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Licence Renewals

Renouvellement de permis

Cameco Corporation

Cameco Corporation

**McArthur River Operation
and Key Lake Operation**

**Établissement de
McArthur River et
établissement de Key
Lake**

Commission Public Hearing

Audience publique de la Commission

Scheduled for:

Prévue le :

June 7 to 8, 2023

7 au 8 juin 2023

Submitted by:

Soumise par :

CNSC Staff

Le personnel de la CCSN

Summary

This Commission member document (CMD) presents information about the following matters of regulatory interest with respect to Cameco Corporation's McArthur River Operation and Key Lake Operation:

- CNSC staff's review and assessment of Cameco's application for, and recommendation regarding, the renewal of uranium mine/mill licences:
 - UML-MINE-MCARTHUR.01/2023
 - UML-MILL-KEY.01/2023

CNSC staff recommend that the Commission consider taking the following actions:

- Renew the uranium mine/mill licences to authorize Cameco to operate both the McArthur River Operation and Key Lake Operation until October 31, 2043
- Authorize the delegation of authority as set out in this CMD

The following items are attached:

- Current licences UML-MINE-MCARTHUR.01/2023 and UML-MILL-KEY.01/2023
- Proposed licence changes
- Proposed licences UML-MINE-MCARTHUR.00/2043 and UML-MILL-KEY.00/2043
- Proposed licence conditions handbooks
- Summary of, and links to, Environmental Protection Review Reports for both the [McArthur River Operation](#) and the [Key Lake Operation](#)

Résumé

Le présent document à l'intention des commissaires (CMD) fournit des renseignements au sujet des questions d'intérêt réglementaire suivantes en ce qui a trait aux établissements de McArthur River et de Key Lake de Cameco Corporation :

- L'examen et l'évaluation par le personnel de la CCSN de la demande de Cameco visant le renouvellement de ses permis d'exploitation de mines et d'usines de concentration d'uranium, et les recommandations connexes:
 - UML-MINE-MCARTHUR.01/2023
 - UML-MILL-KEY.01/2023

Le personnel de la CCSN recommande à la Commission de considérer prendre les mesures suivantes :

- Renouveler les permis d'exploitation de mines et d'usines de concentration d'uranium afin d'autoriser Cameco à exploiter les établissements de McArthur River et de Key Lake jusqu'au 31 octobre 2043
- Autoriser la délégation des pouvoirs prévue dans le présent CMD

Les pièces suivantes sont jointes :

- Les permis actuels UML-MINE-MCARTHUR.01/2023 et UML-MILL-KEY.01/2023
- Les modifications proposées aux permis
- Les permis proposés UML-MINE-MCARTHUR.00/2043 et UML-MILL-KEY.00/2043
- Les manuels des conditions de permis proposés
- Le résumé des rapports d'examen de la protection de l'environnement pour les établissements de [McArthur River](#) et de [Key Lake](#), et les liens connexes

Signed/signé le
16 February 2023

Kavita Murthy

Director General
Directorate of Nuclear Cycle and Facilities Regulation

Directrice générale de la
Direction de la réglementation du cycle et des installations nucléaires

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. OVERVIEW.....	3
1.1 Background	3
1.2 Highlights.....	12
1.3 Overall Conclusions.....	14
1.4 Overall Recommendations	14
2. ENVIRONMENTAL PROTECTION REVIEW	15
3. GENERAL ASSESSMENT OF SAFETY AND CONTROL AREAS	16
3.1 Management System.....	17
3.2 Human Performance Management.....	21
3.3 Operating Performance	23
3.4 Safety Analysis	26
3.5 Physical Design	29
3.6 Fitness for Service.....	35
3.7 Radiation Protection	37
3.8 Conventional Health and Safety	48
3.9 Environmental Protection	54
3.10 Emergency Management and Fire Protection	75
3.11 Waste Management	79
3.12 Security	87
3.13 Safeguards and Non-Proliferation	89
3.14 Packaging and Transport	92
4. INDIGENOUS AND PUBLIC CONSULTATION AND ENGAGEMENT ...	94
4.1 Indigenous Consultation and Engagement.....	94
4.2 CNSC Public Consultation and Engagement	98
4.3 Licensee Public Information and Engagement	102
4.4 Participant Funding Program.....	104
5. OTHER MATTERS OF REGULATORY INTEREST	104
5.1 Cost Recovery	104
5.2 Financial Guarantees	105
5.3 Improvement Plan and Significant Future Activities	106
5.4 Nuclear Liability Insurance	107
5.5 Proposed Licence Period	107
5.6 Delegation of Authority	117
6. OVERALL CONCLUSIONS AND RECOMMENDATIONS.....	117
6.1 Overall Conclusions.....	117
6.2 Overall Recommendations	118

REFERENCES	119
GLOSSARY.....	122
A. SAFETY PERFORMANCE RATING LEVELS.....	125
B. BASIS FOR THE RECOMMENDATIONS(S).....	126
B.1 Regulatory Basis.....	126
B.2 Detailed Summary of CNSC Assessment of Application	137
B.3 Technical Basis.....	141
C. SAFETY AND CONTROL AREA FRAMEWORK.....	142
C.1 Safety and Control Areas Defined	142
C.2 Specific Areas for this Facility Type.....	144
PART 2 – MCARTHUR RIVER OPERATION	146
CURRENT LICENCE.....	147
PROPOSED LICENCE CHANGES	148
PROPOSED LICENCE.....	149
DRAFT LICENCE CONDITIONS HANDBOOK.....	150
PART 3 – KEY LAKE OPERATION.....	151
CURRENT LICENCE.....	152
PROPOSED LICENCE CHANGES	153
PROPOSED LICENCE.....	154
DRAFT LICENCE CONDITIONS HANDBOOK.....	155

EXECUTIVE SUMMARY

Cameco Corporation (Cameco) has requested to renew its Canadian Nuclear Safety Commission (CNSC)-issued licences for its McArthur River Operation (MRO) and Key Lake Operation (KLO). The sites are situated within Treaty 10 (1906) territory and the Homeland of the Métis, and are within the traditional territories of the Dene, Cree, and Métis peoples. The MRO and KLO are operationally linked, as all uranium ore from the MRO is transported by road to the KLO for milling into uranium ore concentrate. The current licences for both operations are valid from November 1, 2013, to October 31, 2023.

This Commission member document (CMD) presents CNSC staff's assessment, conclusions and recommendations in respect of Cameco's licence renewal applications. In light of the operational and corporate links between the 2 facilities, and their proximity to one another, CNSC staff have developed a single CMD to address both licence renewals.

CNSC staff have evaluated the licensee's compliance with the requirements of the [Nuclear Safety and Control Act](#), the [Uranium Mines and Mills Regulations](#) and other applicable regulations. After assessing the licensee's regulatory performance, CNSC staff concluded that environmental and radiological risks from the 2 sites remain low. Effluent quality and radiation doses are effectively controlled and kept well below regulatory limits. The licensee's performance in conventional health and safety also demonstrates that risks to workers are managed and activities are conducted safely.

Licensed activities at the MRO and KLO have been subject to several federal and provincial environmental assessments over the years. These assessments concluded that, after taking mitigation measures into consideration, activities conducted at both the MRO and KLO will not cause significant adverse environmental effects.

Based on the licensee's regulatory performance, as well as results of these environmental assessments, CNSC staff have concluded that the proposed continued operation of the MRO and KLO remains within the bounds and intent of the current licensing basis. CNSC staff have further concluded that the licensee is qualified to carry out those activities, make adequate provisions for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

CNSC staff therefore recommend that the Commission take the following actions:

For the MRO:

1. Renew the uranium mine licence to authorize Cameco to operate the facility until October 31, 2043
2. Delegate authority as set out in this CMD.

For the KLO:

1. Renew the uranium mill licence to authorize Cameco to operate the facility until October 31, 2043
2. Delegate authority as set out in of this CMD.

Referenced documents in this CMD are available to the public upon request, subject to confidentiality considerations.

CMD STRUCTURE

This Commission Member Document (CMD) is presented in 3 parts.

Part 1 of this CMD includes:

1. an overview of the matter being presented
2. overall conclusions and overall recommendations
3. general discussion pertaining to the safety and control areas (SCAs) that are relevant to this submission
4. discussion about Indigenous consultation and engagement and other matters of regulatory interest
5. appendices material that complements items 1 through 4.

Part 2 provides all available information pertaining directly to the current and proposed licence for the **McArthur River Operation**, including:

1. current licence, UML-MINE-MCARTHUR.01/2023
2. proposed changes to the conditions, licensing period, or formatting of the current licence and licence conditions handbook
3. proposed licence, UML-MINE-MCARTHUR.00/2043
4. proposed licence conditions handbook, LCH-MINE-MCARTHUR.00/2043.

Part 3 provides all available information pertaining directly to the current and proposed licence for the **Key Lake Operation**, including:

1. current licence, UML-MILL-KEY.01/2023
2. proposed changes to the conditions, licensing period, or formatting of the current licence and licence conditions handbook
3. proposed licence, UML-MILL-KEY.00/2043
4. proposed licence conditions handbook, LCH-MILL-KEY.00/2043.

1. Overview

1.1 Background

Cameco Corporation's ([Cameco](#)) McArthur River Operation (MRO) is an underground uranium mining facility located approximately 630 kilometres (km) north of Saskatoon, Saskatchewan (figure 1.1). Accessible by an all-weather road, the northern village of Pinehouse, the nearest community, is located 280 km from the MRO.

The MRO is [joint-venture owned](#) by Cameco and Orano Canada Inc. (Orano). With 69.8% ownership, Cameco is the operator and licensee of the MRO; Orano holds the balance with 30.2% ownership.

Cameco's Key Lake Operation (KLO) is a uranium milling facility located in the northern region of the province of Saskatchewan, approximately 70 km southeast of Cree Lake and is situated approximately 570 km north of Saskatoon, Saskatchewan (figure 1.1). Located approximately 220 km from the KLO, the village of Pinehouse is the nearest community with accessibility by an all-weather road. With 83.3% ownership, Cameco is the operator and licensee of the KLO, and Orano owning the remainder with 16.7% ownership. Uranium ore from the MRO is transported to the KLO for milling.

Figure 1.1: Location map

Source: Cameco Corporation

The MRO consists of an underground mine with underground ore preparation and 3 vertical access shafts. The surface supporting infrastructure consists of freezing plants, ore processing and load out building, water treatment plant and its holding, monitoring and contingency ponds, inert mine rock pile, temporary mine rock and special waste storage pads, concrete batch plant, sewage treatment, domestic landfill, warehouses, worker camp, office, airport and administrative buildings. Figure 1.2 presents an aerial view of the MRO.

Figure 1.2: Aerial view of the McArthur River Operation



Source: Cameco Corporation

High-grade ore slurry from the MRO, which is located northeast of the KLO, is transported approximately 80 km by truck to the KLO for processing into uranium concentrate (U_3O_8). All tailings derived from the processing of MRO ore are placed into the Deilmann Tailings Management Facility (DTMF) at the KLO.

The KLO mill uses a sulphuric acid leach and a solvent extraction process to extract and purify a uranium oxide (U_3O_8) product from the ore. The Key Lake mill processes MRO slurry ore, which is blended with special waste, low-grade ore, and mineralized waste, to extract the uranium. The KLO also receives recycled byproducts from Cameco's [Port Hope Conversion Facility](#) and [Blind River Refinery](#), both located in Ontario, that are processed in the mill. The waste solids from the milling process (tailings) are disposed of in an engineered tailings management facility.

