Performance Objectives and Indicators

Criteria to determine the eligibility for release from CNSC licensing were presented to the Commission with the intent that each of the decommissioned Beaverlodge properties would be assessed through the Framework. The performance objectives for the decommissioned Beaverlodge properties have been defined as "safe, secure, and stable/improving":

- Safe – The site is safe for unrestricted public access. This objective is to ensure that the 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.

To determine if a site is meeting the performance objectives, site specific performance indicators were established (Figure 1.2-3). Table 1-1 provides an overview of the performance indicators as presented to the Commission during the 2014 update meeting (Cameco 2014). The applicable indicators vary depending on the nature of the property, but generally include ensuring that: risks associated with residual gamma radiation and crown pillars are acceptable; mine openings to surface are closed and secure; boreholes (if present) are plugged; and, the site is free from historical mining debris. The stable/improving objective is also related to these performance indicators, but is more relevant to monitoring water quality. In order to verify that conditions on and downstream of the properties are stable/improving, Cameco has continued to monitor the progress of natural recovery and the expected localized improvements from the additional remedial measures implemented at the properties.

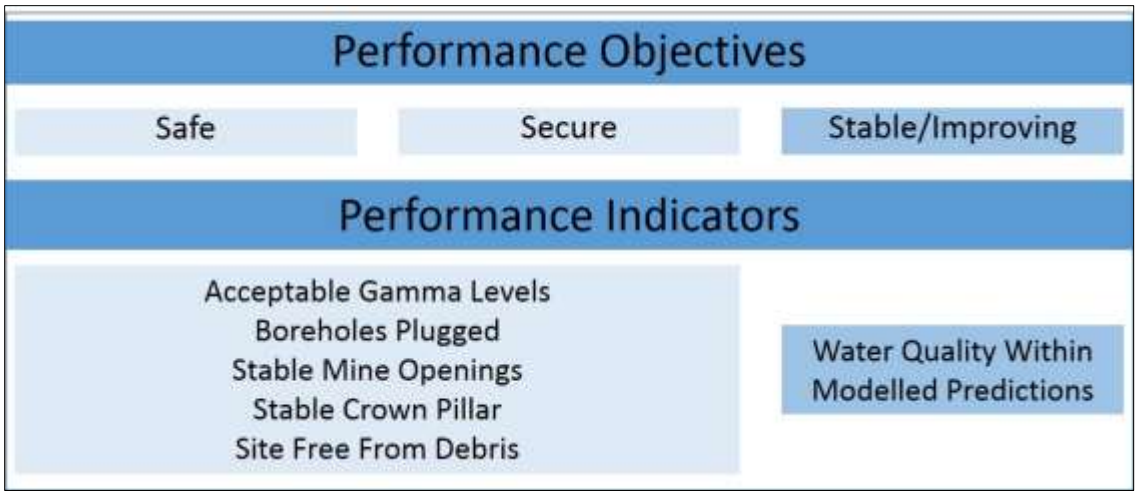

Figure 1.2-3 Performance objectives and underlying indicators.

Table 1-1 Description and acceptable criteria related to the Beaverlodge performance indicators.

Performance Indicators	Description	Acceptance Criteria
Acceptable Gamma Levels	Cameco will complete a site-wide gamma survey that will indicate where additional material may need to be applied to cover existing waste rock or tailings. Following the application of the cover material, a final survey will be completed of the remediated areas verifying that the cover was adequate.	Reasonable use scenario demonstrating gamma levels at the site are acceptable.
Boreholes Plugged	Cameco will plug all identified boreholes on the site to prevent groundwater outflow to the surface.	All boreholes have been sealed.
Stable Mine Openings*	The current concrete caps on the vertical mine openings will be replaced with new engineered caps with established designs to improve the long-term safety of the site.	Caps have been replaced and signed off by a qualified person.
Stable Crown Pillar	Based on the surface subsidence in the Lower Ace Creek area, a crown pillar assessment will be completed for the four areas that have mine workings close to surface, specifically Hab, Dubyna, Bolger/Verna, and Lower Ace Creek.	Crown pillar assessed, remediated (if required), and signed off by a qualified person.
Site Free From Debris	Inspection and removal of any residual debris will be completed prior to exempting the properties from CNSC licensing and accepting them into the provincial IC program.	Site free of former mining debris at the time of transfer to IC program.

Performance Indicators	Description	Acceptance Criteria
Water Quality Within Modelled Predictions	Trends established from past and future water monitoring will be compared to modelled predictions to verify: 1. That remedial options expected to result in localized improvements are having the desired effects; and 2. That natural recovery on and downstream of the decommissioned properties is continuing as predicted.	Water quality data is stable/improving.

*Note: The performance indicator identified above as "Stable Mine Openings" was originally labelled as "Stable Caps on Vertical Mine Openings". The scope of this performance indicator was expanded to include all mine openings.

Meeting these objectives will ensure that residual human health and ecological risks are managed to acceptable levels to allow for a release from licensing.

1.3 Summary of Application

In accordance with the Path Forward Report, Cameco submitted applications on April 8, 2016 and April 6, 2018 requesting that 14 and six decommissioned Beaverlodge properties, respectively, be: (1) formally released from further decommissioning and reclamation activity by the SkMOE; (2) released from licensing by the CNSC; and, (3) accepted into the provincial IC program by the Saskatchewan Ministry of Energy and Resources (SkMER).

In accordance with the licensed Public Information Program, Cameco has engaged throughout the licence term with our target stakeholders regarding our activities on the site and the current application. Following consultation with stakeholders and the submission of responses to SkMOE, CNSC and SkMER comments on both applications, the Province issued letters of intent on February 9, 2017 (D. Kristoff to M. Webster) and April 5, 2019 (G. Bihun to M. Webster) stating that Cameco had adequately addressed all comments and fulfilled the requirements and obligations described in the Path Forward for the 20 properties. These letters are intended to serve as notice to Cameco and the CNSC that SkMOE will grant a Release from Decommissioning and Reclamation under the condition that the properties are released from CNSC licensing. The issuance of the letter by SkMOE follows the same process undertaken in 2009, when five former Beaverlodge properties were released from CNSC licensing and accepted by SkMER to the Province of Saskatchewan's IC program.

As such, the purpose of this application is to request the release of these 20 decommissioned Beaverlodge properties (Figure 1.3-1) from licensing by the CNSC and to amend WFOL-W5-2120.0/2023 to reflect those changes. This action would remove the Martin Lake and Eagle Areas in their entirety as well as parts of the Hab, Dubyna, Bolger/ Verna and the Lower Ace Creek Areas. GPS coordinates were provided within the closure report submissions for these properties (Kingsmere 2016; Kingsmere 2018). Changes to supporting documents will be made in accordance with the LCH.

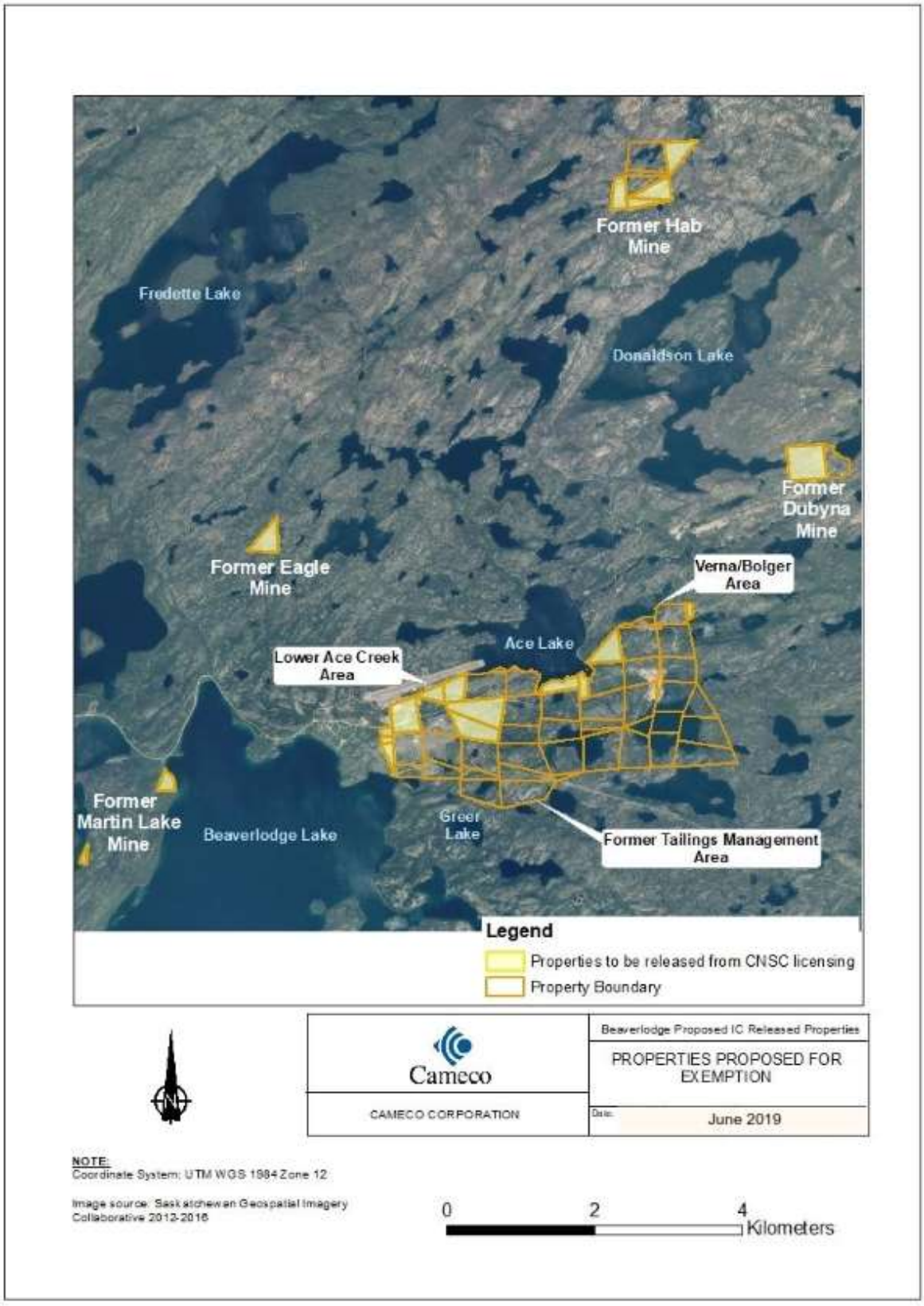

Figure 1.3-1 The 20 Beaverlodge properties proposed for CNSC licence release.

2.0 Performance Indicators and Evaluation

The objective of the licensing basis established in the Beaverlodge LCH with respect to protection of the environment as well as the health, safety, and security of the public and workers is described by: the QSM; CNSC Licence Application (Cameco 2012b); the Path Forward report; the Country Foods Study; and, the Management Framework. In order to demonstrate that release of the requested 20 properties is within the objective of the licensing basis, and that the performance objectives of safe, secure and stable/improving have been met, a review of the performance indicators was conducted for each property.

The 20 decommissioned properties proposed for release from CNSC licensing consist of properties that required little to no remediation once operations ended. A brief assessment of the site specific performance indicators is provided below. Section 3.0 provides property specific discussion for each of the 20 properties for which a Release from Decommissioning and Reclamation, removal from the Beaverlodge Surface Lease and release from CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023 is being sought.