The KLO mill contains 6 main process components. Each processing circuit is contained in a separate plant facility that is linked to the next stage of the process. The 6 components are:

- ore receiving/grinding/blending
- leaching
- counter-current decantation
- solvent extraction
- yellowcake precipitation/calcination/crystallization
- bulk neutralization (effluent treatment).

The annual licence limit of the KLO mill is 9.6 million kilograms (Mkg) of uranium (25 million pounds U_3O_8). The uranium oxide concentrate is also commonly referred to as yellowcake. In addition to the production of uranium oxide concentrate, the KLO mill also produces an ammonium sulphate from the recovery of ammonia used in the milling processes. The ammonium sulphate is transported off-site and sold as fertilizer.

The KLO also operates a reverse osmosis (RO) water treatment plant for water collected as part of the Gaertner/Deilmann pond pumping systems. The water collected is treated at the RO plant and released to the environment. Treated effluent is also discharged to the environment from the bulk neutralization circuit within the mill. The bulk neutralization circuit receives the residual dissolved solids from the RO plant as well as other potentially contaminated water that is pumped to the mill from other areas of the site. The treated effluent is sent to 1 of 4 monitoring ponds where the quality of water is confirmed by sampling and analysis, prior to release to the environment or recycling for re-treatment.

The KLO includes an ammonia sulphate crystallization plant, sulphuric acid plant, oxygen plant, waste rock and special waste rock storage facilities, ore storage areas, tailings management facilities, water treatment plants, warehouses, worker camp and office. The waste management facilities are discussed in more detail in section 3.11. Figure 1.3 presents an aerial view of the KLO.

Figure 1.3: Aerial view of the Key Lake Operation



Source: Cameco Corporation

The McArthur River and Key Lake operations are 2 separate facilities under separate CNSC-issued licences but are operationally connected. As noted earlier, all uranium ore from the MRO is processed at the KLO. To reduce overlap and duplication in both written documentation and information presented to the Commission, CNSC staff prepared 1 commission member document (CMD) for the proposed licence renewal of both operations.

In 1975 and 1976, the Gaertner and Deilmann ore bodies were discovered at Key Lake. Open pit mining of these 2 ore bodies was conducted between 1981 and 1997 and, when depleted, transportation of ore from the MRO began. Tailings management at the Key Lake site was originally within an engineered above-ground tailings management facility and transitioned to the in-pit placement in 1996 after the mined out Deilmann pit was converted to a tailings management facility. Milling began at the KLO in 1983 and continues today. Feed to the mill is composed of ore from the McArthur River mine as well as stockpiled special waste at the Key Lake site. The Key Lake uranium mill licence was initially issued on [October 29, 2013](#), with a 10-year licence term and amended on [July 29, 2020](#). The licence was amended as part of the Commission's acceptance of an updated financial guarantee for the facility.

The McArthur River ore body was discovered in 1988 by Cameco. In 1997, the Joint Federal/Provincial Panel on Uranium Mining in Northern Saskatchewan filed its recommendation, which included support for development of the McArthur River deposit. The Atomic Energy Control Board (AECB), the predecessor of the CNSC, issued regulatory approval to construct the underground and surface facilities in 1997 and 1998. An AECB licence was issued to Cameco in 1999 to allow production mining. Mining has continued at the MRO since 1999. The McArthur River uranium mine licence was initially issued on [October 29, 2013](#) with a 10-year licence term and amended on [June 26, 2019](#). Similar to the KLO, the MRO licence was amended as part of a regular financial guarantee update for the facility.

A complete list of the federal environmental assessments completed for both operations are provided in the respective Environmental Protection Review (EPR) reports ([MRO-EPR](#), [KLO-EPR](#)). On [November 8, 2017](#), Cameco announced the temporary suspension of production at both the MRO and KLO and on [July 25, 2018](#), Cameco announced that the sites would remain in a state of care and maintenance for an indeterminate period of time. During this care and maintenance period, both facilities remained in a safe state and continued activities such as operation of water treatment plants. CNSC regulatory oversight continued throughout this period, with the use of remote inspections when travel was restricted due to the COVID-19 pandemic in 2020 and 2021.

On [February 9, 2022](#), Cameco announced its intent to begin the process to transition both operations from care and maintenance to production over the course of 2022 and 2023. Since this announcement, CNSC inspections and document reviews have focused on ensuring that resumption of production occurs in a safe manner and that the operations remain protective of the environment. On [November 9, 2022](#), Cameco announced that the KLO milled the first ore from the MRO since resuming production at both operations.

The MRO and KLO are regulated at both the provincial and federal levels. At the provincial level, the [Saskatchewan Ministry of Environment](#) (SMOE) issues an Approval to Operate a Pollutant Control Facilities. Both SMOE and the [Saskatchewan Ministry of Labour Relations and Workplace Safety](#) conduct inspections of these operations. At the federal level, the CNSC, [Environment and Climate Change Canada](#), and [Employment and Social Development Canada](#) regulate uranium mines and mills. In addition, under the [Nuclear Safety and Control Act](#) (NSCA), uranium mines and mills are required to have a CNSC licence.

The CNSC-authorized activities at the MRO and KLO are described within the CNSC issued Licence Conditions Handbook (LCH) for each operation (provided in Part 2 and Part 3 of this CMD, respectively). The MRO is authorized to operate the underground mine to a maximum output of 9.6 Mkg of uranium per year and transfer the ore to the KLO. The KLO is authorized to mill ore from the MRO up to a nominal annual production of 9.6 Mkg of uranium. The KLO is also authorized to mill recycle byproducts from Cameco's Blind River and Port Hope Conversion Facilities. Table 1.1 outlines the mining and milling production data for both the MRO and KLO, respectively during the current licensing period (2013 to 2022).

Table 1.1: Mining/Milling production data, 2013–2022

McArthur River Operation										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022¹
Ore tonnage (Mkg/year)	104.1	108.4	88.2	89.3	91.4	2.8	0	0	0	0
Average ore grade mined (%U)	7.49	7.4	8.59	7.89	7.09	6.42	N/A	N/A	N/A	N/A
Uranium mined (Mkg U/year)	7.8	8.02	7.58	7.04	6.48	0.18	N/A	N/A	N/A	N/A
Authorized annual production limit (Mkg U/year)	8.1	8.1	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Key Lake Operation										
Mill ore feed (Mkg/year)	184.1	173.0	165.6	155.3	143.3	0	0	0	0	0
Average annual mill feed grade (% U)	4.23	4.29	4.47	4.51	4.37	N/A	N/A	N/A	N/A	N/A
Percentage of uranium recovery (%)	99.3	99.4	99.35	99.04	99.05	N/A	N/A	N/A	N/A	N/A
Uranium concentrate produced (Mkg U/year)	7.74	7.37	7.35	6.95	6.20	0.06 ²	0.006 ³	0	0	0
Authorized annual production (Mkg U/year)	7.85	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60

¹ The 2022 reporting period is January 1, 2022, to September 30, 2022.

² Processing of remaining ore slurry from 2017.

³ From calciner clean-out and disposal of laboratory samples.

N/A = not applicable

As noted in section 1.1, Cameco maintained the MRO and KLO in a state of care and maintenance since 2018. Cameco has begun the process to transition both operations from care and maintenance to production over the course of 2022 and early 2023. CNSC inspections conducted in 2022 and 2023 are being used to verify that the return to regular production occurs in a safe manner and that the environment remains protected.

The MRO is currently licensed by the CNSC to operate a [uranium mine site](#). The licence authorizes Cameco to:

- a) *prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) for the mining of uranium ore at a site known as the McArthur River Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;*
- b) *mine a nuclear substance (uranium ore);*
- c) *possess, transfer, import, use, store, and dispose of nuclear substances; and*
- d) *possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).*

The KLO is currently licensed by the CNSC to operate a [uranium mill site](#). The licence authorizes Cameco to:

- a) *prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) for the milling of uranium ore at a site known as the Key Lake Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;*
- b) *produce a uranium concentrate;*
- c) *possess, transfer, import, use, store, and dispose of nuclear substances; and*
- d) *possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).*

Cameco has applied to the CNSC for licence renewals and to continue its current activities for both operations [[1](#), [2](#), [3](#)].

This CMD provides CNSC staff’s assessment of the programs and measures planned or in place to provide adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

1.2 Highlights

Cameco's applications for licence renewal of its MRO and KLO

On April 20, 2021, Cameco submitted 2 separate applications for renewal of the CNSC-issued licences for the MRO and KLO [1, 2]. These sites are licensed separately but are operationally linked as ore mined from the MRO is milled at the KLO. Because of this linkage, CNSC staff prepared 1 CMD for the licence renewals of both operations.

The proposed mining operations at the MRO and milling operations at the KLO are within the respective authorized production limits. CNSC staff assessed all aspects of Cameco's applications for the renewal of CNSC-issued licence UML-MINE-MCARTHUR.01/2023 for the MRO and UML-MILL-KEY.01/2023 for the KLO.

Cameco initially applied for an indefinite licence term for both operations. In response to feedback from Indigenous Nations and communities, Cameco subsequently revised its original request and, on November 4, 2022, requested that the licences be renewed by the Commission for a 20-year term [3].

CNSC staff assessment of Cameco's application

CNSC staff assessed Cameco's licence renewal applications for its mining operations at the MRO and milling operations at the KLO under subsection 24(4) of the [NSCA](#). This assessment determined whether Cameco remains qualified to perform the activities to be authorized by the Commission at both operations and in doing so, will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

The majority of people living near the MRO and KLO are Indigenous. In preparation for Cameco's application for the renewal of the CNSC-issued licence, CNSC met with representatives of Indigenous Nations, communities and organizations to provide regular updates on the status of the application process and proposed hearing, which included obtaining input and guidance on preferred hearing locations. As discussed in section 4.1, CNSC staff also participated in outreach sessions in September 2019 in Prince Albert, Saskatchewan and again in September 2020, and October 2021 via Zoom meetings. With the easing of COVID-19 travel restrictions, an in-person information session was held in Saskatoon on September 15, 2022. These outreach events provided opportunities for community members and Indigenous leadership to express any concerns related to Cameco's MRO and KLO licence renewal requests, including the proposed licence term. CNSC staff also regularly met with interested Indigenous Nation and community representatives to discuss a variety of topics, including the proposed licence renewals. CNSC staff held, with Cameco, outreach sessions in various communities in northern Saskatchewan in November 2022 to ensure these communities and interested Indigenous Nations were aware of the proposed licence renewals for MRO and KLO. These sessions also provided the

opportunity for the Indigenous Nations and communities and the public to engage in discussions on these proposed licence renewals directly with CNSC staff and Cameco.

Based on compliance verifications conducted at the MRO and KLO by CNSC staff during the November 1, 2013, to September 30, 2022, review period, CNSC staff have confirmed that Cameco continued to improve the management and safety performance of the facilities. CNSC staff rated Cameco's performance at the MRO and KLO for all 14 safety and control areas (SCAs) as "satisfactory". Cameco's SCA performance ratings for the MRO and KLO are presented in section 3.

Requested licence period

The existing licence term for both operations is 10 years. In Cameco's initial applications to renew the CNSC-issued licences for MRO and KLO, indefinite licence terms were requested for both operations. Taking Indigenous Nations and communities' responses into account, Cameco later requested a revision to the initial application for an indefinite term and are now requesting a 20-year term.

CNSC has a standardized licence and LCH framework which provides for effective regulatory oversight of operating facilities. Cameco is required by its licence to report on the performance of each facility through annual compliance reports, including significant changes to its operations. CNSC staff verify compliance with requirements through desktop reviews, inspections, and event reviews. In addition, CNSC staff report compliance performance of the MRO and KLO annually to the Commission in public meetings through the regulatory oversight reports (ROR) for uranium mines and mills. As a result of the compliance verification program and the fact that there is regular reporting to the Commission, CNSC staff have concluded that regulatory effectiveness can be maintained for licence terms greater than 10 years. However, indefinite licence terms pose additional challenges such as maintaining consistency between CNSC-issued licence terms and strong concerns expressed by Indigenous Nations and communities over the proposal, therefore are not currently supported by CNSC staff. Thus, CNSC staff recommend that the Commission grant 20-year licence terms for both operations, with the requirement for Cameco to complete a mid-term licensing basis review and provide an associated update to the Commission. This update is to include an engagement report prepared by Cameco to demonstrate that engagement with Indigenous Nations and communities is occurring on regular basis. A complete discussion on the proposed licence term is provided in section 5.5.

Financial Guarantees

On June 26, 2019, the Commission [approved](#) the application for an updated financial guarantee for the MRO in the amount of C\$42.1 million.

On July 29, 2020, the Commission [approved](#) the application for an updated financial guarantee for the KLO in the amount of C\$222.5 million. The KLO financial guarantee is higher relative to the MRO, because of the presence of larger waste rock piles and the tailings management facilities at the KLO, and the absence of tailings at MRO.

In accordance with the requirements specified in the respective CNSC-issued LCH for each operation, Cameco must submit an updated Preliminary Decommissioning Plan and a Preliminary Decommissioning Cost Estimate to CNSC staff on a 5-year basis. The updated plans for both the MRO and KLO were submitted by Cameco in December 2022 and are currently undergoing review. Once the reviews are complete, and if the submissions are considered acceptable, CNSC staff will prepare CMDs for the Commission's consideration of these financial guarantee revisions.

1.3 Overall Conclusions

CNSC staff's assessment determined that the application complies with regulatory requirements. CNSC staff also concluded that the licensee's performance during the licensing term was satisfactory and met regulatory requirements, as reported to the Commission annually through the [Regulatory Oversight Report for Uranium Mines and Mills in Canada](#).

1.4 Overall Recommendations

CNSC staff recommend the following, in regard to the McArthur River Operation:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [Nuclear Safety and Control Act](#) (NSCA), in that the Cameco Corporation:
 - a) Is qualified to carry on the activities authorized by the licence
 - b) Will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
2. Issue the proposed licence UML-MINE-MCARTHUR.00/2043
3. Delegate authority as set out in section 5.6 of this CMD.

CNSC staff recommend the following, in regard to the Key Lake Operation:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [Nuclear Safety and Control Act](#) (NSCA) in that Cameco Corporation:
 - a) Is qualified to carry on the activities authorized by the licence
 - b) Will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
2. Issue the proposed licence UML-MILL-KEY.00/2043
3. Delegate authority as set out in section 5.6 of this CMD.

2. Environmental Protection Review

CNSC staff conduct environmental protection reviews (EPRs) for licence applications with potential environmental interactions, in accordance with the CNSC's mandate under the [NSCA](#) and associated regulations. The EPRs help inform the Commission's conclusion on whether the proposal provides adequate protection of the environment and the health of people.

CNSC staff reviewed the licence application to identify which type of environmental review was required to be conducted, if applicable. As part of this process, CNSC staff must assess whether an integrated impact assessment or a federal lands review under the [Impact Assessment Act](#) (IAA) is required. For these licence applications, neither are required because the applications do not include activities listed in the IAA, [Physical Activities Regulations](#) that require an impact assessment, or that meet the definition of a project on federal lands.

CNSC staff's assessment included a review of the licence applications and supporting documents, including the environmental risk assessments, annual compliance monitoring reports, preliminary decommissioning plans, and past environmental performance for the facilities. The EPR reports, which contain the results of these assessments, including a summary of past environmental assessments for the facility, is available for the [MRO](#) and [KLO](#) on the CNSC website.

CNSC staff have found that the information provided by Cameco regarding environmental protection is sufficient to meet the applicable regulatory requirements under the NSCA and associated regulations for the licence renewals, as described in the respective EPR reports.

CNSC staff will continue to verify through ongoing licensing and compliance activities and reviews, that the environment and the health and safety of persons are protected over the proposed licence periods.

3. General Assessment of Safety and Control Areas

CNSC staff review and assess an applicant's proposed measures and controls, and if applicable, a licensee's past performance in each safety and control area (SCA) during the current licence term. Rating level categories for the SCAs are provided in Appendix A.

The regulatory and technical basis for the matters discussed in this CMD arise directly from the [Uranium Mines and Mills Regulations](#) (UMMR) and the [General Nuclear Safety and Control Regulations](#) (GNSCR) as well as other regulatory requirements associated with the [NSCA](#) and relevant legislation. Further information regarding the regulatory and technical basis for the matters discussed in this CMD are provided in Appendix B to this document.

The CNSC implements a risk-informed approach in the regulation of nuclear facilities and activities. The functional area of any licensed facility or activity consists of a standard set of SCAs. The depth of regulatory reviews of each SCA and the baseline frequency of regulatory compliance activities is informed by the risk ranking of that SCA. The high-level definitions of each SCA are provided in Appendix C.1. Each SCA is comprised of "specific areas" of regulatory interest; however, the specific areas associated with each SCA vary between facility types. Appendix C.2 provides the specific areas that comprise the SCAs for the operations.

CNSC staff's assessments provided in the following sections are based on a comprehensive review of Cameco's past performance at the MRO and KLO and a thorough evaluation of the safety and control measures to be implemented for the proposed licence period. These measures are outlined in Cameco's licence applications [1, 2, 3] and supporting documentation submitted for these applications. Where prudent and appropriate, the information on the assessment of SCAs has been combined for the MRO and KLO to reduce duplication.

The SCA evaluation periods referenced within this CMD is from November 1, 2013, to September 30, 2022, for both operations.

3.1 Management System

Safe and reliable operation requires a commitment and adherence to a set of management system principles and, consistent with those principles, the establishment and implementation of processes that achieve the expected results. CSA standard N286-12, *Management system requirements for nuclear facilities* [4] contains the requirements for a management system for nuclear facilities and extends to all SCAs. The management system must satisfy the requirements set out in the [NSCA](#), regulations made pursuant to the NSCA, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides the evidence that the licensing basis is being adhered to.

The following specific areas that comprise this SCA are discussed as relevant to the licence renewal application including:

- management system and organization
- performance assessment, improvements and management review
- change management and records management
- contractor management program.

3.1.1 Trends

The following table indicates the overall rating trends for the management system SCA over the current licensing period:

TRENDS FOR MANAGEMENT SYSTEM										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has mature management systems at both the MRO and KLO which continue to improve to meet evolving regulatory requirements. CNSC staff monitor implementation of the management systems at the operations through compliance verification activities which includes desktop reviews and inspections.</p> <p>Cameco continues to have effective management systems and has taken proactive steps to review and incorporate the requirements of CSA standard N286-12, <i>Management system requirements for nuclear facilities</i> into the MRO and KLO management systems.</p>										

3.1.2 Discussion

Cameco has established management systems to oversee its MRO and KLO activities to assure the protection of the health and safety of workers, the public, and the environment. Cameco is also required to implement and maintain written operating procedures and carry out the licensed activities in accordance with the policies and programs for the purposes described in the licence renewal applications. Cameco uses an integrated quality management system for each of the operations that is comprised of management system policies, procedures, work instructions, forms, and other controlled documents (including reports and training manuals). CNSC staff monitored and evaluated the management system processes used for the licensed activities during the current licensing period.

Management system and organization

CNSC staff determined that the MRO and KLO have a management system that meets requirements as outlined in the respective licence conditions handbooks (LCHs). CNSC staff regularly assess the compliance of the operations documents and programs through desktop reviews and planned compliance verification inspection activities.

Verification activities conducted throughout the licensing period included areas of maintenance, calibration, problem identification/resolution, change and design control, document and records control, procurement (specifically in the areas of receipt inspection and vendor audits), the internal audit program, management self-assessments and annual reviews. All inspection findings in this SCA over the licence term were of low safety significance.

CNSC staff evaluated both operations' organizational structure. Personnel roles and responsibilities were also reviewed and confirmed to be well defined and documented. CNSC staff's compliance verification conducted during the current licence period verified no issues concerning the licensee's organizational structure and individual responsibilities of positions with oversight on licensed activities.

Performance assessment, improvements and management review

Cameco's MRO and KLO management teams conduct annual reviews to analyze the previous years' performance with its plans, assess compliance with standards, assess the effectiveness of the management systems and considers any trends for each operation. CNSC staff assessed these management reviews as part of compliance verification activities and found them acceptable.

Cameco also conducts internal assessments to confirm conformance and effectiveness of its licensed programs and associated documentation at the operations. Cameco completes internal assessments on a 3-year frequency and tracks resulting actions. Over the current licence period, CNSC staff performed inspections on the operation's internal assessment program and confirmed that the programs met requirements.

Change management and records management

The design and change control procedures at the MRO and KLO ensures that changes are tested, reviewed and approved before implementation and that changes are controlled and carried out according to its change control documentation. Change control is a formal process used to ensure that changes to a product or system are introduced in a controlled and coordinated manner. The purpose of change control is to identify, evaluate, and control the risks associated with change.

The records management process at the MRO and KLO encompasses the control of documents, which includes the development, validation, approval of documents and the tracking of associated changes. CNSC staff confirmed that documents and procedures are available for use in the location of the activity and any outdated or expired documents are removed in a timely manner. Over the current licence period, the MRO and KLO change management programs and records management programs met CNSC requirements.

Contractor management program

Cameco's contractor management program ensures that all contract workers at the MRO and KLO comply with the same requirements as the licensee's permanent staff.

Safety Culture

CNSC's [REGDOC-2.1.2, Safety Culture](#) was added to the MRO and KLO LCHs, to verify the licensees' commitment to fostering a healthy safety culture. CNSC staff will continue to monitor licensee actions in support of a healthy safety culture over the licence term through planned compliance and monitoring activities.

3.1.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements at the operations are presented in the following subsections.

3.1.3.1 Past Performance

Through review of Cameco's documentation and CNSC staff's regular compliance inspections, CNSC staff found that Cameco's performance in this area meets CNSC regulatory requirements. CNSC staff rated Cameco's performance for the management system SCA at the MRO and KLO as satisfactory during the current licence period.

3.1.3.2 Regulatory Focus

CNSC staff verified through inspections and desktop reviews that Cameco has implemented its management systems in accordance with CNSC's regulatory requirements.

Management system criteria were included in 10 CNSC general inspections at the MRO and 11 CNSC general inspections at the KLO during the licensing period. In addition, there were 2 focused management system inspections conducted at each of the MRO and KLO during the licence term.