Table 2-1 provides a high level review of the properties in relation to the performance indicators. The current condition of the 20 decommissioned properties demonstrates that the properties meet the established performance objectives of safe, secure, stable/improving and pose minimal risk to public safety or the environment. As such, it is anticipated that the properties will support traditional activities, such as hunting/gathering of country foods and collection of firewood. Cameco concludes that meeting these objectives ensures residual risks are managed to acceptable levels to allow for a release from CNSC licensing.

2.1 Acceptable Gamma Levels

A gamma survey of the reasonably accessible and disturbed areas of the decommissioned Beaverlodge properties was completed in 2014 (ARCADIS 2014), with results compared to the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008). EPB 381 suggests that residual gamma levels on reclaimed sites should not be greater than a mean of 1 uSv/hr above background averaged over a 1 ha area. Where gamma levels measured on the Beaverlodge properties met those guidelines, no additional assessment of residual risk was completed and those areas were considered acceptable for transfer to the IC program, from a gamma radiation perspective.

For those areas where the measured residual gamma radiation exceeded the EPB 381 guidelines, a risk based approach was used to assess the potential risks to members of the general public. To complete this risk based assessment, consultation with local community members regarding current and expected land use activities was completed in 2015 (SENES and Kingsmere 2015). The risk based approach to evaluating potential radiation risk at the decommissioned Beaverlodge properties involved assessing the gamma radiation levels using both conservative and realistic approaches, taking into

account the reported land use, to estimate the incremental doses to members of the public accessing the Beaverlodge properties. Both the conservative and realistic estimates of cumulative dose from the Beaverlodge properties were well below the public dose criterion of 1 mSv/yr (ARCADIS 2015). As a result of this assessment, the 20 decommissioned properties meet the performance indicator associated with gamma radiation.

More details are provided in the following closure reports:

- Final Closure Report Beaverlodge Properties HAB 3, HAB 6, EXC 2, RA 6, RA 9, EAGLE 1, BOLGER 2, ATO 26, EXC ATO 26, URA MC, EXC ACE 1, ACE 10, ACE 2 & EXC ACE 3 (Kingsmere 2016).
- Final Closure Report Beaverlodge Properties URA 3, URA 5, EXC URA 5, ACE 5, JO-NES, and HAB 2A (Kingsmere 2018).

2.2 Boreholes Plugged

All exploration boreholes located on the 20 properties have been remediated. Fourteen boreholes have been identified by Cameco to exhibit, or have potential to exhibit, artesian conditions in which groundwater associated with flooded historic underground mine workings have reported to the surface. Seven of these boreholes are located in an area northeast of Beaverlodge Lake adjacent to one of the properties (URA MC) and were plugged in 2011, using accepted methods (Cameco 2017). These boreholes have been inspected annually since being plugged and have shown no evidence of flows. Their locations have been provided as part of the Final Closure Report and will be included as part of future IC inspections. Additional boreholes discovered during the final site inspections were also plugged as a precaution despite showing no evidence or potential of flow. As sites are transferred to the IC program, a permanent record of borehole locations associated with the Beaverlodge properties (e.g., GPS coordinates and closure methods) will be transferred to the Province of Saskatchewan.

2.3 Stable Mine Openings

Five of the decommissioned properties (HAB 2A, RA 6, RA 9, JO-NES and URA 3) have mine openings that have been sealed via approved methods and remain safe, secure and stable. The raises located on the properties identified as HAB 2A, URA 3 and JO-NES have been sealed with a stainless steel cap designed with a certified usable lifespan of 1,200 years prior to the potential need for replacement.

The adit at the RA 6 property has been secured using a steel grate secured to bedrock, which provides a robust and permanent closure to the mine opening. The adit at the RA 9 property has been covered with waste rock and the entrance contoured to fit closely with the adjacent topography. Similarly, the adit at the JO-NES property was also covered with waste rock and ventilation raises sealed with a stainless steel cap.

2.4 Stable Crown Pillar

A site wide assessment of crown pillars completed by a third party expert in 2015 did not identify any areas of concern related to the 20 decommissioned properties (SRK 2015).

2.5 Site Free From Debris

All properties were inspected in an effort to locate historic debris not removed during decommissioning. GPS tracking was utilized to ensure adequate coverage of the properties. Debris removed from the properties was disposed of in the Bolger pit, used by Eldorado during decommissioning, where it was buried in waste rock in accordance with regulatory approval, or in the Lower Fay Pit, which is still being used as an active disposal location for residual debris. Maps of the site inspection tracking are provided in the associated Final Closure Reports (Kingsmere 2016; 2018).

2.6 Water Quality within Modelled Predictions

Based on the final inspection of the properties, no aspect or features on the 20 properties that are subject to this application are anticipated to have a measurable influence on the downstream water quality. As such, this performance indicator is not applicable to the current request.

Table 2-1 Beaverlodge performance indicator summary evaluation.

	PERFORMANCE INDICATORS					
	Acceptable Gamma Levels	**Boreholes Plugged**	**Stable Mine Openings**	**Stable Crown Pillar**	**Site Free From Debris**	**Water Quality Within Modelled Predictions**
	Reasonable use scenario demonstrating gamma levels at the site are acceptable.	All boreholes have been plugged at the time of transfer to institutional control.	Caps have been replaced and signed off by a qualified person.	Crown pillar assessed, remediated if required, and signed off by a qualified person.	Site free of former mining debris at the time of transfer to institutional control.	Water quality data is stable/ improving.
HAB 3	✓	✓	N/A	✓	✓	N/A
HAB 6	✓	✓	N/A	N/A	✓	N/A
EXC 2	✓	✓	N/A	N/A	✓	N/A
RA 6	✓	N/A	✓	✓	✓	N/A
RA 9	✓	✓	✓	✓	✓	N/A
EAGLE 1	✓	✓	✓	N/A	✓	N/A
BOLGER 2	✓	N/A	N/A	N/A	✓	N/A
ATO 26	✓	N/A	N/A	N/A	✓	N/A
EXC ATO 26	✓	N/A	N/A	✓	✓	N/A
URA MC	✓	✓	N/A	✓	✓	N/A
EXC ACE 1	✓	N/A	N/A	N/A	✓	N/A
ACE 10	✓	N/A	N/A	N/A	✓	N/A
ACE 2	✓	N/A	N/A	✓	✓	N/A
EXC ACE 3	✓	N/A	N/A	✓	✓	N/A
URA 3	✓	✓	✓	✓	✓	N/A
URA 5	✓	✓	N/A	✓	✓	N/A
EXC URA 5	✓	✓	N/A	✓	✓	N/A
ACE 5	✓	✓	N/A	✓	✓	N/A
JO-NES	✓	✓	✓	✓	✓	N/A
HAB 2A	✓	✓	✓	✓	✓	N/A

3.0 Matter for Consideration

As required by Section 6 in the *General Nuclear Safety and Control Regulations*, the following section provides a description of the nuclear substances, land, areas, buildings, structures, components, equipment and systems that will be affected by the requested licence amendment and the manner in which they will be affected. Further detail regarding these decommissioned properties are provided in the following documents:

- Final Closure Report Beaverlodge Properties HAB 3, HAB 6, EXC 2, RA 6, RA 9, EAGLE 1, BOLGER 2, ATO 26, EXC ATO 26, URA MC, EXC ACE 1, ACE 10, ACE 2 & EXC ACE 3 (Kingsmere 2016).
- Final Closure Report Beaverlodge Properties URA 3, URA 5, EXC URA 5, ACE 5, JO-NES, and HAB 2A (Kingsmere 2018).

3.1 Hab Area

The decommissioned Hab mine was staked, prospected and mapped in 1948 with an extensive evaluation completed in 1966 and 1967. Underground mine operations started in 1968 with the first ore being shipped to the mill in 1970. The Hab mine workings (which consisted of the 038 and 039 Zone ore bodies) were shut down in 1973 and the mine allowed to fill with water. A small open pit in the 039 Zone located on the HAB 1 property (not part of this licensing request) was operated from 1975 to 1980. All structures at the former Hab mine site were demolished during decommissioning and all non-salvageable items were placed in the 039 Zone Hab pit and covered with locally sourced waste rock. A waste rock pile stability assessment concluded that there was no indication of tension cracks or other signs of instability and that the waste rock slope presents no greater hazard than natural topographic features in the area (SRK 2010).

The Hab area is accessible via the road from Uranium City and is located approximately 8 km north-northeast from the former Beaverlodge mine/mill (i.e., Lower Ace Creek Area). Based on the results of a land use study, the maximum recreational use of the Hab mine site by Uranium City residents was a total of 3.25 hours per year to tour the site or passing through the site to fish in Milmine Lake located beyond the Hab area (SENES and Kingsmere 2015).

The Hab area currently consists of seven properties (Figure 3.1-1). Of these seven, four properties are currently proposed for release from the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023 and are discussed below.

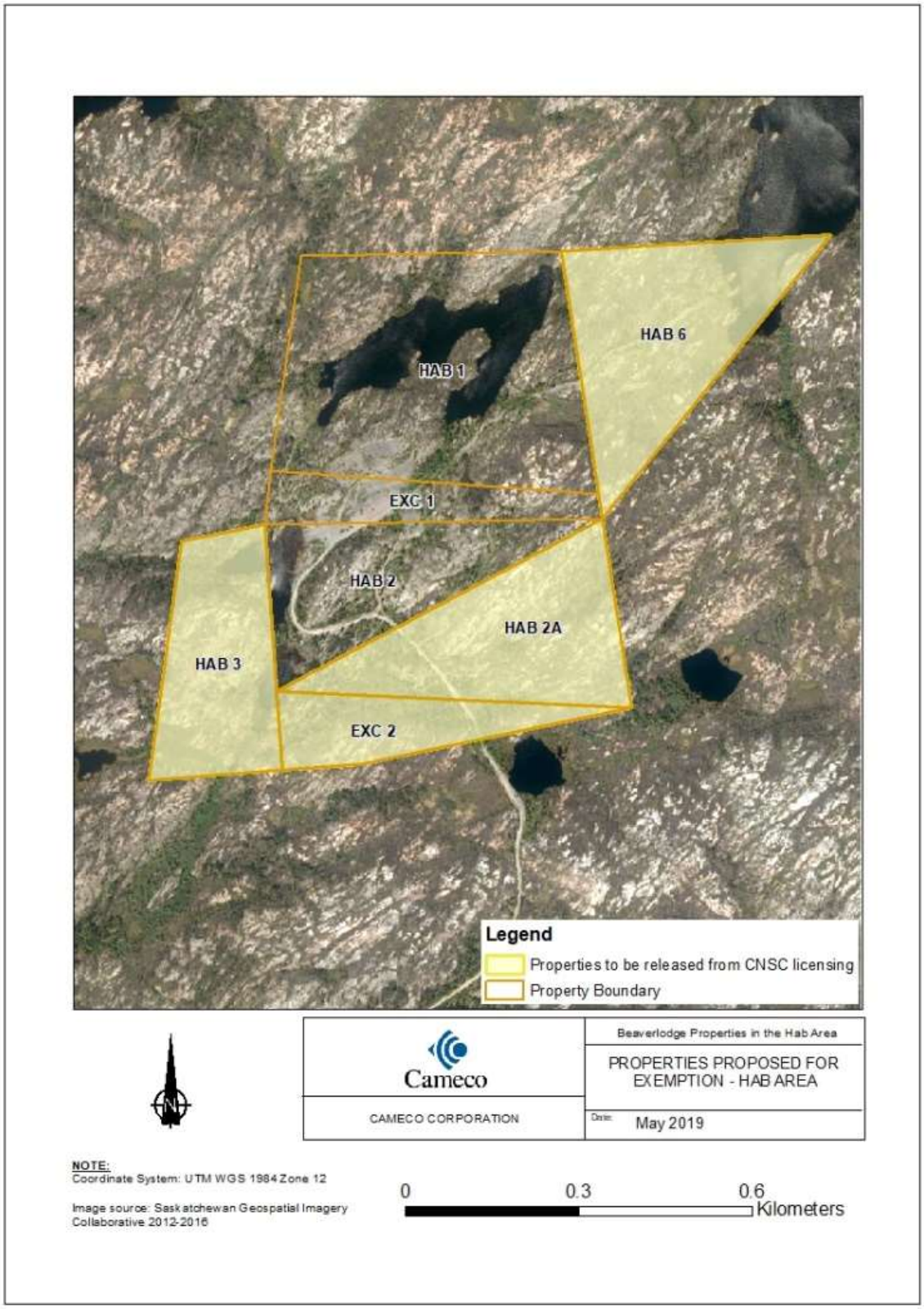

Figure 3.1-1 Hab Area property boundaries.