Onsite verification activities included areas of maintenance, calibration, problem identification/resolution, change and design control, document and records control, the internal audit program, management self-assessments, contractor management, work planning, work control, annual reviews and procurement (specifically in the areas of receipt inspection and vendor audits). All inspection findings were of low-risk significance.

Cameco is required to implement and maintain a management system in compliance with CSA standard N286-12, *Management system requirements for nuclear facilities* [4]. In 2021, CNSC staff performed a detailed desktop review of Cameco's MRO and KLO quality management programs to determine the readiness for a transition to CSA N286-12. CNSC staff's current desktop review assessment is that Cameco's MRO and KLO management programs meet the requirements of CSA N286-12. In March 2022, CNSC staff conducted management system focused inspections for the MRO and KLO to verify the continued implementation of CSA N286-12 requirements. Inspections throughout the proposed licence term will be conducted to continue verification of implementation of the CSA N286-12 requirements.

CNSC staff will continue monitoring Cameco's performance in this area through regulatory oversight activities including inspections and desktop reviews.

3.1.3.3 Proposed Improvements

As noted in section 3.1.2, CNSC's [REGDOC-2.1.2, Safety Culture](#) was added to the MRO and KLO LCHs, with full implementation by Cameco in June 2022. CNSC staff will conduct verification of the implementation of REGDOC-2.1.2 as part of ongoing compliance activities. CNSC staff will also review any proposed modifications to Cameco's management system documentation as it is adapted to conform to CSA N286-12.

3.1.4 Conclusion

CNSC staff concluded that Cameco met its regulatory requirements and has maintained and implemented a satisfactory management system program at the MRO and KLO.

3.2 Human Performance Management

The human performance management SCA covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee personnel are in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

The specific area that comprises this SCA at the MRO and KLO is personnel training.

3.2.1 Trends

The following table indicates the overall rating trends for the human performance management SCA over the current licensing period:

TRENDS FOR HUMAN PERFORMANCE MANAGEMENT										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>CNSC staff consistently rated the human performance management SCA as satisfactory during the current licence period for the operations. Cameco has acceptable training programs and has improved performance through the implementation of a systematic approach to training (SAT) at the MRO and KLO during the licensing period.</p> <p>Cameco continues to maintain and improve its training system and confirm implementation.</p>										

3.2.2 Discussion

The systematic approach to training (SAT) is the framework endorsed by the CNSC for establishing and maintaining training for persons working in uranium mines and mills. The CNSC requires the licensee to ensure that employees and contractors are trained and assessed to confirm that they have acquired and maintain the knowledge, skills, and competencies to safely perform their work assignments. Cameco has implemented a SAT system to train its workers at the MRO and KLO.

Cameco reports to the CNSC annually on improvements to its training programs and training delivered to workers. CNSC staff review Cameco's adherence to its training system and maintenance of training records through periodic routine compliance inspections.

CNSC's [REGDOC-2.2.2, Human Performance Management, Personnel Training](#), updated in December 2016, defines the requirements for the development and implementation of a training system in a nuclear facility. It requires licensees to implement a training plan to systematically analyze, design, develop, implement,

evaluate, document and manage training for persons working in a nuclear facility. Cameo was expected to implement REGDOC-2.2.2 at both the MRO and KLO by October 31, 2022. CNSC staff verified the implementation of REGDOC-2.2.2 at the KLO via an inspection carried out in November 2022.

CNSC staff concluded that Cameco is qualified to carry out its authorized licensed activities and CNSC staff are satisfied with the training system at the MRO and KLO.

3.2.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.2.3.1 Past Performance

Based on a comprehensive review of Cameco's updated training documentation, annual reports and routine compliance inspections, CNSC staff concluded that Cameco's performance for this area meets regulatory requirements. CNSC staff rated Cameco's overall performance for the human performance management SCA at the MRO and KLO as satisfactory for the current licence period. CNSC staff are also satisfied that Cameco has taken, and will continue to take, all appropriate corrective actions necessary to resolve any non-compliances that stem from inspections and document reviews conducted during the current licence period.

3.2.3.2 Regulatory Focus

During the licence period, human performance management criteria were included in general inspections conducted by CNSC staff at the MRO and KLO. There were also 3 and 2 focused human performance management inspections conducted at the MRO and KLO, respectively, during the current licence term. The inspections were used to evaluate and verify compliance of Cameco's training programs and assess their effective implementation. This included reactive training focused inspections in May and June 2022 for each of the MRO and KLO. These inspections focused on training and onboarding associated with Cameco's planned restart of mining and milling activities at the sites.

Onsite compliance activities conducted from 2013 to 2022 included verification of the implementation of the SAT, worker training and qualification, and worker onboarding associated with the restart of mining and milling activities. All inspection findings were of low-risk significance.

Cameco's revised management system included sections related to the training system and a suite of training procedures. CNSC staff evaluated Cameco's training system documentation and determined that regulatory requirements of the human performance management (training) SCA were met.

CNSC staff will continue to monitor performance in this area through routine regulatory oversight activities including inspections and desktop reviews.

3.2.3.3 Proposed Improvements

The compliance verification criteria for this SCA in the KLO LCH includes CNSC's [REGDOC-2.2.2](#) with an implementation deadline of October 31, 2022. Although not in the MRO LCH, the implementation deadline was the same for the MRO.

Within the proposed LCHs provided in this CMD the implementation deadline has been removed as Cameco is expected to be fully compliant. There are no other proposed improvements for this SCA in the LCHs. For the current licence period, the performance rating for this SCA has been focused on the training programs and their implementation.

As part of on-going compliance activities, CNSC staff will continue to review any proposed modifications to Cameco's training system and programs.

3.2.4 Conclusion

CNSC staff concluded that Cameco met its regulatory requirements and has maintained and implemented a satisfactory human performance management program at the KLO and MRO.

3.3 Operating Performance

The operating performance SCA includes an overall review of the conduct of the licensed activities and other activities that enable effective performance. The specific areas that comprise this SCA are not addressed individually in this document.

3.3.1 Trends

The following table indicates the overall rating trends for the operating performance SCA over the current licensing period:

TRENDS FOR OPERATING PERFORMANCE										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented and maintained operating performance programs at the MRO and KLO that include construction, commissioning and operation of the facilities in accordance with CNSC regulatory requirements. CNSC staff monitor implementation of these operating programs through compliance verification activities, which include desktop reviews and inspections. The operating performance SCA is a key compliance area and is included in many CNSC staff inspections at the MRO and KLO. CNSC staff's compliance activities verify that Cameco continues to improve its operating performance.</p> <p>Cameco's operating performance program at the MRO and KLO continues to be effective and meets regulatory requirements.</p>										

3.3.2 Discussion

The operating performance SCA requires that the licensee implement and maintain an operating performance program for the conduct of licensed activities. This SCA focuses on the conduct of operations and the controls that are in place to manage risks from licensed activities.

The CNSC expects Cameco to take all reasonable precautions to protect workers and to control the release of nuclear and hazardous substances into the environment during the conduct of activities. The necessary precautions include engineering and administrative controls to minimize risks. The CNSC expects the licensee to maintain the integrity of its facilities and to apply managed processes for operations and control.

For the majority of the licensing period, the MRO and KLO were in full operation, however as noted in section 1.1, the sites operated in a safe state of care and maintenance from the end of 2017 until 2022. On February 9, 2022, Cameco announced its intent to begin the process to transition both operations from care and maintenance to production over the course of 2022 and 2023. On November 9, 2022, Cameco announced that the KLO milled the first ore from the MRO since resuming production at both operations. Note that the operating performance SCA applies equally to both operational and care and maintenance states.

CNSC staff confirmed throughout the licence period that Cameco operated the MRO and KLO in accordance with regulatory requirements. CNSC staff are satisfied with Cameco's programs, which provide adequate assurance that any modifications to the facility or its operation will remain within the licensing basis.

3.3.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.3.3.1 Past Performance

Cameco has operated the MRO and KLO in compliance with CNSC regulatory requirements during the licensing term and CNSC staff's findings from inspections or desktop reviews were addressed in a timely manner. CNSC staff rated Cameco's overall performance for the operating performance SCA at the MRO and KLO as satisfactory for the current licence period.

3.3.3.2 Regulatory Focus

Cameco is required to report unplanned events at the operations and take necessary corrective actions to improve safety and to prevent the recurrence of such events.

As identified in the attached draft LCHs, and as reflected in CNSC's [REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills](#), Cameco is required to submit detailed reports on unplanned situations or events.

During the current licence period, events related to mine operations, series injuries, environmental spills, and radiation protection action level exceedances were promptly reported to the CNSC and other relevant regulators including [Saskatchewan Ministry of Environment](#) (SMOE), [Saskatchewan Ministry of Labour Relations and Workplace Safety](#), and [Environment and Climate Change Canada](#). All incidents were of medium or low safety significance. CNSC staff verified that, in accordance with [CNSC's REDGOC-3.2.1, Public Information and Disclosure](#), Cameco has continued to proactively disclose reportable events.

Table 3.1 lists the number of events reported to the CNSC by the licensee over the current licence period. The events include both radiation protection and environmental protection action level exceedances, effluent limit exceedances, spills and lost time injuries.

Table 3.1: Number of reported events, 2013-2022

McArthur River Operation										
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Total Number of Events	3	2	7	5	3	3	1	0	0	0
Key Lake Operation										
Total Number of Events	5	1	8	4	3	6	4	2	4	6

* The 2022 reporting period is from January 1, 2022, to September 30, 2022. Action level exceedance which occurred at the KLO in October 2022 is included in table.

The radiation protection, conventional health and safety and environmental protection events reported to the CNSC by the licensee over the current licence period are described within sections 3.7, 3.8 and 3.9, respectively.

CNSC staff review all reported events to identify if there are any regulatory concerns and report significant events at public meetings of the Commission. Reported events include action level exceedances, injuries, spills, and releases of hazardous substances to the environment. Details on each reported event is included in the Regulatory Oversight Report (ROR) on uranium mines and mills for the year in which the event occurred. Additional information on radiation protection, environmental protection and health and safety incident/events are provided in the respective sections within this CMD.

CNSC staff verified that Cameco conducted investigations into these reported events to determine probable causes and necessary corrective actions were taken by Cameco to prevent reoccurrences. There was 1 focused operating performance inspection conducted at the MRO during the current licence term. The operating performance SCA was also included as compliance verification criteria in 11 and 10 general CNSC inspections at the MRO and KLO, respectively during the current licence term.

CNSC staff confirmed that workers, the public and the environment continue to be safe. CNSC staff are satisfied with Cameco's event reporting, investigation processes, and timely implementation of corrective actions and lessons learned to minimize and/or eliminate future recurrences at both the MRO and KLO.

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA for the MRO and KLO.

3.3.3.3 Proposed Improvements

Improvements to operation, equipment and programs are identified on an ongoing basis and implemented as part of a process of continuous improvement. There are no other proposed improvements for this SCA.

3.3.4 Conclusion

During the current licence period, CNSC staff observed that Cameco has operated the MRO and KLO in compliance with the CNSC's regulatory requirements.

CNSC staff concluded that Cameco has maintained and satisfactorily implemented its operational performance programs and has made adequate provision for safe operation of the MRO and KLO.

3.4 Safety Analysis

The safety analysis SCA covers the maintenance of the safety analysis that supports the overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

The specific area that comprises this SCA at the MRO and KLO is hazard analysis.

3.4.1 Trends

The following table indicates the overall rating trends for the safety analysis SCA over the current licensing period:

TRENDS FOR SAFETY ANALYSIS										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented and maintained processes at both the MRO and KLO to identify hazards and assessment of risks related to the protection of the environment and to the health and safety of workers and the public, as well as radiation protection. CNSC staff verify Cameco's implementation of the safety analysis SCA through inspections and desktop reviews.</p> <p>Cameco's safety analysis programs at the MRO and KLO continue to be effective in providing CNSC staff with an assessment of proposed changes or modifications, identification and evaluation of risks and impacts, and proposed mitigation measures.</p>										

3.4.2 Discussion

As a licensing requirement, Cameco must implement and maintain a process to identify and assess hazards and risks on an ongoing basis at the MRO and KLO. This includes identifying and evaluating new or unforeseen risks that were not considered at the planning and design stages and updating previous risk assessments by replacing important assumptions with performance data.

Hazard analysis

Hazard analysis provides an opportunity to identify and mitigate potential hazards to worker health and safety, and to the environment, to an acceptable level. These analyses are completed by workers and subject matter experts before the work begins. Cameco uses the following methods for identifying risks and hazards at the MRO and KLO as the jobs are being planned:

- risk assessment
- safe work plans

Risk assessment

As per CNSC regulatory requirements, Cameco's MRO and KLO each continue to maintain a register of hazards, risks and mitigation measures for the facility, which are reviewed and updated for the new projects, significant changes or modifications and non-routine tasks. Risk assessments are carried out to identify, manage, and reduce the potential of adverse risk. An assessment of controls is conducted as required and may be triggered by:

- predetermined need to re-evaluate a control
- changes to processes or facilities
- an incident
- an identified non-conformance
- legislation/regulation changes
- required actions as identified in investigations, inspections or by regulators.

Risks are mitigated with consideration to the following hierarchy:

- elimination
- substitution
- engineering controls
- signage/warnings and/or administrative controls
- personal protective equipment.

Safe work plans

Safe work plans are prepared for any work considered non-routine and high risk. The purpose of a safe work plan is to assess hazards specific to tasks, to ensure controls are developed and that all personnel understand the risks associated with the completion of the job. The safe work plan outlines the tasks and hazards involved, corrective actions, level of risk, training and personal protective equipment required. Safe work plans are to be reviewed and signed by all personnel working on the job.

Prior to implementing any significant change or modification to the facility, its operation or safety and control measures described in the documents provided to support the application, Cameco must provide the CNSC with an assessment of the proposed changes or modifications, identification and assessment of potential risks, impacts, proposed mitigation measures, and demonstrate that the changes meet the objective of the licensing basis.

Cameco has change control processes for each of the MRO and KLO, which CNSC staff have reviewed and accepted. Changes to facility processes are completed through the change control process, which also includes a risk assessment requirement.

3.4.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.4.3.1 Past Performance

Through CNSC staff's review of Cameco's MRO and KLO documentation, CNSC staff concluded that the safety analysis program meets requirements.

For the current licence period, CNSC staff rated Cameco's overall performance for the safety analysis SCA as satisfactory for the MRO and KLO.

3.4.3.2 Regulatory Focus

CNSC staff conducted inspections and desktop reviews to confirm that safety analysis is also completed on an ongoing basis by Cameco's MRO and KLO on specific job requirements to assess all jobs of non-routine or complex nature. Through inspections, CNSC staff also verified that Cameco has the necessary safety analyses to plan, implement and monitor construction operations ensuring mitigation of risks to workers, the public and the environment have been conducted. One focused safety analysis inspection was conducted by CNSC staff at the MRO and KLO during the current licence term. Safety analysis criteria were also included in 8 and 3 general inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term.

3.4.3.3 Proposed Improvements

There are no other proposed improvements for this SCA.

3.4.4 Conclusion

Based on the above assessment, CNSC staff concluded that Cameco is meeting the regulatory requirements and CNSC staff's expectations to protect workers and the environment at the MRO and KLO as it relates to the development and maintenance of the safety analysis for the facility.

3.5 Physical Design

The physical design SCA relates to activities that impact the ability of structures, systems and components to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The specific areas that comprise this SCA at the MRO or KLO are not addressed individually in this document.

3.5.1 Trends

The following table indicates the overall rating trends for the physical design SCA over the current licensing period:

TRENDS FOR PHYSICAL DESIGN										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented and maintained design control processes at both the MRO and KLO that verifies and validates the design to ensure safety, performance and dependability of the facility.</p> <p>Cameco has a mature physical design control system in place, which continues to remain effective and meet regulatory requirements.</p>										

3.5.2 Discussion

The CNSC expects licensees to implement and maintain a design control process to ensure that design outputs are verified against design inputs and performance expectations. The design control process includes:

- design planning
- input
- output
- review
- verification
- validation
- transfer
- records
- change management

Licensees are required to implement and maintain a design control process to ensure that design outputs are verified against design inputs and performance expectations. Cameco uses facility change control and design control processes to ensure that any physical changes to the facility are reviewed and approved by site management before implementation. The change management process includes a risk assessment requirement for new designs and design changes. The change control and design control processes at the MRO and KLO have been reviewed and accepted by CNSC staff.

McArthur River Operation

Cameco's physical design program for the MRO is described and documented in summarized form in the MRO [Mining Facility Licensing Manual](#) [5], and in detail in the Mining Operations Program [6]. These documents provide details about the facility including physical description, technical specifications and capacities.

The MRO was constructed in the mid 1990's and began production at the end of 1999. Its current configuration, in terms of production capacity, water and waste management infrastructure, and the physical footprint, was largely established prior to the renewal of the licence in 2013. Over the past licensing term, the physical design changes at MRO have been around supporting production and incremental adaptations to improve performance and safety. The following provides information on the most significant changes and improvements which have been or are being made at the MRO during the current licence term.

Ventilation improvements - Shaft 2 ventilation upgrade

As the underground mine workings are developed to access the ore body, ventilation must be modified to ensure adequate air flow to remove radon and problematic dusts away from workers and to be exhausted from the mine. Over the life of the current licence, exhaust fans were upgraded, and unneeded furnishings were removed to increase vent flow. The total mine ventilation capacity increased by 20% (increasing from approximately 910,000 to 1,090,000 cubic feet per minute). Further, improved use of and controls on auxiliary fans coupled with integrating digital monitoring of mine-air quality have assisted in air quality management in the dynamic underground environment.

South freeze plant and underground brine distribution

Mining at the MRO involves isolating the ore body from surrounding water-saturated ground using freeze walls. Because the time from the start of freezing the ground to the commencement of mining is measured in months, additional freeze capacity has come to be added over the current licence period in advance of extracting new zones of the ore body. For example, the Zone 4 North freeze wall was established in 2014 followed by Zone 4 Center freeze wall in 2017. As of 2022, both areas are now active mining areas. Ground freezing utilizes an ammonia heat exchange refrigeration plant located on the surface. In order to meet freezing demands of future mining zones and to retain spare capacity, the South Freeze plant was constructed and commissioned in 2017 to provide needed additional capacity (about an 160% increase). As part of the new plant construction, 2 new boreholes were drilled from surface to the 520 metre level to circulate brine to the south end of Zone 4. The freeze plant is currently in a care and maintenance state and Cameco anticipates that it will not be required until approximately 2024 when Zone 1 freezing begins.

Boomerang Lake discharge channel

A rock-lined channel was constructed in 2014 so as to safely direct effluent, even during periods of greater discharges, from the MRO mine directly into Read Creek, rather than into Boomerang Lake. The channel was completed in 2014 and remains in use.

Shaft #3 water for industrial use project

This project was constructed to allow the use of clean groundwater inflows from Shaft #3 for industrial use on site, reducing fresh water withdrawal from Toby Lake and as well as reducing effluent volumes. The project was completed in 2014.

Key Lake Operation

Cameco's physical design program for the KLO is described and documented in summarized form in the KLO [Mining Facility Licensing Manual](#) [7], and in detail in the Facilities Program [8]. These documents provide details about the facility including physical description, technical specifications and capacities.

The following provides information on the most significant changes and improvements which have been or are being made at the KLO during the current licence term.

Mill ammonia tanks and piping upgrade

Cameco initiated a 3-year staged project to refurbish the 3 ammonia storage tanks and associated infrastructure at the KLO mill. Information related to ammonia releases are included in the annual [uranium mines and mills RORs](#). The project was initiated in 2018 and completed in 2020. The intent of the project was to bring the 30-year (plus) ammonia tank system to current standards, addressing any tank corrosion and valving/piping concerns.

Calciner repairs/refurbishment

Due to the corrosion issues observed during the commissioning of the newly installed horizontal calciner in 2016, Cameco decided to suspend the use of the horizontal calciner and instead focused on repairs and refurbishment of the existing vertical calciner. The vertical calciner shaft and associated brickwork were replaced. The calciner ductwork was also replaced and critical structural steel of the Calciner/Crystallization building was also refurbished in 2017.

Deilmann Tailings Management Facility (DTMF) pit wall stabilization

The majority of the pit wall stabilization of the DTMF was completed during the previous licence term (by the end of 2013), however Cameco requested and received approval from CNSC staff for the completion of remaining outstanding work items during the current licence term including a request in 2015 to conduct additional slope stabilization work in slope section 26 of the DTMF and a 2019 request to remediate northeast slope section 02, 02B, 03 and 04. This work was completed, and follow-up reports provided to CNSC staff.

Yellowcake packaging automation

In 2021 and 2022 Cameco proposed and received CNSC staff acceptance for a number of upgrades to facilities and components at the KLO mill. The first of these was the automation of the yellowcake package area proposed in May 2021. The project consisted of automating the existing packaging process in order to automatically de-stack drums, fill drums with yellowcake, lid and clean the drums, complete final weighing, and apply the necessary labelling. The system is encompassed within an enclosed containment area starting at the filling area and ending after the cleaning station. A new dust collection and filtration system collects and filters the dust accumulated in the containment area. In November 2022, the system came into use as production at the KLO resumed.

Mill automation and process upgrades

In June 2021 Cameco requested approval for automation and process upgrades within the KLO mill. The intent was to streamline processes and leverage digital and automation technologies to reduce future operating costs and increase the degree of operating flexibility. Cameco also stated that they anticipated that the use of digital and automated systems is anticipated to lead to improved worker health and safety and radiation protection by reducing worker interaction with various components within the mill and associated process areas. As part of the upgrades, Cameco installed additional nuclear densometers, a measurement device which contains a radioactive source, to better analyze and monitor uranium grades within the mill process streams.

Bulk neutralization gypsum desaturation project

In February 2022, Cameco proposed the modifications within the bulk neutralization (effluent treatment) circuit of the KLO mill. Specifically, Cameco proposed to modify the bulk neutralization circuit by introducing industrial water from the existing reverse osmosis water treatment plant into the pH adjustment tanks. Additional ferric sulphate will also be added to ensure continued solids polishing in the downstream radium removal section of the circuit. These modifications are anticipated to reduce gypsum saturation within the circuit which will reduce gypsum scaling on pipes/pumps within the polishing stage and the effluent discharge system as well as reduce total suspended solids (TSS) in the effluent. This project received approval from CNSC staff and the effectiveness of the project in reducing TSS is being monitoring by CNSC staff.