3.1.1 HAB 3

Description

The HAB 3 property consists of a 7.8 hectare parcel of land on the western edge of the former Hab satellite mine area. It includes portions of Pistol Lake and of a small unnamed waterbody located downstream of Pistol Lake. The surface of the HAB 3 property was not disturbed by historical mining/milling activities; however, the underground mine operations extended below the north-west corner of the property and some historic exploration activity is evident.

Decommissioning Activities

The HAB 3 property did not require, nor was it subject to, any decommissioning or reclamation activity during the 1982 to 1985 site-wide Beaverlodge decommissioning and reclamation activities. Activities completed since 1985 have included sealing all exploration boreholes according to accepted methods (Cameco 2017), removing debris from the site and disposing it as accepted by SkMOE as well as ensuring crown pillars are secure. Based on visual inspection of historic mine plans and overlaid surface maps, underground workings likely extend under the HAB 3 property. The underground workings have been decommissioned for approximately 42 years and no indication of instability or subsidence have been identified in the area of the mine underlying the HAB 3 property. A geotechnical assessment of the crown pillar stability in that area concluded that there was a "low" likelihood of subsidence and that no additional investigation or remediation was required (SRK 2015). Since the HAB 3 property was not disturbed by any surface mining or milling activities, a gamma survey was not completed.

Current Condition and Land Use

The HAB 3 property is in a natural and undisturbed state. The time spent by local residents on the HAB 3 property is expected to be substantially less than the annual estimated time on the Hab site for recreational use (maximum of 3.25 hours; SENES and Kingsmere 2015), as access to the HAB 3 property is difficult with no features of interest on the property (Kingsmere 2016).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the HAB 3 property, SkMER has indicated that only a portion at the north end of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The HAB 3 property is not expected to require maintenance under the IC program.

3.1.2 HAB 6

Description

HAB 6 consists of a 10.8 hectare parcel of land on the northeast corner of the former Hab satellite mine area. The HAB 6 property includes a portion of Milmine Lake, which was used as a freshwater source during mining operations. The only mining-related disturbance on the HAB 6 property is an access trail that runs from the former mine site to Milmine Lake. The trail is approximately 600 m long and 5 m wide and was constructed using crushed waste rock to access Milmine Lake and to provide a corridor for the required water pipeline. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

Decommissioning on the HAB 6 property consisted of the removal of the freshwater pump house and related infrastructure at Milmine Lake, as well as the pipeline used to deliver freshwater to the Hab mine site. Activities completed since 1985 have included sealing exploration boreholes according to accepted methods (Cameco 2017), removing debris from the site and disposing it as accepted by SkMOE as well as performing confirmation surveys on disturbed areas (i.e. the access trail) to ensure that gamma levels are acceptable.

Current Condition and Land Use

The HAB 6 property is in a largely natural and undisturbed state. The only disturbed area is the access trail, which has seen 40 years of natural encroachment of trees and shrubs. The time spent on the HAB 6 property by local residents is expected to be substantially less than the annual estimated time on the Hab site for recreational use (maximum of 3.25 hours), as the only time spent on the property would be travelling through the property to gain access to Milmine Lake for fishing (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the HAB 6 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The HAB 6 property is not expected to require maintenance under the IC program.

3.1.3 EXC 2

Description

The EXC 2 property consists of a 4.6 hectare parcel of land on the southern edge of the former Hab satellite mine area. The EXC 2 property was not disturbed by historical mining activities other than a transmission line corridor and the construction of a portion of the Hab site access road, which transects the property.

Decommissioning Activities

The EXC 2 property did not require, nor was it subject to, any decommissioning or reclamation activity during the 1982 to 1985 site-wide Beaverlodge decommissioning and reclamation activities. Activities completed since 1985 have included sealing of an exploration borehole in accordance with accepted methods (Cameco 2017), removing power transmission line debris from the site and disposing it as accepted by SkMOE, as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Current Condition and Land Use

The EXC 2 property is in a largely natural and undisturbed state. The only disturbed areas are the access road and transmission line corridor to the former Hab mine site. The time spent on the EXC 2 property by local residents is expected to be substantially less than the annual estimated time on the Hab site for recreational use (maximum of 3.25 hours) because the only time spent on the property would be travelling through the property to access the former Hab mine site as there are no features of interest on the property (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

No aspect of the EXC 2 property requires inspection or maintenance under the IC program. Therefore, this property is planned for free-release, as it does not require a licence under the NSCA (1997).

3.1.4 HAB 2A

Description

The HAB 2A property consists of a 9.9 hectare parcel of land located on the former Hab satellite mine area. Surface disturbance was limited to hosting a single raise (the D013810 raise), the Hab site access road and the power transmission line. There was limited mining activity on the site with the 038 Zone Hab underground mine workings extending underneath.

Decommissioning Activities

In 1975, the D013810 raise was sealed with timbers and a 12" thick reinforced concrete plug. The reinforced concrete cap was replaced with an engineer designed stainless steel cap by Cameco in 2017 to ensure long-term safety and stability. Additional activities have included sealing all exploration boreholes on or adjacent to the property according to regulatory accepted methods (Cameco 2017); removal of remnant debris from the site and disposing it in an approved location; ensuring crown pillars are secure; as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the HAB 2A property. The underground workings have been decommissioned for approximately 42 years and no indication of instability has been identified. A geotechnical assessment for the crown pillar stability in that area concluded that there was a "low" likelihood of subsidence and that no additional investigation or remediation was required (SRK 2015).

As surface disturbance on this property was limited to the site access road, a gamma survey was completed in the disturbed areas.

Current Condition and Land Use

The HAB 2A property is in a largely natural and undisturbed state. The only disturbed area is the access road to the former Hab mine site and the immediate area associated with the D013810 raise. The time spent on the HAB 2A property by local residents is expected to be substantially less than the maximum 3.25 hours identified for the Hab mine site in total (SENES and Kingsmere 2015), as the only time spent on the property would be travelling through the property to access the former Hab mine site.

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The stainless steel cap covering the D013810 raise is not expected to require maintenance for the certified usable lifespan of 1,200 years under the IC program; however, funding to assess the cap every 50 years is included in the IC fund calculations (Section 4.4).

3.2 Dubyna Area

The decommissioned Dubyna mine area currently consists of two property parcels, JO-NES and EMAR 1. The site is accessible by road from Uranium City and is located approximately 6.4 km northeast of the historic Beaverlodge mine/mill facilities.

Operations occurred through both open pit mining (1977 – 1982) and underground mining (1978 – 1981). The underground operation consisted of an adit with a decline ramp system from surface and two ventilation raises to surface.

During decommissioning in 1982, scrap material from the Dubyna mine site was placed in the mine workings and the underground was closed by backfilling the Dubyna adit with waste rock sourced from the site. General site clean-up and contouring waste rock piles was completed in 1983. The ventilation raises were reported to be backfilled with a reinforced concrete cap installed at surface during initial decommissioning activities.

A land use survey found that the maximum time residents of Uranium City would generally be expected to spend on or in the vicinity of the Dubyna site was 28 hours per year sightseeing, to collect firewood and for other recreational purposes (SENES and Kingsmere 2015).

The JO-NES property, identified in Figure 3.2-1 and discussed below, is proposed for release from the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023.

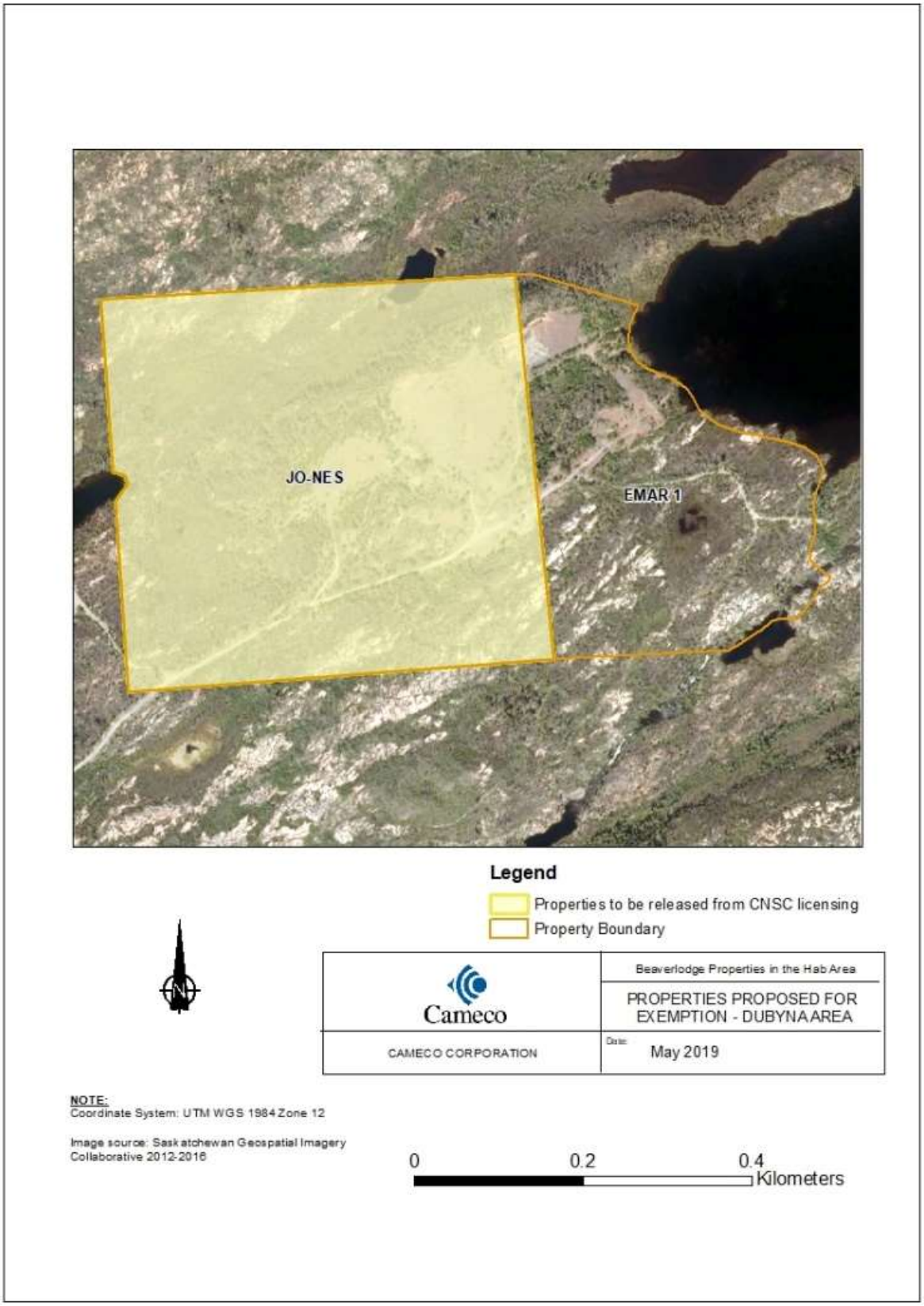

Figure 3.2-1 Dubyna Area property boundaries.

3.2.1 JO-NES

Description

The JO-NES property covers an area of approximately 24 hectares, which encompasses a large portion of the disturbed area of the former Dubyna satellite mine site. During operations, the development of the JO-NES property included the construction of an adit and decline ramp system to provide access to the underground mine, which is largely located below the JO-NES property. The underground mine operations also included the development of two ventilation raises to surface that are located on the JO-NES property.

Surface development included the development of an open pit, of which a small portion intersects the west boundary of the JO-NES property. Waste rock generated from development of the mine was placed on the JO-NES property. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

When the Dubyna mine was decommissioned between 1981 and 1983, the following activities were completed:

- The solids generated from water treatment were disposed of in the underground mine.
- The adit was backfilled.
- The ventilation raises were covered with concrete caps.
- The waste rock pile was contoured.

The concrete caps were replaced with an engineer-designed stainless steel cap by Cameco in 2017 to ensure the long-term safety and stability of the closure. Additional activities completed since 1985 have included sealing all exploration boreholes according to regulatory accepted methods (Cameco 2017), removing debris from the site and disposing it as accepted by SkMOE as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings extend under JO-NES property. The underground workings have been decommissioned for approximately 42 years and no indication of instability was identified. A geotechnical assessment for the crown pillar stability in that area concluded that there was a “low” likelihood of subsidence and that no additional investigation or remediation was required (SRK 2015).

Current Condition and Land Use

Based on the results of a land use study, the maximum expected recreational use associated with the Dubyna mine site and area by Uranium City residents was a total of 28 hours per year (SENES and Kingsmere 2015). Time on the property was spent harvesting firewood, hiking and sightseeing.

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the JO-NES property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2018).

The stainless steel caps covering the 810394 and 820694 raises are not expected to require maintenance for the certified usable lifespan of 1,200 years under the IC program; however, funding to assess the caps every 50 years is included in the IC fund calculations (Section 4.4).

3.3 Verna/Bolger Area

The Verna/Bolger area is made up of seven individual properties. This group of properties are located approximately 3.5 km east of the former Beaverlodge mine/mill facilities with most of the properties accessible via road. This area saw the development of the Verna Shaft and associated ventilation and access raises, as well as the Bolger open pit and the 72 Zone adit. The Verna Shaft and associated ventilation raises were developed as part of the main Beaverlodge mine complex. The 72 Zone adit and Bolger Pit were developed to access nearby ore bodies. The Bolger Pit was operated intermittently between 1959 and 1980. As a result of this development, there are two waste rock piles in the Verna area. A waste rock pile stability assessment concluded that there was no indication of tension cracks or other signs of instability and that the waste rock slope presents no greater hazard than natural topographic features in the area (SRK 2010). As outlined in the response to regulatory comments regarding the final closure report for six properties (Kingsmere 2018), a review of the data reported by ASKI (2011) also shows that the waste rock has a low potential for acid generation.

Within the Verna/Bolger area, only the BOLGER 2 and ACE 5 properties are proposed for release from the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023 at this time.

3.3.1 BOLGER 2

Description

The BOLGER 2 property consists of a 1.6 hectare parcel of land located on the former Verna/Bolger satellite mine area (Figure 3.3-1). The BOLGER 2 property contains a small open pit, identified as the Bolger "spur pit". The spur pit is located adjacent to the

main Bolger Pit, but terminated at a higher elevation. No decommissioning waste was disposed of within the spur pit on the BOLGER 2 property. There is also a small amount of waste rock associated with the BOLGER 2 property. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

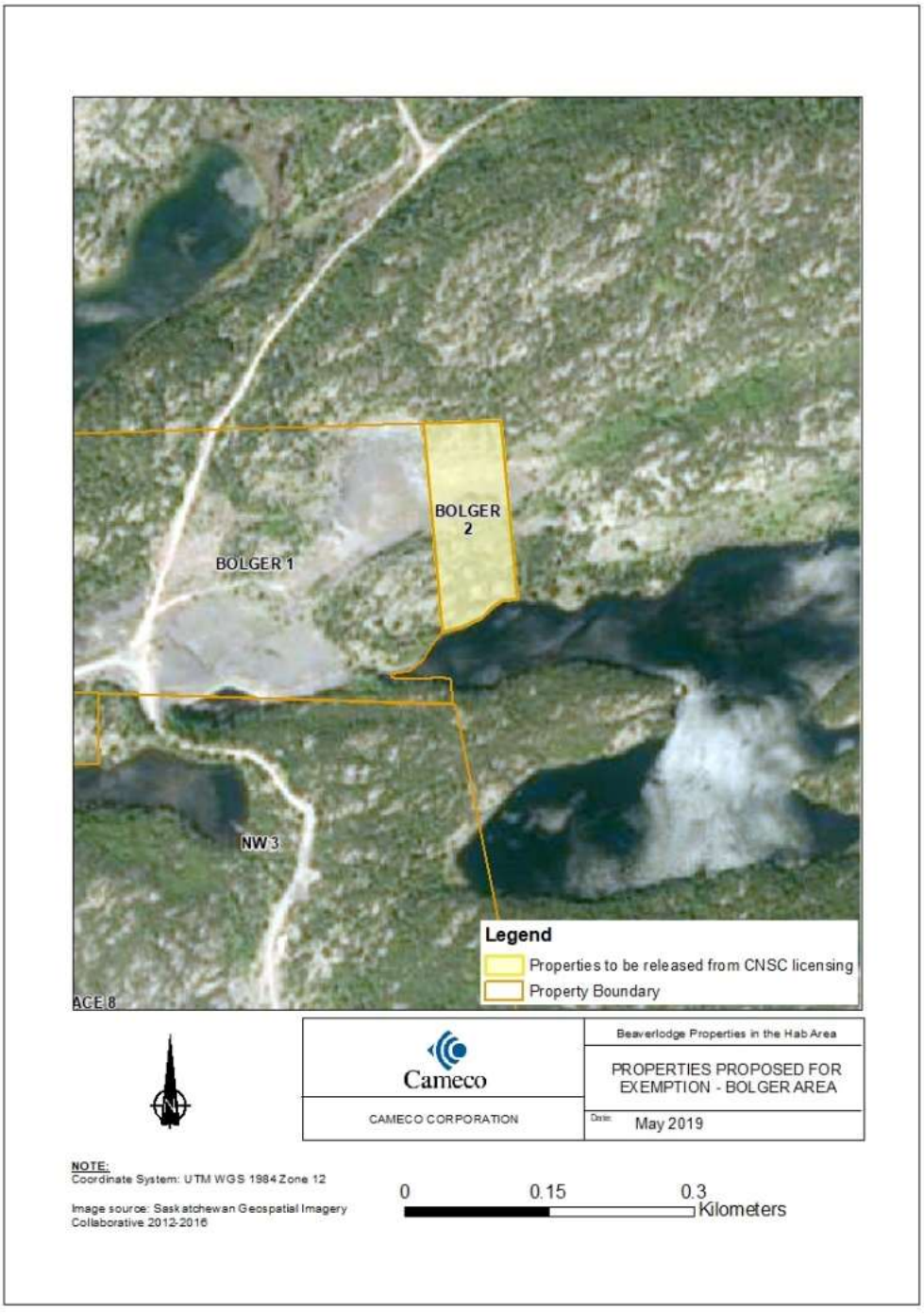

Figure 3.3-1 BOLGER 2 property boundaries.

Decommissioning Activities

There are no records of decommissioning activities occurring on the BOLGER 2 property during the initial decommissioning period. As the property contains only a small shallow pit with no standing water, no decommissioning activities were required. Activities completed since 1985 have included sealing all exploration boreholes according to accepted methods (Cameco 2017); removing debris from the site and disposing it as accepted by SkMOE; as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Current Condition and Land Use

The access road to the Verna/Bolger area is currently blocked with a locked gate as remediation work on other properties in the area not subject to this request is being performed. Unrestricted casual access will be allowed once all remediation work in the area has been completed. Based on the results of a land use study, the Verna/Bolger site sees very limited use (SENES and Kingsmere 2015). Users indicated they only pass through the area while snowmobiling or to gather firewood beyond the area boundary.

Results of the 2014 gamma survey demonstrate that a small portion of the BOLGER 2 property has incremental gamma values between 1 and 3 μSv/h (ARCADIS 2014). As such, a risk-based approach was applied to evaluate potential radiation risk at the property and concluded incremental dose from the Beaverlodge properties based on the measured gamma results and the reported land use are well below the public dose criterion of 1 mSv/yr (ARCADIS 2015) and meet the Performance Indicator associated with acceptable gamma levels. Additionally, portions of the property that were disturbed as a result of the Zora Creek flow path reconstruction project were scanned again in 2016. Results were consistent with the 2014 survey results.

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The BOLGER 2 property will not require maintenance under the IC program.

3.3.2 ACE 5

Description

The ACE 5 property consists of an 11.3 hectare parcel of land located between Ace Lake and the Verna site (Figure 3.3-2). The ACE 5 property hosted two separate utility corridors/lines: the main powerline from the Fay site crossed the corner of Ace Lake and traveled directly over the hill to the Verna powerhouse, and a communication line, which also crossed the corner of Ace Lake and traveled directly over the hill to the Verna powerhouse. The property does not contain any roads or any other infrastructure or disturbance.

Figure 3.3-2 ACE 5 property boundaries.

Decommissioning Activities

The ACE 5 property did not require, nor was it subject to, any decommissioning or reclamation activity during the 1982 to 1985 site-wide Beaverlodge decommissioning and reclamation activities. Activities completed since 1985 have included sealing an exploration borehole according with accepted methods (Cameco 2017), removing debris including powerline infrastructure from the site and disposing of it as accepted by SkMOE as well as ensuring crown pillars are secure. Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the ACE 5 property at an approximate depth of more than 100 m. The underground workings have been decommissioned for approximately 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the ACE 5 property. A geotechnical assessment for the crown pillar stability concluded that there was a "low" likelihood of subsidence due to the depths of the underground workings and stated that no additional investigation or remediation was required (SRK 2015). Since the ACE 5 property was not disturbed by any surface mining or milling activities, a gamma survey was not completed.

Current Condition and Land Use

The land use survey found that local residents do not visit the ACE 5 property other than to drive by the edge of the property on the road around Ace Lake (SENES and Kingsmere 2015).

Institutional Control Monitoring and Maintenance

Crown pillars associated with the property have been deemed secure (SRK 2015).

The ACE 5 property is not expected to require inspection or maintenance under the IC program.