Uranium recovery well infrastructure

On June 30, 2022, Cameco proposed the infrastructure installation for operation of the uranium groundwater recovery wells as recommended in the Corrective Action Plan developed for the 2018 Molybdenum Extraction Circuit Release. Cameco described infrastructure required to be installed to collect and transport the recovered groundwater from wells MTRW21- 01 and MTRW21- 03 as well as the strategy for treating the water within the existing mill bulk neutralization circuit. The infrastructure installation was accepted by CNSC staff.

3.5.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.5.3.1 Past Performance

During the current licence period, Cameco demonstrated to CNSC staff that the MRO and KLO follow the respective design control process when undertaking modifications or additions to facilities, processes, or equipment. For the MRO in particular, Cameco exercised control and maintained its design basis in the dynamic environment of mining so as to ensure the protection of workers from physical and radiological risks. Upgrades or replacements to the physical design were reviewed and found acceptable by CNSC staff.

3.5.3.2 Regulatory Focus

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of MRO and KLO's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

CNSC staff completed 2 focused physical design inspections at the KLO during the licence term. The physical design criteria were also included in 5 and 2 general inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term. All non-compliances identified by CNSC staff were of low safety significance and have been adequately addressed. Cameco's MRO and KLO continue to implement and follow the design control process as per CNSC's regulatory requirements.

3.5.3.3 Proposed Improvements

There are no other proposed improvements for this SCA. Improvements to operation, facility equipment and processes are identified on an ongoing basis and implemented as part of continuous improvement.

3.5.4 Conclusion

CNSC staff confirmed that Cameco followed its approved design and change management program in managing changes and improvements to the MRO and KLO during the current licence period. Cameco's projects were completed as planned and within their respective safety cases, with no major deficiencies or events. CNSC staff assessed Cameco's documentation and analyses under this SCA and found it to be acceptable. CNSC staff concluded that Cameco's overall performance at the MRO and KLO for this SCA is satisfactory and that Cameco is qualified to carry out the authorized activities in this SCA.

3.6 Fitness for Service

The fitness for service SCA covers activities that impact the physical condition of structures, systems and components to ensure that they remain effective over time. This area includes programs that verify equipment is available to perform its intended design function when called upon to do so.

The specific areas that comprise this SCA at the MRO and KLO are not addressed individually in this document.

3.6.1 Trends

The following table indicates the overall rating trends for the fitness for service SCA over the current licensing period:

TRENDS FOR FITNESS FOR SERVICE										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented and maintained programs to ensure structures and equipment remain effective and perform as designed over time at both the MRO and KLO.</p> <p>CNSC staff are satisfied with the implementation of the fitness for service program at the MRO and KLO.</p>										

3.6.2 Discussion

The fitness for service SCA at the MRO and KLO covers activities that are carried out to ensure that the physical condition of structures, systems and components remain effective over time. This includes programs that ensure all equipment is available to perform its intended design function reliably when called upon to do so. The CNSC requires the licensee to implement and maintain a maintenance program to comply with regulatory requirements and accepted industry practice to minimize potential impacts to workers, the public and the environment. In addition, maintenance activities must provide assurance to achieve desired results, provide effective management of inventory of spare parts, manage maintenance records and procedures and provide systematic management of maintenance change control.

Cameco's maintenance group organizes and stores equipment information, maintenance records and facilities information on a computerized maintenance management system to coordinate the routine, predictive and preventative maintenance activities at the MRO and KLO. This computerized maintenance management system keeps track of the preventive maintenance program for all equipment and logs the equipment operating history. A facility change control procedure, reviewed and accepted by CNSC staff, is in place to control and record changes to the facilities.

CNSC staff verified through inspections and desktop reviews that Cameco maintains the MRO and KLO according to regulatory requirements and uses operational experience to ensure that the procedures, processes, structures, containment systems and components remain effective over time. Cameco has identified the safety-significant structures, systems and components at the MRO and KLO and implemented documented and approved maintenance programs to ensure that these remain effective.

CNSC staff's review of the maintenance management systems at the MRO and KLO during regular inspections confirms that preventative maintenance activities are scheduled, completed and recorded. During the current licence term, CNSC staff routinely inspected maintenance records associated with the preventative maintenance programs and found them acceptable. Random sampling of equipment, maintenance and monitoring records were also verified during inspections. These compliance verification activities confirmed that the maintenance program is well implemented.

3.6.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.6.3.1 Past Performance

Based on the results of compliance inspections and desktop reviews, CNSC staff rated Cameco's performance for the fitness for service SCA at the MRO and KLO as satisfactory for the current licence period.

3.6.3.2 Regulatory Focus

CNSC staff conducted 1 and 2 fitness for service focused inspections at the MRO and KLO, respectively. Fitness for service criteria were also included in 7 general inspections conducted by CNSC staff at each of the MRO and KLO during the current licence term. All non-compliances identified were of low safety significance and have been adequately addressed.

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation.

3.6.3.3 Proposed Improvements

There are no other proposed improvements for this SCA.

3.6.4 Conclusion

CNSC staff have assessed Cameco's MRO and KLO documentation under the fitness for service SCA and found it to be acceptable. Cameco continues to maintain the facilities to ensure that structures, systems and components remain effective over time.

3.7 Radiation Protection

The radiation protection (RP) SCA covers the implementation of a RP program in accordance with the [Radiation Protection Regulations](#) (RPR). The program must ensure that radiation doses received by individuals and contamination levels are monitored, controlled and maintained as low as reasonably achievable (ALARA).

The specific areas that comprise the RP SCA are as follows:

- application of ALARA
- worker dose control
- radiation protection program performance
- radiological hazard control

3.7.1 Trends

The following table indicates the overall rating trends for the RP SCA over the current licensing period:

TRENDS FOR RADIATION PROTECTION										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented and maintained radiation protection programs that meet regulatory requirements and protect the health and safety of workers at both the MRO and KLO. During the current licence period, no worker or member of the public received a radiation dose in excess of CNSC regulatory limits.</p> <p>CNSC staff are satisfied with the implementation of the radiation protection program at the MRO and KLO.</p>										

3.7.2 Discussion

The RPR requires licensees to implement an RP program to keep exposures ALARA, social and economic factors taken into account, through the implementation of a number of controls. These include management control over work practices, personnel qualification and training, control of occupational and public exposures to radiation, and planning for unusual situations. The RPR also prescribe dose limits for workers and members of the public.

As required by the [UMMR](#), Cameco has an RP program, which includes a radiation code of practice, in place at the MRO and KLO. The RP programs include continuous and routine radiological monitoring, dosimetry, and contamination control.

Application of ALARA

The RP programs describe how the MRO and KLO manages RP hazards and meet applicable regulatory requirements.

Cameco's application of ALARA within its RP programs at MRO and KLO includes management commitment and oversight, personnel qualification and training.

MRO and KLO annually establish ALARA targets focused on initiatives to reduce site worker doses. Key performance indicators are used as well, such as participation rates in RP training, personnel dosimetry results, and workplace monitoring data. Over the licence period, initiatives have included targeted programs to reduce dose to workers in potentially high exposure environments, to improve compliance with RP is a key consideration during all phases of the facility's life, from conceptual design, through detailed engineering, operation and decommissioning. Many operational controls have been implemented with radiation safety in mind. These include extensive use of shielding, use of local extraction ventilation (in addition to the general dilution ventilation) and the separation of workers from the ore process streams.

Because RP has been incorporated into the design of the facility, the routine radiation levels at the MRO in most areas are typically low and result in exposures well below regulatory limits. The potential, however, for receiving an elevated radiation exposure during an upset condition, such as the failure of the ventilation system, may be significant and therefore a variety of RP controls are in place.

Worker Dose Control

Worker dose control is managed at both operations as described below.

McArthur River Operation

Gamma radiation at the MRO is emitted from the ore. There will be localized areas where it is not practical to extensively shield the ore. Worker exposures to workplace gamma fields are kept ALARA through design or layout, the use of automated or remote equipment, shielding and administrative controls (e.g., procedures).

Radon gas is emitted from the ore and can also be carried into the mine with mine water. When radon gas undergoes radioactive decay, short lived nuclear substances called radon progeny are created and these can contribute to worker doses from inhalation. The radon gas and radon progeny are usually captured at the source and removed through extraction ventilation. In addition, the general ventilation system helps to control radon progeny and radon gas concentrations. Again, management of worker doses in some upset conditions are addressed through administrative controls.

At the MRO, long-lived radioactive dust (LLRD) is in the form of uranium ore dust. The control of LLRD is achieved through extraction ventilation, exhaust ventilation on process equipment and through good housekeeping practices.

Generally, potential process-related sources of LLRD are also sources of radon and the control of radon will also control LLRD.

Key Lake Operation

At the KLO, the primary radiological hazards are gamma radiation, radon progeny, and LLRD. RP is a key consideration during all phases of the facility's life, from conceptual design, through detailed engineering, operation and decommissioning. Many operational controls have been implemented with radiation safety in mind. These include extensive use of shielding, use of local extraction ventilation (in addition to the general dilution ventilation) and the separation of workers from the ore process streams.

Gamma radiation at the KLO is emitted from different process streams. Given the nature of ore and the milling process, there is potential for elevated gamma radiation fields. Workplace gamma fields are kept ALARA through building design or layout, the use of automated equipment, and shielding. Worker exposures to gamma radiation from these sources is controlled procedurally.

Radon progeny at the KLO is usually captured at the source and removed through extraction ventilation. In addition, the general ventilation system helps to control radon progeny concentrations by dilution or air exchange. Again, some upset conditions are addressed procedurally.

At the KLO, LLRD is in the form of uranium ore dust, non-calcined yellowcake dust, and calcined yellowcake dust. The dose per unit intake of each LLRD type depends upon the mixture of radionuclides and their physical and chemical properties. The control of LLRD is achieved through exhaust ventilation on process equipment and good housekeeping practices. In general, potential process-related sources of LLRD are also sources of radon and the control of radon will also control LLRD.

Cameco uses a combination of engineered controls (e.g., design features), administrative controls (e.g., staff training and qualification, and dose management tools such as work planning, administrative levels, management oversight) and protective equipment (e.g., respiratory protection during higher risk maintenance activities) to ensure radiation doses to workers are controlled and kept ALARA.

Radiation Doses Received by NEWs, 2013-2021

As required by the [RPR](#), all nuclear energy workers (NEWs) are informed, in writing, of their status, of the risks associated with radiation that they may be exposed to in the course of their work and while carrying out their responsibilities during emergencies, and of the applicable effective and equivalent dose limits. Female NEWs are also informed, in writing, of their rights related to pregnancy and breastfeeding, and of the risks associated with the exposure of embryos and fetuses to radiation and the risks to breastfed infants from the intake of nuclear substances.

Cameco's RP programs at the MRO and KLO provide assurance that exposures to all NEWs and the public is compliant with the RPR. Licensed dosimetry services are utilized at the MRO and KLO for both external and internal dose assignment. No worker from either the MRO or KLO received an effective or equivalent dose that exceeded the corresponding regulatory dose limits pursuant to the RPR.

McArthur River Operation

The main source of radiological exposure at the MRO is from mining high-grade uranium ore. The effective dose contributors to NEWs at the MRO are gamma radiation, radon progeny, LLRD and radon gas. Gamma radiation hazards are controlled through the effective use of time, distance and shielding. Exposures to radon progeny and LLRD are controlled through source control, ventilation, contamination control and personal protective equipment.