3.4 Eagle Area

The Eagle area is located approximately 3.5 km from the historic Beaverlodge mine/mill facilities. The site is accessible via an access road approximately 5 km from the Airstrip Road turnoff; however, natural encroachment by vegetation during the last number of years has made access difficult.

The Eagle mining area consisted of the three distinct mine zones; the EAGLE 4/7 Zones, which included a shaft and three small open pits; the EAGLE 02 Property; and the EAGLE 1 property. Mining from the Eagle area occurred in the 1970s and 1980s with the ore being shipped via haul truck to the former Beaverlodge mill for processing. The Eagle underground mine was originally developed in 1954, but ceased operation when the Ace-Fay mine was developed. Fire destroyed the headframe in the late 1950s and the shaft was demolished and covered with a concrete cap. The original concrete cap was replaced in 1999 with an engineer-designed and approved concrete cap.

In 2009, Cameco was granted a release from decommissioning and reclamation from SkMOE and a release from CNSC licensing for the EAGLE 4/7 Zones and the EAGLE 02 property. Once the release from licensing was received, these properties were transferred to the IC program in 2009.

Based on the results of a land use study, the maximum expected recreational use of the EAGLE 1 property by Uranium City residents was a total of 32 hours per year performing traditional activities, such as hunting and gathering firewood (SENES and Kingsmere 2015).

The EAGLE 1 property consists of a flooded open pit (12 Zone) and another shallow open pit (12 Zone extension), and minor amounts of waste rock associated with those pits.

The EAGLE 1 property identified in Figure 3.4-1and discussed below, is proposed for release from the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023.

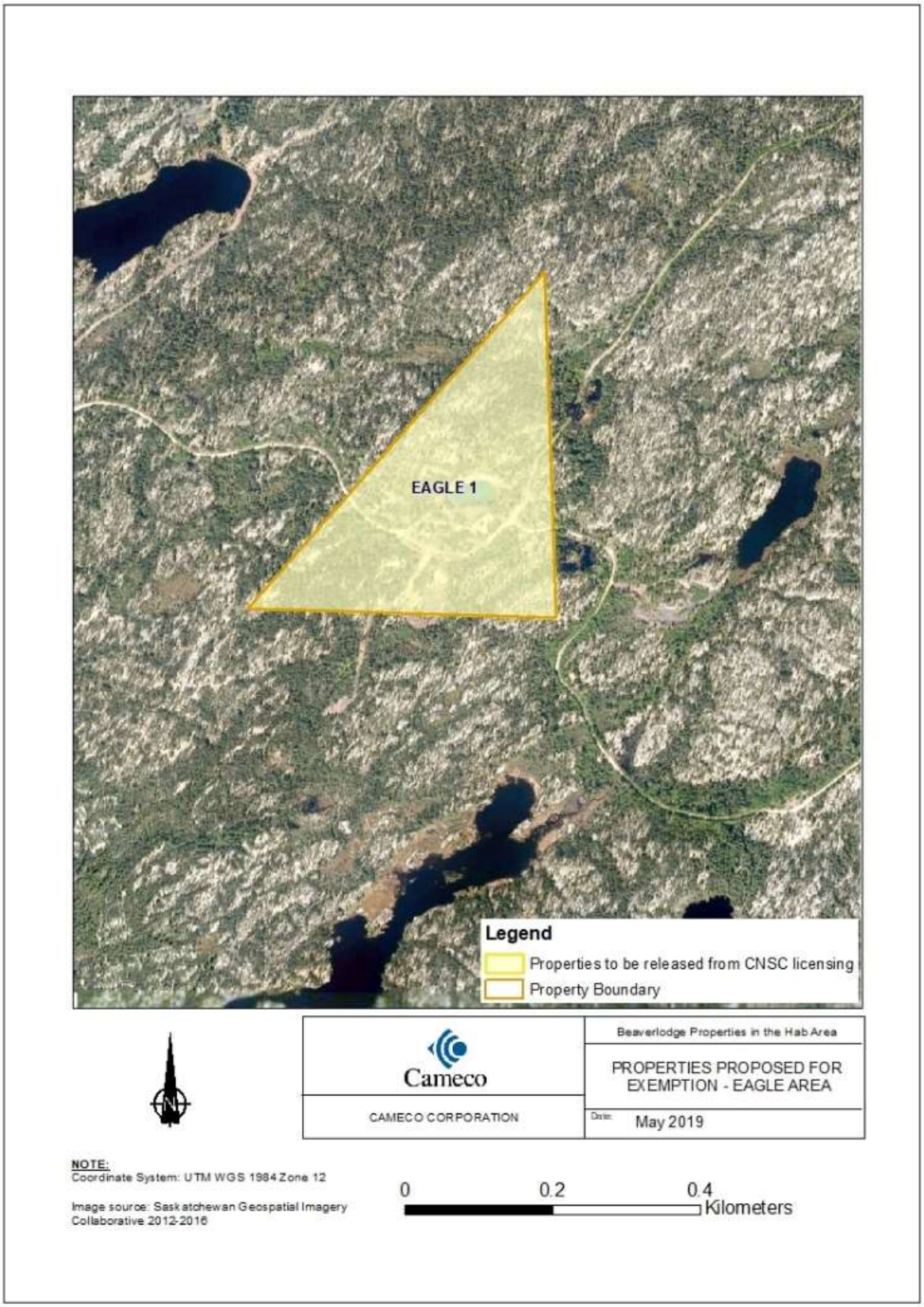

Figure 3.4-1 EAGLE 1 property boundary.

3.4.1 EAGLE 1

Description

The EAGLE 1 property consists of a 9.8 hectare parcel of land located on the former Eagle satellite mining area. The property consists of two decommissioned open pits referred to as the 12 Zone Pit and the 12 Zone Pit Extension and some associated waste rock. The 12 Zone Pit is a partially flooded open pit approximately 0.21 hectares in size, while the 12 Pit Extension is dry. The pit is completely isolated from the surrounding watershed and the likelihood of the water overflowing the pit and discharging to the surrounding environment has been assessed as minimal (SENES 2009). The volume of water within the pit varies based on local precipitation; however, the water level is typically more than 4 m below the pit crest. It is unlikely water will overtop the pit crest given the limited drainage basin of the pit and there has been no documentation of such an event occurring (Kingsmere 2016). It was noted in close out documentation that there was an adit opening within the 12 Zone pit that was sealed by blasting the sides of the pit and filling the remaining voids with waste rock (Eldorado Nuclear Limited, 1983). This opening is thought to be located near the base of the partially flooded pit as there is no evidence of an opening at surface.

The 12 Zone Pit Extension was a small pit, which was filled with waste rock at the end of operations and currently consists of a relatively flat area that is filled with waste rock of varying size. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

The 12 Zone and 12 Zone Extension pits were infilled with rock sourced on site in 1985. In 1999, the 12 Zone Pit wall was assessed for potential hazards and long-term geotechnical stability. Some minor scaling of the pit wall was completed at that time and a means of egress from the flooded area of the pit was established. The pit in its current configuration presents no greater hazard than other natural topographic features in the area.

Although uranium and radium concentrations in the 12 Zone pit is above Saskatchewan Environmental Quality Guidelines for surface waters, the observed concentration poses a negligible environmental or human health risk as the pit is isolated and not utilized by the public (SENES 2009; CanNorth and SENES 2012; SENES and Kingsmere 2015).

Additional activities completed on the property have included sealing all exploration boreholes according to regulatory accepted methods (Cameco 2017), removing debris from the site and disposing it as accepted by SkMOE as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Current Condition and Land Use

There is a road that runs through the property that provided access to the former Eagle properties that were transferred to the IC program in 2009, as well as access for some exploration activities beyond the Eagle area. With the limited travel on the access road, natural encroachment of vegetation is making travel to the property more difficult.

Based on the results of a land use study, the EAGLE 1 property sees very limited use (SENES and Kingsmere 2015). A single household indicated they utilized the EAGLE 1 site and the access road for approximately 32 hours/year while completing traditional activities (i.e., trapping rabbits). The EAGLE 1 property is in a safe and stable state and will support traditional activities, such as hunting/gathering of food sources and collection of firewood.

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the EAGLE 1 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The EAGLE 1 property will not require maintenance under the IC program.

3.5 Martin Lake Area

The Martin Lake mining area currently consists of two property parcels: RA 6 and RA 9. An underground mine connected the two properties straddling the narrow strip of land separating Martin Lake from Beaverlodge Lake. Adit development was initiated on the RA 6 property (Martin Lake side) in 1948 with the development on the RA 9 property (Beaverlodge Lake side) occurring in 1952-53. Mining activities were largely completed by 1955; however, small amounts of ore were removed under third party contracts from the mine in the late 1950s.

Based on the results of a land use study conducted in 2014, the maximum expected recreational use of the properties associated with the Martin Lake area by Uranium City residents is limited to two hours per year (SENES and Kingsmere 2015).

The RA 6 and RA 9 properties associated with the Martin Lake area are discussed below and are proposed for release from the CNSC Waste Facility Operating License WFOL-W5-2120.0/2023.

3.5.1 RA 6

Description

The RA 6 property consists of a 1.5 hectare parcel of land located along the eastern shore of southern portion of the narrows that connects the two halves of Martin Lake (Figure 3.5-1). The RA 6 property contains an adit with a steel grate anchored to bedrock preventing access to the mine workings. A geotechnical assessment of the crown pillar located between properties RA 6 and RA 9 concluded no immediate subsidence or safety risk is expected and no additional investigations or remediation related to the crown pillars in this area are expected to be required due to the thickness of the crown pillars and depth to the underground workings below this area (SRK 2015).

Also located on the property is waste rock associated with the mine development. The waste rock pile is located immediately adjacent to the adit opening covering an area of approximately 0.25 hectares. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Figure 3.5-1 RA 6 property including exclusion boundary.

Decommissioning Activities

During the original decommissioning of the RA 6 property, waste rock was placed adjacent to the mine opening and the adit was blocked with plywood and chain link fencing. In 2000, Cameco reinforced the final closure of the adit by installing a steel grate anchored to bedrock, creating a permanent restriction on access to the underground workings.

A geotechnical assessment for the crown pillar stability concluded no immediate subsidence or safety risk is expected and no additional investigations or remediation related to the crown pillars in this area are expected to be required due to the thickness of the crown pillars and depth to the underground workings below this area (SRK 2015).

A gamma study was completed on the RA 6 in 2001, which identified areas of elevated gamma radiation that required remediation. This work was completed in 2003 and involved using clean waste rock from the site to cover the areas of elevated gamma radiation. A follow-up gamma survey was completed in 2014 and confirmed that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008)

Final inspection of the site occurred in 2015 and remnant debris identified during that inspection was removed from the property and disposed of as accepted by SkMOE.

Current Condition and Land Use

The RA 6 property currently contains a waste rock pile of approximately 0.25 hectares in size. The adit has been permanently covered with a steel grate anchored to bedrock to prevent access to the underground workings. The RA 6 property is accessible by boat via Martin Lake, or by hiking approximately 1.5 km from the RA 9 property. Based on the results of a land use study, the maximum expected recreational use of the properties associated with the Martin Lake mine by Uranium City residents is limited to 2 hours per year (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the RA 6 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

Future maintenance activities on the RA 6 property are limited to the replacement of the steel grate installed to restrict access to the adit. Replacement is scheduled for approximately 75 years from now.

3.5.2 RA 9

Description

The RA 9 property consists of a 4.5 hectare parcel of land located along the western shoreline of Padget Bay of Beaverlodge Lake (Figure 3.5-1). The RA 9 property contains an adit that has been backfilled with waste rock to prevent access to the mine workings. A geotechnical assessment of the crown pillar located between properties RA 6 and RA 9 concluded no immediate subsidence or safety risk is expected and no additional investigations or remediation related to the crown pillars in this area are expected to be required due to the thickness of the crown pillars and depth to the underground workings below this area (SRK 2015).

Also located on the property is waste rock associated with the mine development. The waste rock pile is located in the area between the adit opening and the shoreline of the lake, but does not encroach on Beaverlodge Lake. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Figure 3.5-2 RA 9 property including proposed IC boundary.

Decommissioning Activities

There is no record of the original decommissioning activities completed on the site; however, it is assumed that the infrastructure related to this property was decommissioned at the same time as the main Beaverlodge mine/mill facilities. The decommissioning of the adit was found to include the construction of a wooden bulkhead at the opening, with waste rock placed in front of the bulkhead.

Activities completed since 1985 have included sealing all exploration boreholes according to accepted methods (Cameco 2017); removing debris from the site and disposing it as accepted by SkMOE; securing a mine opening; ensuring crown pillars are secure; as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Following routine inspections, it was identified that additional work to secure the adit opening was required. Activities consisted of re-opening of the adit, trimming the brow and sides in order to remove unstable material, and packing the adit opening access tunnel with waste rock to a depth of twice the height of the adit opening. This methodology was reviewed and accepted by the CNSC and SkMOE, and had been implemented in many jurisdictions, including other mine closures in the Uranium City area.

In 2009, during a routine inspection of the RA 9 property, an area of slightly elevated gamma radiation was detected in a waste rock pile located adjacent to the adit. As part of the adit remediation conducted in 2010, this waste rock was placed inside the mine workings.

Current Condition and Land Use

The RA 9 property currently contains waste rock associated with the development of the historic mine and can be accessed via a 300 m long trail along the shoreline of Beaverlodge Lake, located off the main road between Uranium City and the airstrip. Based on the results of a land use study, the maximum expected recreational use of the properties associated with the Martin Lake mine by Uranium City residents is limited to 2 hours per year (SENES and Kingsmere 2015).

Results of the 2010 and 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation*, EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the RA 9 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. It is also SkMER's intention to expand the IC boundaries to cover the area between RA 6

and RA 9 properties, which is not included in the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023, to inspect the condition of the crown pillar that extends into RA 9. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The RA 9 property is not expected to require maintenance under the IC program.

3.6 Lower Ace Creek Area

The Lower Ace Creek Area is accessible by road from Uranium City and is located immediately to the south and southeast of the Uranium City airstrip. The properties associated with the historic mine/mill facilities are located adjacent to the main road in this area. Other Lower Ace Creek properties are accessible via a road network and some are not accessible by road at all.

In addition to the mill and mine access points (Fay and Ace shafts), infrastructure included: the office complex; a large fuel storage area; freshwater pipelines and storage tank; tailings lines from the mill to a cyclonic separator (Dorrclone); a warehouse; a laydown area; and, an industrial waste disposal site. Waste rock and developmental rock (i.e., similar to area bedrock) was also placed in the Lower Ace Creek area (covers roughly 33 hectares) and on the shores of Ace Lake (covers roughly 2.1 hectares).

During initial decommissioning, the mill structures were partially demolished, voids were filled with waste rock to the extent practical, and the entire mill facility and site were covered with waste rock. A total of approximately 259,100 m^3 of waste rock was hauled to the mill complex and placed to cover the mill building debris. Similarly, the former fuel farm and waste dump were decommissioned by covering with locally-sourced waste rock. A waste rock pile stability assessment concluded that there was no indication of tension cracks or other signs of instability and that the waste rock slope presents no greater hazard than natural topographic features in the area (SRK 2010). A review of the data reported by ASKI (2011) also showed that the waste rock has a low potential for acid generation. During operation numerous tailings spills occurred along the wood stave tailings lines between the mill; the Dorrclone separator; and the approved final disposal location. During site wide decommissioning activities, these tailings spills were documented and assessed. Accessible tailings were covered with 0.6 m of waste rock while inaccessible areas were left *in situ*, in accordance with the approved decommissioning plan (Eldorado 1986). Inaccessible areas, either due to topography or naturally-established vegetative cover, were assessed on an individual basis to determine whether they should be left as is or remediated. If a decision was made to leave tailings *in situ*, it was because removal or covering of the tailings would have resulted in greater environmental damage than leaving them in place.

Uranium City residents utilize the area for an estimated total of 40 hours per year to sightsee on mill hill or pass through on the way to fish, harvest wood and/or go to a Bible Camp located approximately 500 m north of the area (SENES and Kingsmere 2015).

The Lower Ace Creek area currently consists of 20 properties (Figure 3.6-1). Of these 20, 10 properties are discussed below and are proposed for release from the CNSC Waste Facility Operating Licence WFOL-W5-2120.0/2023.

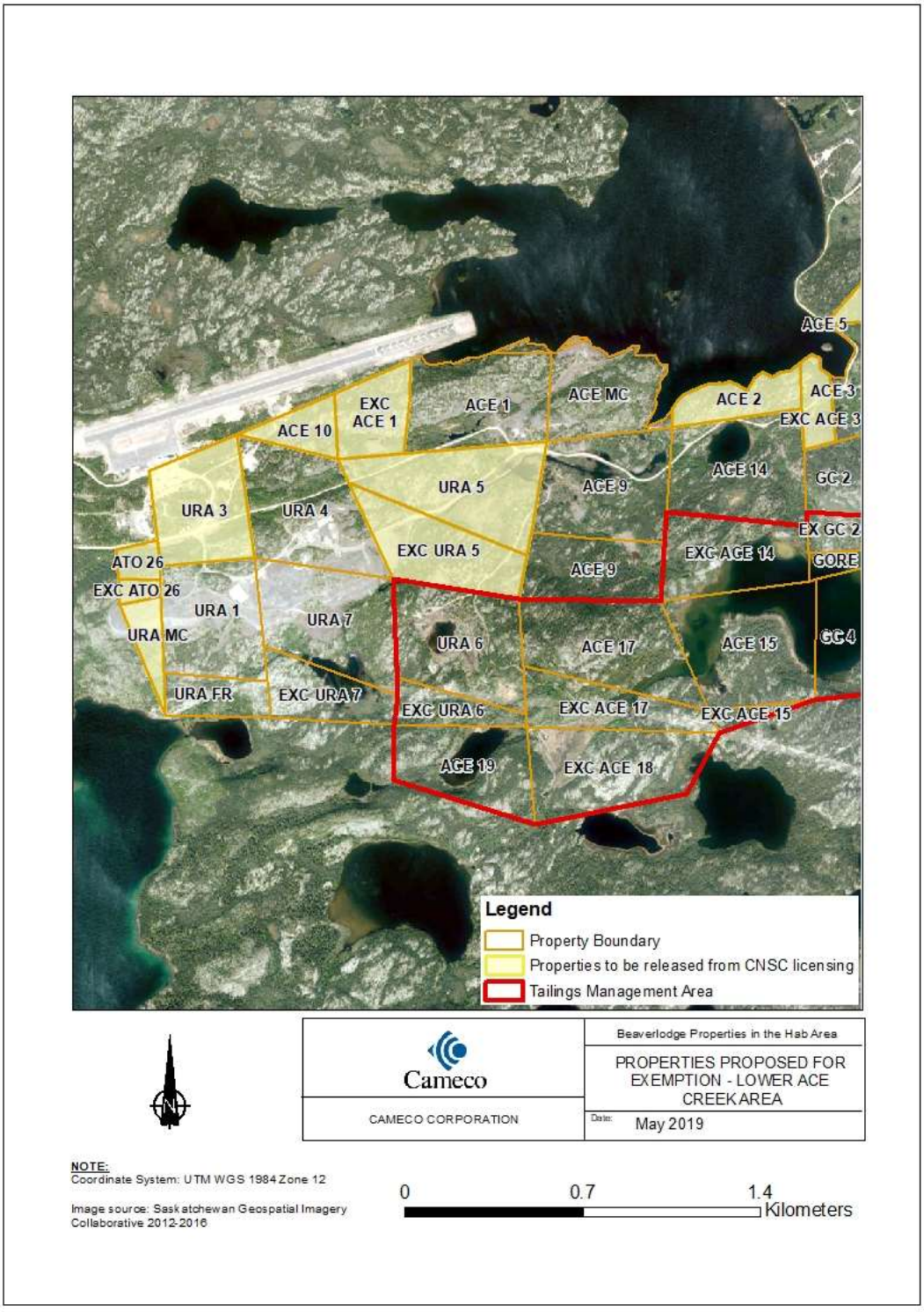

Figure 3.6-1 Lower Ace Creek Area property boundaries.

3.6.1 ATO 26

Description

The ATO 26 property consists of a 2.3 hectare parcel of land located at the western edge of the group of properties that host the former main Fay mine and Beaverlodge mill facilities. No record exists of any surface activities having taken place on the ATO 26 property; however, there is potential for the property to be underlain by underground workings.

Decommissioning Activities

As the ATO 26 property was not disturbed during operations, the property did not require, nor was it subject to, any decommissioning or reclamation activity during the 1982 to 1985 site wide Beaverlodge decommissioning and reclamation activities. No physical decommissioning or reclamation activities have taken place on the property since 1985. Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the ATO 26 property at an approximate depth of more than 91 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the ATO 26 property. A geotechnical assessment for the crown pillar stability concluded that there was a "low" likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).Following visual inspections of the property, residual debris has been removed and disposed as accepted by SkMOE. As surface disturbance on this property was limited to the access road to the Uranium City airstrip, a gamma survey was completed along this area.

Current Condition and Land Use

The ATO 26 property is in a natural and undisturbed state. The primary interaction between the residents of Uranium City and this property is limited to using the access road to the Uranium City airstrip.

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation*, EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on the potential for the property to be underlain by underground workings, SkMER has indicated that a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing.

No aspects of the ATO 26 property are expected to require inspection or maintenance under the IC program.

3.6.2 EXC ATO 26

Description

The EXC ATO 26 property is a 1.4 hectare parcel of land that is located immediately south of the ATO 26 property on the western edge of the group of properties that hosts the former main Fay mine and Beaverlodge mill facilities. The northern portion of the EXC ATO 26 property is undisturbed while the southern portion consists of a flat area of waste rock that extends beyond the property boundary to the west where it ends in a gradually increasing slope. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

A waste rock pile stability assessment concluded that the waste rock slope presents no greater hazard than natural topographic features in the area and no further decommissioning activities were performed (SRK 2010).

Additional activities completed have included removing debris from the site and disposing it as accepted by SkMOE, performing confirmation surveys to ensure that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the EXC ATO 26 property at an approximate depth of more than 76 m. The underground workings has been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).Current Condition and Land Use

A land use survey found that the maximum expected use of the Fay area by Uranium City residents was a total of 40 hours per year to tour the site and/or sightsee (SENES and Kingsmere 2015). The time spent on the EXC ATO 26 property is likely substantially less than other areas of the waste rock pile (i.e., URA MC) as these areas are more easily accessible and offer a better view of Beaverlodge Lake.

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The EXC ATO 26 property is not expected to require maintenance under the IC program.