At the MRO, the total effective dose assignment for workers is the sum of whole body dose as measured by optically stimulated luminescent dosimeters for exposure to gamma radiation, and personal alpha dosimeters to measure exposures due to LLRD and radon progeny. For higher risk maintenance activities that involve the use of respiratory protection, worker exposures to airborne hazards are monitored through air sampling techniques and are administratively controlled through radiation work permits. In the review period, the personnel with the highest total effective dose were the mine services group. In general, mine services crews work in areas of higher radiation levels, such as around mine sumps and ore handling, and servicing equipment in contact with ore materials or contaminated waters.

Key Lake Operation

Cameco's KLO RP program describes how the licensee manages RP issues, meets applicable regulatory requirements and keeps radiation exposures As Low As Reasonably Achievable, social and economic factors considered (ALARA principle). The RP program includes continuous and routine radiological monitoring, dosimetry, contamination control and LLRD exposure control.

The source of radiological exposure at the KLO is the milling of high-grade uranium ore received from the MRO mine. The 3 primary dose contributors are gamma radiation, radon progeny and LLRD. During the current licensing period, the largest dose contributor at the KLO mill was gamma radiation. Gamma radiation is controlled through the effective use of time, distance and shielding. In the review period, the working group with the highest effective dose was the mill operators.

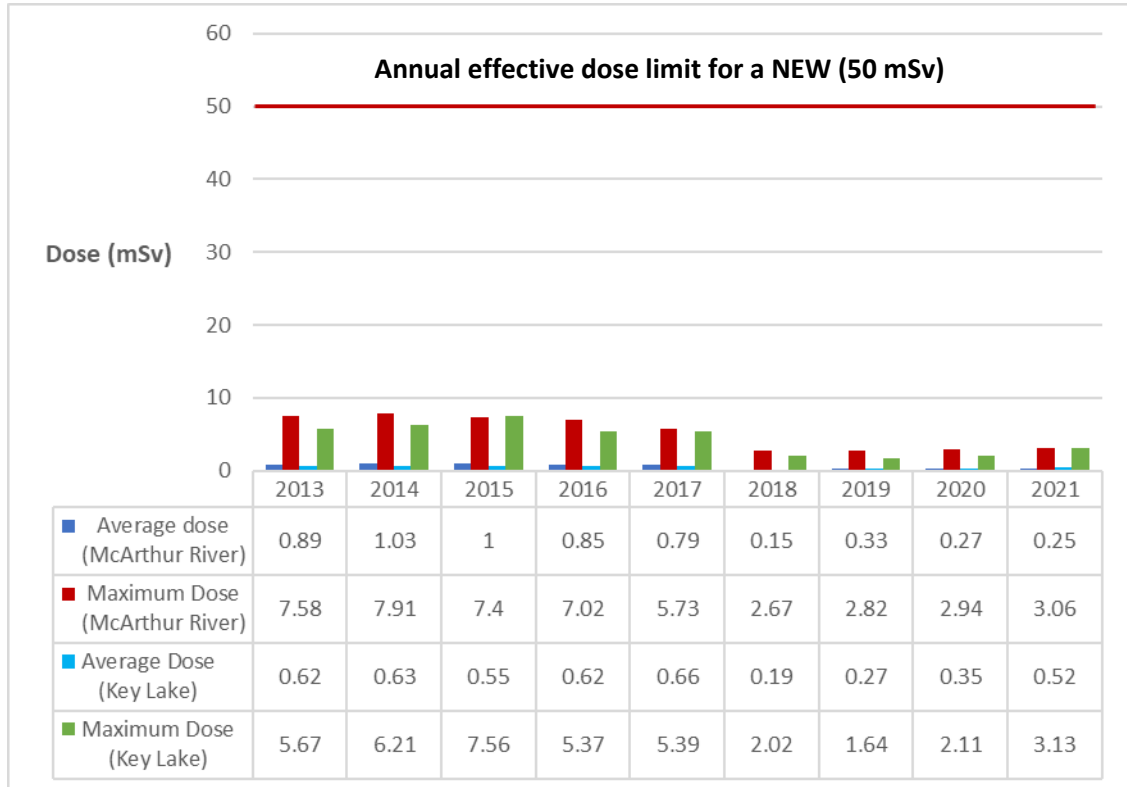
Exposure Summary

Cameco's RP programs at both the MRO and KLO includes processes and criteria to provide assurance that workers are identified as NEWs, as defined in section 2 of the [NSCA](#). The regulatory effective dose limit for a NEW is 50 millisievert (mSv) per year and 100 mSv over a 5-year dosimetry period.

Cameco's MRO and KLO have RP design features enabling it to mine high-grade ore. As seen in the following graph, annual doses to workers at the MRO and KLO remained well below the 50 mSv/year regulatory limit.

Figure 3.1 displays the maximum and average individual effective doses to NEWs from 2013 through to 2021.

Figure 3.1: Maximum individual and average effective doses to NEWs, 2013-2021



As defined in the [RPR](#), the 5-year dosimetry period is a fixed 5-year period. The 5-year dosimetry periods that are applicable to both operations over this licensing period are 2011 to 2015, 2016 to 2020 and 2021 to 2025. The maximum doses during these periods are shown in table 3.2.

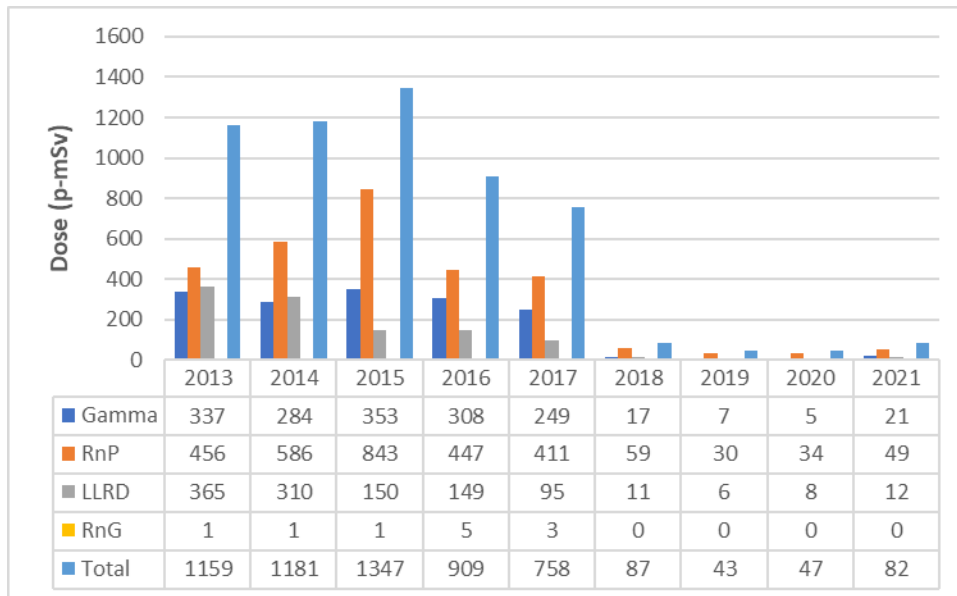
Table 3.2: Maximum doses during 5-year dosimetry periods, 2011-2020

McArthur River Operation		
Dosimetry Period	2011-2015	2016-2020
Maximum Dose	33.48 mSv	13.65 mSv
Key Lake Operation		
Dosimetry Period	2011-2015	2016-2020
Maximum Dose	22.21 mSv	14.09 mSv

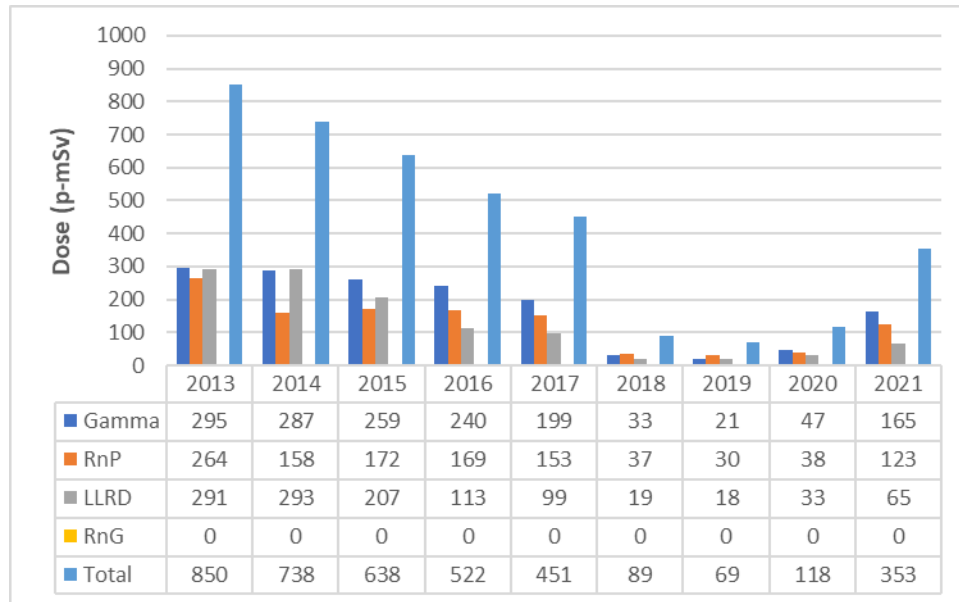
In 2021 the maximum dose was 3.06 mSv and 3.13 mSv, for the MRO and KLO, respectively. No worker exceeded the regulatory individual effective dose limit of 50 mSv in 1 year and 100 mSv in a 5-year dosimetry period. As described in section 1.1, both the MRO and KLO went into care and maintenance in late 2017 and a reduction in doses is seen from that time due to reduced activities at the site (no mining or milling).

During the current licensing period, the annual collective dose¹ totals for the MRO ranged from 1,347 person-mSv (p-mSv) in 2015, to a low of 43 p-mSv in 2019. During the current licensing period, the annual collective dose totals for the KLO ranged from 850 p-mSv in 2013, to a low of 69 p-mSv in 2019. Figures 3.2 and 3.3 display the annual collective doses for NEWs at the MRO and KLO, respectively during the current licence term.

Figure 3.2: Annual collective doses for NEWs, 2013-2021 for the MRO



¹ The annual collective dose is the sum of effective dose assigned to workers at the operation in a given calendar year.

Figure 3.3: Annual collective doses for NEWs, 2013-2021 for the KLO

Radiation protection program performance

CNSC compliance activities

CNSC staff assessed RP program performance at the MRO and KLO over the current licence period through various compliance verification activities including desktop reviews of monthly, quarterly and annual compliance reports. CNSC staff have observed and verified RP practices at the MRO during 22 general compliance inspections and 3 focused RP inspections during the licence term.

CNSC staff have also observed and verified RP practices at the KLO during 1 focused inspection and 23 general compliance inspections during the licence term.

Overall, inspection findings have confirmed ongoing compliance with the RPR during the current licensing period. Non-compliant findings have been identified; however, these regulatory findings have been of low safety significance and were not indicative of widespread deficiencies in RP program implementation at either operation. The licensee has taken timely actions to address all regulatory findings. CNSC staff have verified that Cameco has taken appropriate corrective actions and these non-compliances are now closed.