3.6.3 URA MC

Description

The URA MC property is a 3.7 hectare parcel of land located immediately south of the EXC ATO 26 property on the western edge of the group of properties that hosts the former main Fay mine and Beaverlodge mill facilities (Figure 3.6-1). The northern portion (approximately 25%) of the URA MC property consists of a flat area of waste rock that extends beyond the property boundary to the west and ends in a west facing slope. The area was used as a storage area during operation and the waste rock was contoured during the initial decommissioning of the area. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation. The remainder of the property is relatively undisturbed.

Decommissioning Activities

Activities completed since 1985 have included sealing all exploration boreholes on or adjacent to the property according to accepted methods (Cameco 2017); removing debris from the site and disposing it as accepted by SkMOE; performing confirmation surveys to ensure that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the URA MC property at an approximate depth of more than 91 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the URA MC property. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).A waste rock pile stability assessment concluded that there was no indication of tension cracks or other signs of instability on the property and that the waste rock slope presents no greater hazard than natural topographic features in the area and no further decommissioning activities were performed (SRK 2010).

Current Condition and Land Use

A land use survey found that the maximum expected recreational use of the URA MC property by Uranium City residents was a total of 40 hours per year to tour the site and admire the view of Beaverlodge Lake (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2018).

The URA MC property is not expected to require maintenance under the IC program.

3.6.4 EXC ACE 1

Description

The EXC ACE 1 property is composed of an 8.7 hectare parcel of land bounded to the north by the Uranium City airstrip. No record exists of any mining related activity having taken place on the EXC ACE 1 property; however, a small amount of tailings were placed on the property during operation.

Decommissioning Activities

As discussed in Section 3.6, during site wide decommissioning activities, accessible tailings were covered with 0.6 m of waste rock while inaccessible areas were left *in situ*, in accordance with the approved decommissioning plan (Eldorado 1986). Waste rock present on the EXC ACE 1 property is limited to that used to cover tailings. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Activities completed since 1984 have included removing debris from the site and disposing it as accepted by SkMOE as well as performing confirmation surveys to ensure that gamma levels are acceptable.

Current Condition and Land Use

No resident of Uranium City indicated any use of the EXC ACE 1 property in the past five years (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that a small portion of the EXC ACE 1 property has incremental gamma values between 1 and 3 μSv/h (ARCADIS 2014). As such, a risk-based approach was applied to evaluate potential radiation risk at the property and concluded incremental dose from the Beaverlodge properties based on the measured gamma results and the reported land use are well below the public dose criterion of 1 mSv/yr (ARCADIS 2015) and meet the Performance Indicator associated with acceptable gamma levels.

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the EXC ACE 1 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for

free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The EXC ACE 1 property is not expected to require maintenance under the IC program.

3.6.5 ACE 10

Description

The ACE 10 property is a 5 hectare triangular parcel of land adjacent to the EXC ACE1 property. It is bounded to the north by the Uranium City airstrip and by the former Eldorado sewage lagoons to the south. No record exists of any mining related surface activities having taken place on the ACE 10 property.

Decommissioning Activities

As the ACE 10 property was not disturbed by surface operations, the property did not require, nor was it subject to, any decommissioning or reclamation activity during the 1982 to 1985 site wide Beaverlodge decommissioning and reclamation activities. Following visual inspections of the property, various debris materials have been removed and disposed as accepted by SkMOE and confirmation surveys have been performed to ensure that gamma levels are acceptable.

Current Condition and Land Use

No resident of Uranium City indicated any use of the ACE 10 property in the past five years other than to travel the road that traverses the property (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation*, EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. The proposed boundary is not related to any monitoring, maintenance of land use control requirements related to ACE 10. The proposed boundary provides a logical boundary continuation based on surrounding properties and their monitoring, maintenance and land use requirements.

No aspect of the ACE 10 property is expected to require inspection or maintenance under the IC program.

3.6.6 ACE 2

Description

The ACE 2 property is composed of a 7.0 hectare parcel of land on the southern shore of Ace Lake. No record exists of any mining-related activities having taken place on the ACE 2 property - although the electrical transmission line from the mill site to the former Verna mine did traverse the property as did a short section of the pipeline transporting tailings from the tailings separating plant (i.e., Dorrclone) to the Marie and Fulton tailings management areas. Additionally, the road from the Uranium City airstrip to Ace Lake, and areas to the north does briefly intersect the southern boundary of the property.

Waste rock present on the ACE 2 property is limited to that used to construct the roads transecting the property and covering the areas of spilled tailings. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

As discussed in Section 3.6, during site wide decommissioning activities, accessible tailings were covered with 0.6 m of waste rock while inaccessible areas were left *in situ*, in accordance with the approved decommissioning plan (Eldorado 1986).

Activities completed since 1985 have included removing debris from the site and disposing it as accepted by SkMOE, performing confirmation surveys to ensure that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings likely extend under the ACE 2 property at an approximate depth of more than 91 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the ACE 2 property. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).

Current Condition and Land Use

As the ACE 2 property hosts no feature of interest and no road access, it is assumed that there is very little, if any use of the property by Uranium City residents other than using the access road (which briefly travels on the southern boundary of the property) from the Uranium City airstrip to Ace Lake and areas to the north (i.e. Donaldson Lake, etc.).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation*, EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2016).

The ACE 2 property is not expected to require maintenance under the IC program.

3.6.7 EXC ACE 3

Description

The EXC ACE 3 property is a 3.9 hectare parcel of land located at the southeast end of Ace Lake. The property is traversed by the main access road from the former Beaverlodge mill site to other areas of the site. No record exists of any mining, milling or related activities having taken place on the EXC ACE 3 property although the electrical transmission line from the former Beaverlodge mill area to the Verna mine did traverse the property as did the main road from the Uranium City airstrip to Ace Lake.

Decommissioning Activities

Activities completed since 1985 have included removing debris from the site and disposing it as accepted by SkMOE, performing confirmation surveys to ensure that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the EXC ACE 3 property at an approximate depth of more than 91 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the EXC ACE 3 property. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).Current Condition and Land Use

No resident of Uranium City indicated any use of the EXC ACE 3 property in the past five years other than to travel the road which traverses the property (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that the property meets the criteria identified in the *Saskatchewan Guidelines for Northern Mine Decommissioning and Reclamation,* EPB 381 (SkMOE 2008).

Institutional Control Monitoring and Maintenance

Based on the potential for the property to be underlain by underground workings, SkMER has indicated that the EXC ACE 3 property will be transferred to the Province of Saskatchewan’s IC program; however, no aspect of the property is expected to require inspection or maintenance under the IC program.

3.6.8 URA 3

Description

The URA 3 property consists of a 15.7 hectare parcel of land that overlaps the Uranium City airstrip access road and the Eldorado mill access road. During operations, no significant surface mining-related activities took place on this property; however, it does contain a Raise (25373) opening to the surface, historic exploration boreholes and portions of power transmission lines. The property also includes infrastructure (communication tower, Saskatchewan Department of Highways facilities) that are not related to the former Eldorado mine or milling operations.

Decommissioning Activities

The original decommissioning activities included sealing the raise with a concrete cap in addition to removing the majority of the power line infrastructure. In the early 1980s, three large steel bulk fuel storage tanks and cylinders were transported from the former Eldorado mill site and left on the property on either side of the Uranium City airstrip access road.

Activities completed since 1985 have included sealing all exploration boreholes according to regulatory accepted methods (Cameco 2017); removing debris from the site (E.g., large steel tanks and residual material) and disposing it as accepted by SkMOE; securing the raise via the installation of an engineered stainless steel cap in accordance with regulatory approval; performing confirmation surveys to ensure that gamma levels are acceptable; and, ensuring crown pillars are secure.

Results of the 2014 gamma survey demonstrate that a small portion of the URA 3 property have incremental gamma values between 1 and 3 μSv/h (ARCADIS 2014). Portions of the URA 3 property that are planned for free-release following release from CNSC licensing were remediated to meet the criteria identified in the S*askatchewan Guidelines for Northern Mine Decommissioning and Reclamation*, EPB 381 (SkMOE 2008). For areas to be managed within the IC program, the risk-based approach was applied to evaluate potential radiation risk at the property and concluded incremental dose from the Beaverlodge properties based on the measured gamma results and the reported land use are well below the public dose criterion of 1 mSv/yr (ARCADIS 2015) and meet the Performance Indicator associated with acceptable gamma levels.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the URA 3 property at an approximate depth of more than 45 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the URA 3 property. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence due to the depths of the underground workings and stated that no additional investigation or remediation was required (SRK 2015).

Current Condition and Land Use

The results of the land use survey (SENES and Kingsmere 2015) indicated the primary interaction between the residents of Uranium City and the URA 3 property is limited to using the access road to the Uranium City airstrip.

Institutional Control Monitoring and Maintenance

Based on historical mining/milling activities and decommissioning at the URA 3 property, SkMER has indicated that only a portion of the property will be transferred to the Province of Saskatchewan's IC program and the remaining portion is planned for free-release from CNSC licensing. Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2018).

The stainless steel cap covering the 25373 raise is not expected to require maintenance for the certified usable lifespan of 1,200 years under the IC program; however, funding to assess the cap every 50 years is included in the IC fund calculations (Section 4.4).

3.6.9 URA 5

Description

The northwest corner of the URA 5 property (20.9 hectares) hosts the final cell of the decommissioned Eldorado sewage lagoon system as well as the main road between the main Fay site and the Ace site. A second ore haul road traveled from the main road to the Fay mill area crossing the URA 5 property along the northern bank of Ace Creek. The trail accessing the former water treatment facilities at the Marie Reservoir outlet also crosses the southern portion of the property. In addition to these roads, both of the main power utility corridors originally crossed the URA 5 property as did the power corridor from the former water treatment facility located at the outlet of Marie reservoir to the main grid.

During operations, the tailings pipeline from the mill facility to the tailings separating plant (i.e., Dorrclone) crossed the property and traveled along the edge of the main road. At one point during operations, the URA 5 property also hosted the former Eldorado Exploration Department facilities and a significant volume of exploration drill core and associated boxes. Waste rock present on the URA 5 property is limited to that used to construct the roads transecting the property and as discussed in Section 3.6, covering the areas of spilled tailings. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation.

Decommissioning Activities

Initial decommissioning activities that took place in the early 1980s included:

- Removal of the Exploration Department facilities.
- Removal of most of the power line infrastructure.
- Breaching sewage lagoon dams to allow them to drain and vegetate naturally.

Accessible tailings located on the property were excavated or covered. The cover consisted of 0.6 m of sand/gravel, waste rock or muskeg/peat to encourage the natural vegetation of these areas. The removed tailings were disposed of down the Ace 2157 vent raise.

Activities completed since initial decommissioning have included sealing all exploration boreholes according to accepted methods (Cameco 2017), removing debris (e.g., core and core boxes) from the site and disposing it as accepted by SkMOE, performing surveys to confirm that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the URA 5 property at an approximate depth of more than 200 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the URA 5 property. A geotechnical assessment for the crown pillar stability concluded that there was a "low" likelihood of subsidence due to the depths of the underground workings and stated that no additional investigation or remediation was required (SRK 2015).

Current Condition and Land Use

Based on a land use survey, the primary interaction between the residents of Uranium City and the URA 5 property was determined to be limited to using the main access road, which transects a small portion of the property (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that a small portion of the URA 5 property has incremental gamma values between 1 and 3 μSv/h (ARCADIS 2014). As such, a risk-based approach was applied to evaluate potential radiation risk at the property and concluded incremental dose from the Beaverlodge properties based on the measured gamma results and the reported land use are well below the public dose criterion of 1 mSv/yr (ARCADIS 2015) and meet the Performance Indicator associated with acceptable gamma levels.

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2018).

The URA 5 property is not expected to require maintenance under the IC program.

3.6.10 EXC URA 5

Description

The 15 hectare EXC URA 5 property hosts surface stored waste rock, an access road to the former water treatment facility at the outlet of Marie Reservoir that crosses the eastern portion of the property and a short portion of the ore haul road between the main road and the Fay mill that crosses the northwest section of the property. Waste rock characterization has been completed and demonstrates that the waste rock has a low potential for acid generation. In addition, visual observation and monitoring has not indicated any conditions or impacts that would be attributed to acid generation. The power corridor from the former water treatment facility located at the outlet of Marie reservoir to the main grid crossed the southern end of the property, and during operations the tailings pipeline from the mill facility to the tailings separating plant (i.e., Dorrclone) crossed the northern tip of the EXC URA 5 property as did a steel freshwater pipeline.

Decommissioning Activities

As the EXC URA 5 property saw minimal disturbance during operations, the property did not require, nor was it subject to, any major decommissioning or reclamation activity during the 1982 to 1985 site wide Beaverlodge decommissioning and reclamation activities other than the removal of the tailings pipeline crossing the property, remediation of exposed tailings, the removal of power transmission related infrastructure and re-contouring of the waste rock. Similar to the exposed tailings on URA 5, historic decommissioning practices included covering, excavating or natural re-vegetation.

A small portion of the Fay Waste Rock pile extends into the western edge of the EXC URA 5 property. A waste rock pile stability assessment concluded that the waste rock slope presents no greater hazard than natural topographic features in the area and no further decommissioning activities were performed (SRK 2010).

Additional activities completed since initial decommissioning have included sealing all exploration boreholes according to accepted methods (Cameco 2017), removing debris from the site and disposing it as accepted by SkMOE, performing confirmation surveys to ensure that gamma levels are acceptable as well as ensuring crown pillars are secure.

Based on visual inspection of historic mine plans and overlaid surface maps, underground workings may extend under the EXC URA 5 property at an approximate depth of more than 200 m. The underground workings have been inactive for more than 34 years and no indication of instability or subsidence have been identified in the area of the mine underlying the EXC URA 5 property. A geotechnical assessment for the crown pillar stability concluded that there was a “low” likelihood of subsidence and stated that no additional investigation or remediation was required (SRK 2015).Current Condition and Land Use

The results of the land use survey indicated that members of the public do not spend time on the EXC URA 5 property (SENES and Kingsmere 2015).

Results of the 2014 gamma survey demonstrate that a small portion of the EXC URA 5 property has incremental gamma values between 1 and 3 μSv/h (ARCADIS 2014). As such, a risk-based approach was applied to evaluate potential radiation risk at the property and concluded incremental dose from the Beaverlodge properties based on the measured gamma results and the reported land use are well below the public dose criterion of 1 mSv/yr (ARCADIS 2015) and meet the Performance Indicator associated with acceptable gamma levels.

Institutional Control Monitoring and Maintenance

Following acceptance into the IC program, a long-term monitoring plan developed in consultation with regulatory agencies will be implemented. Specific aspects expected to be monitored as part of the IC program are outlined by Kingsmere (2018).

The EXC URA 5 property is not expected to require maintenance under the IC program.

4.0 Other Matters of Regulatory Interest

4.1 Environmental assessment

The decommissioned Beaverlodge properties were fully decommissioned, in accordance with a regulatory approval by the AECB, in 1985 and in accordance with the provincial and federal regulations of the time. In the absence of an environmental assessment trigger under the *Canadian Environmental Assessment Act* (CEAA 2012), no environment assessment is required for the decommissioned Beaverlodge properties.

4.2 Indigenous and community engagement

Cameco recognizes the right of local Indigenous groups to be consulted and, where applicable, to have their interests accommodated by the Crown with respect to any Crown authorization, disposition, licence, permit or approval associated with CNSC licensed operations and projects, the granting of which could potentially impact the exercise of aboriginal or Treaty rights. Cameco assists the CNSC and other regulators in the discharge of Indigenous consultation and accommodation obligations where they arise. The Crown's duty to consult and accommodate aligns with Cameco's corporate values, commitments and measures of success, and as such constitutes sound business practice.

As the majority of northern Saskatchewan residents are of Indigenous origin, including First Nations and Métis, Cameco's public engagement activities relating to the Beaverlodge properties provide opportunities for the CNSC and Cameco to effectively consult with Indigenous groups in northern Saskatchewan. Representatives from the Métis Nation – Saskatchewan Local in Uranium City are invited to all public meetings in the community and are asked to participate in all engagement events related to the Beaverlodge properties.

Each year, Cameco hosts a public meeting in Uranium City, typically with the CNSC and SkMOE in attendance, to review the results of any activities completed since the previous meeting and to preview the plans for the upcoming year, including any activities or planned studies that are to be completed. This meeting also provides an opportunity for Cameco to engage local residents regarding the plan and schedule for transferring properties to the Province of Saskatchewan's IC program. This engagement opportunity allows residents to provide feedback to Cameco and the JRG regarding potential concerns with the properties and their suitability for transfer to the IC program. The following groups are the focus of such engagement activities:

- The Northern Hamlet of Uranium City – Only community with year-round road access to the Beaverlodge properties;
- Yá thi Néné Land and Resource Office – Cameco updated its 1999 Impact Management Agreement with the Athabasca Basin communities and signed a Collaboration Agreement in June 2016 with the First Nations and communities of Hatchet Lake, Wollaston Lake, Black Lake, Fond du Lac, Stony Rapids, Uranium City and Camsell Portage. As a result, the Yá thi Néné Land and Resource Office was established representing leadership of the Athabasca First Nations and Athabasca communities.
- Athabasca sub-committee of the Northern Saskatchewan Environment Quality Committee (EQC) – includes representatives from each of the Athabasca communities (Wollaston Lake, Stony Rapids, Fond du Lac, and Camsell Portage) and First Nations (Hatchet Lake Denésuline Nation and Black Lake Denésuline Nation); and,
- Athabasca Joint Engagement and Environment Subcommittee (AJES) – which is a Collaborative Agreement (CA) specific subcommittee and includes representatives from each of the Athabasca communities and First Nations. The CA is geared towards Cigar Lake and Rabbit Lake activities, therefore engagement related to Beaverlodge is similar to that with the EQC.

Cameco also uses a range of communication tools including fact sheets, posters, presentations, and a specially-purposed website (www.beaverlodgesites.com) for the Beaverlodge properties to engage and communicate information of interest to the public for routine and non-routine situations, events and activities.

4.3 Cost recovery

Cameco is in good standing with the CNSC with respect to the payment of licensing fees for the Beaverlodge properties. The CNSC has provided Cameco with fee projections for fiscal years 2020-21 and 2021-22. The fee projection for fiscal year 2020-21 is $213,700, and $218,000 for fiscal year 2021-22.

4.4 Financial assurance

The financial liabilities associated with the management of the Beaverlodge properties are held by the Government of Canada and managed by Canada Eldor Inc. (CEI), a wholly owned subsidiary of the Canada Development Investment Corporation (CDEV). Both CEI and CDEV report to the federal Minister of Finance. The Ministry of Finance has confirmed via letter to the CNSC that:

Canada Eldor Inc. is an agent of the Crown in right of Canada for all purposes. It follows that any undischarged obligations and liabilities of Canada Eldor Inc. are the obligations and liabilities of the Crown in right of Canada. That will include Canada Eldor Inc.'s obligations and liabilities to decommission the Beaverlodge Site and the expenses associated with possession, management and control of nuclear substances at that site.

The CNSC has acknowledged receipt of the letter and accepted that the information fulfilled the requirements of condition 2.2 of Waste Facility Operating Licence WFOL-W5-2120.0/2007.

The Province of Saskatchewan's *Reclaimed Industrial Sites Act* and its Regulations require provision of a fund sufficient to pay for the long-term monitoring and maintenance of the site. In addition, depending on whether or not any engineered structures or tailings remain on the site, an additional contribution of between 10 - 20% of the monitoring and maintenance amount is made to an Unforeseen Events Fund. The IC program also requires that a financial assurance in the amount of the maximum potential failure event be carried until such time as the Unforeseen Events Fund builds to a level that the Province of Saskatchewan is comfortable that there is sufficient money in the fund to cover any future unforeseen event.

As properties are transferred to the IC program, CEI will provide the required funds to the Province of Saskatchewan to meet the Monitoring and Maintenance requirements as well as the Unforeseen Events Fund. As the obligations and liabilities associated with this site have been accepted by the Crown, there is no need to maintain a financial assurance for the maximum potential failure event for these properties until there is sufficient money in the fund to cover any future unforeseen event.

4.5 Other regulatory approvals

Cameco's objective in managing Beaverlodge is to protect the health and safety of the public and environment, and to meet the requirements for transfer of the decommissioned properties to the Saskatchewan IC program. The Saskatchewan Ministry of Environment has provided Cameco notice that upon receiving CNSC licence release, a Release from Decommissioning and Reclamation will be granted. This follows the same process undertaken in 2009 when five former Beaverlodge properties were released from CNSC licensing and accepted by SkMER into the IC program. As proposed by SkMER, some portions of properties based on the absence of historic mining/milling activities may not be transferred into the IC program and are planned to be free-released, as they do not

require a licence under the NSCA. In some situations, the proposed IC boundaries may also extend beyond the property boundaries that are the subject of this request to cover additional aspects that are anticipated to be monitored through the IC program.

4.6 Licensee's public information program

Cameco has developed a Public Information Program (Cameco 2013b) (PIP) for Beaverlodge that describes communication with stakeholders. The PIP formalizes the communication process, ensuring that Cameco's activities or plans at the decommissioned Beaverlodge properties are effectively communicated to the public in a manner that complies with established guidelines. It is based on the PLAN-DO-CHECK-ACT model outlined in internationally recognized management standards. For more detailed description of public communication activities undertaken, refer to Section 3.2 Community Engagement and Consultation above.

Cameco measures the effectiveness of these various public information efforts through polling. Public perceptions of the uranium mining industry are surveyed annually across Saskatchewan, including the north. The most recent polling results from November 2018 indicate that a large majority of residents (80%) continue to support the uranium mining industry. This includes 38% of residents who describe themselves as "strongly" supportive. In northern Saskatchewan, 82% of those polled support the continuation of uranium mining and milling, including 43% who describe themselves as strongly supportive.

This level of public support for uranium mining and milling in Saskatchewan is not new. Although support levels rise and fall, they do so within a relatively limited range. The current level of support is consistent with the long-term trend identified since 1990.

5.0 Conclusions

The current condition of the 20 properties requested for licence release has met the established performance objectives of safe, secure, stable/improving and demonstrates that these properties pose minimal risk to public safety or to the local environment. As such, HAB 3, HAB 6, EXC 2, HAB 2A, JO-NES, BOLGER 2, ACE 5, EAGLE 1, RA 6, RA 9, ATO 26, EXC ATO 26, URA MC, EXC ACE1, ACE 10, ACE 2, EXC ACE 3, URA 3, URA 5, EXC URA 5 should be considered for release from CNSC Licence WFOL-W5-2120.0/2023 to allow the applicable portions to be transferred to the IC program.

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