The MRO and KLO RP program has been effective in providing adequate protection to workers from radiological hazards throughout the current licensing period. As a result of inspections and desktop review verification activities, CNSC staff confirmed that the MRO and KLO RP programs comply with CNSC regulatory requirements.

Radiological action levels

The [UMMR](#) and the [RPR](#) require that a licensee report any RP action level exceedances. The action levels for effective doses identified in the MRO and KLO RP program are 1 mSv per week and 5 mSv per quarter. Action level exceedances during the current licence period at both the MRO and KLO are outlined in table 3.3.

Table 3.3: Action level exceedances, 2013-2022

McArthur River Operation										
Period	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Weekly Action Level (1 mSv/wk)	0	0	6	2	0	0	0	0	0	0
Quarterly Action Level (5 mSv/qtr)	0	0	1	0	0	0	0	0	0	0
Key Lake Operation										
Weekly Action Level (1 mSv/wk)	1	0	7	1	0	0	0	0	0	1
Quarterly Action Level (5 mSv/qtr)	0	0	0	0	0	0	0	0	0	0

* The 2022 reporting period is January 1, 2022, to September 30, 2022.

All action level exceedances provided in the table were discussed in the applicable [uranium mines and mills RORs](#). However, a summary of events which occurred in 2015 at the MRO and KLO which resulted in action levels, along with the corrective actions and preventative measures, are included in this report, as well as the KLO exceedance in 2022 which has not yet been included in an ROR to the Commission.

McArthur River Operation

On January 6, 2015, a raise bore operator recorded a dose of 4.725 mSv from radon progeny and LLRD on their January personal alpha dosimeter and a total of 5.5 mSv for the quarter, which exceeded both the weekly and quarterly action levels. The investigation identified that the exposure happened in a drill chamber while reaming a raise. The negative ventilation vents were not placed in the correct position to adequately exhaust the radon progeny. The prism, which was misplaced near the entrance to the chamber, did not monitor the work area and, hence, failed to detect the elevated conditions. Several corrective actions were undertaken by Cameco. Cameco updated the work instructions to prevent upcasting of contaminated air from open raises into the work area to reduce reoccurrence of such exposures. A daily radiation safety topic was created to address the placement of Prisms (continuous air monitors) to provide more

effective early warning of elevated exposure. Lastly, the exposed worker was assigned low dose work for the remainder of 2015 to ensure the individual's exposure limit was not exceeded.

Five workers received doses on their September 2015 personal alpha dosimeters that were in excess of the weekly action level of 1 mSv/week. The total dose for the 2015 year for impacted workers ranged between 5.0 and 7.4 mSv and the dose received by each worker as a result of the incident ranged between 1.9 and 3.7 mSv. A review indicated the workers received their exposure while doing non-routine work backfilling a sloughing raise of the mine. The localized elevated radiological conditions were not identified by either grab samples or by prism monitoring. As an interim measure, the remaining back filling was completed with workers using self-contained breathing apparatuses. A root cause investigation was carried out by Cameco in addition to the site investigation. Work management plans for impacted employees were implemented to prevent any further dose in 2015. Corrective measures included better control of groundwater infiltration (source of radon), enhanced radiation monitoring, conduct and execution of job hazard assessment, and improved management of personal alpha dosimeters use. CNSC verified the implementation of the corrective actions and were satisfied with the measures taken. These events were reported to the Commission within the [2015 Uranium Mines and Mills ROR](#).

Key Lake Operation

On January 14, 2015, a hole in the main calciner shaft allowed uranium ore concentrate to enter and pass through the crystallization circuit and enter the workspace. Uranium in urine analysis indicated 13 workers had a uranium uptake, and 5 of those were assigned an effective dose of greater than the weekly action level of 1 mSv, with results ranging from 1.00 to 1.89 mSv. On February 19, 2015, calcined uranium ore concentrate was found on the floor of the fourth floor of the yellowcake building. It was determined that the material came from a leak in the calciner exhaust duct. Enhanced urine bioassay sampling confirmed that 1 worker received a weekly total effective dose of 1.16 mSv exceeding KLO's weekly action level of 1 mSv/week effective dose. A safe shutdown was initiated following the event. These events were reported to the Commission within an event initial report (CMD 15-M16) [9] and within the 2015 ROR.

A multi-point repair plan was put in place to repair the damaged ducting and expansion joints as well as to address the causes of the break. An inspection port was added to the ducting to allow annual internal examination. A safe start-up plan was developed and included operator inspections, area airborne sampling and surface contamination swipe monitoring for a period of 3 days. The causes of both the February 19 incident and the January 14, 2015 incident were further evaluated through a root cause investigation. Follow-up inspections were conducted by CNSC staff to verify implementation of the corrective actions and preventative measures. As a result of these events, on March 10, 2015, CNSC staff requested that all Saskatchewan operating uranium mill facilities complete follow-up actions to prevent similar occurrences [10].

This request was issued pursuant to subsection 12(2) of the [GNSCR](#). All licensees completed the follow up to the satisfaction of CNSC staff. Onsite inspections were conducted to verify the 12(2) responses were implemented by the licensees. Overall, Cameco's corrective actions included improvements to engineering controls, enhanced radioactive dust monitoring of workers, and contamination monitoring to provide additional surveillance to the calciner area.

At the time of the events, the replacement of the operational calciner was planned. However, during commissioning of the new calciner in 2016, shell corrosion was observed and therefore the use of the calciner was suspended. Cameco has indicated that there are no plans to operate the new calciner in the immediate future. Instead, in 2017 Cameco requested and received approval from CNSC staff for repairs and refurbishment of the original calciner. The calciner shaft and associated brickwork were replaced. The calciner ductwork was also replaced and critical structural steel of the Calciner/Crystallization building was also refurbished. In 2021, CNSC staff requested that Cameco initiate a fixed LLRD area sampling program to verify that engineering controls associated with the calciner remain effective. This monitoring program was implemented in 2022.

On June 26, 2022, workers completed an entry into a counter-current decantation tank to complete clean-up activities following a tank integrity inspection. Post work urine samples collected indicated that 1 worker had an intake of LLRD. It is suspected that as part of the removal of the personal protective equipment (PPE), the worker had an exposure to LLRD. The worker reported removing their respirator and then further handling their contaminated PPE including disposal of the disposable gloves and coveralls and return of the used respirators. The final dose assessment for the intake event for this worker was 4.19 mSv, which is above the weekly action level of 1 mSv. The estimate of the workers quarterly dose for the second quarter is 4.61 mSv, which remains below the quarterly action level of 5 mSv. Conservative assumptions were made in the development of this estimate and CNSC staff confirmed the calculations performed by Cameco. A root cause investigation was undertaken, and the results provided to CNSC staff. Corrective actions implemented by Cameco included a review of training and documentation to clarify expectation on decontamination procedures and the completion of LLRD focused housekeeping inspections.

Summary

CNSC staff are satisfied with the performance of Cameco's RP programs and their implementation at the MRO and KLO.

Radiological hazard control

Radiation and contamination control procedures have been established at the MRO and KLO to control and minimize radiological hazards and the spread of radioactive contamination. Radiological monitoring results confirm the effectiveness of contamination control procedures and include a combination of direct and indirect contamination monitoring of eating areas, footwear, work clothing and PPE. Routine airborne monitoring programs have been established and implemented for LLRD, radon progeny and radon gas.

When sample results exceed administrative levels, protective actions are taken as specified in the radiation code of practice. The operations use continuous radon progeny detectors with warning lights to monitor and warn workers of elevated radon progeny levels.

Cameco possesses sealed sources, unsealed sources and radiation devices at the MRO and KLO that are regulated under the [Nuclear Substances and Radiation Devices Regulations](#). These radiation sources range in type from fixed nuclear gauges to radiation instrumentation calibration sources. The controls associated with these radiation sources are supported by the MRO and KLO RP programs including training, leak testing, radiation warning signs and access control to areas where such sources are used or stored.

CNSC staff are satisfied that radiological hazards have been adequately controlled at the MRO and KLO and where incidents have occurred, appropriate corrective actions and preventative measures were implemented.

3.7.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.7.3.1 Past Performance

Based on the review of the MRO and KLO's monthly, quarterly and annual compliance reports and CNSC staff's routine compliance verification activities, CNSC staff rate the performance for the RP SCA as satisfactory for the current licence period for the MRO and KLO. Summaries of Cameco's RP programs for the [MRO](#) and [KLO](#) are provided on Cameco's licence renewal webpage.

3.7.3.2 Regulatory Focus

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation at the MRO and KLO pertaining to this SCA. This oversight will include monitoring the effectiveness of RP programs as Cameco continues to transition back to normal operation at both the MRO and KLO after the care and maintenance period. Radiation exposures are expected to return to levels previously observed at these sites.

3.7.3.3 Proposed Improvements

There are no other proposed improvements for this SCA.

3.7.4 Conclusion

CNSC staff assessed Cameco's documentation and analyses at the MRO and KLO under the RP SCA and found them to be acceptable. CNSC staff are satisfied with Cameco's efforts in applying the ALARA principle to keep the doses to persons ALARA over the current licence period. Therefore, CNSC staff concluded that the overall performance for this SCA is satisfactory, and that Cameco is qualified to carry out the authorized activities at the MRO and KLO in this SCA.

3.8 Conventional Health and Safety

The conventional health and safety SCA covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

The specific areas that comprise this SCA at the MRO and KLO addressed individually in this document are:

- performance
- practices
- awareness

3.8.1 Trends

The following table indicates the overall rating trends for the conventional health and safety SCA over the current licensing period:

TRENDS FOR CONVENTIONAL HEALTH AND SAFETY										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has acceptable conventional health and safety programs to identify and control risks at both the MRO and KLO. CNSC staff monitor implementation of the programs to ensure protection of workers. Cameco has been proactive in identifying and managing risks to improve health and safety performance.</p> <p>Cameco's conventional health and safety programs and their implementation continues to improve, be effective and meet applicable regulatory requirements.</p>										

3.8.2 Discussion

The CNSC requires licensees of uranium mines and mills to develop, implement and maintain effective safety programs, to promote a safe and healthy workplace for employees, and to minimize the incidence of occupational injuries and illnesses. The CNSC requires Cameco to identify potential safety hazards, assess the associated risks, and implement the necessary materials, equipment, programs and procedures to effectively manage, control and minimize these risks at the MRO and KLO.

The occupational health and safety programs at the MRO and KLO are comprised of several components designed for employees, visitors and contractors. This health and safety program has been developed to meet legislated requirements and internal standards. The programs include audits, inspections, training, incident reporting and tracking, objectives and targets, hazard identification, risk assessments, job hazard analysis, key performance indicators, and regular safety meetings.

Performance

A key performance measure for this SCA is the number of lost-time injuries (LTIs) that occur per year. An LTI is an injury that takes place at work, resulting in the worker being unable to return to work and carry out their duties for a period of time.

Table 3.4 shows the total number of LTIs that occurred, their frequency and severity and the total recordable incident rate during this licensing period at the MRO and KLO. CNSC staff reviewed the investigation reports and verified that corrective actions have been implemented and remain effective. Since 2010, all LTIs and reported to the Commission as part of CNSC staff's uranium mines and mills annual ROR.

Table 3.4: LTIs, severity rate and frequency rate, 2013-2022

McArthur River Operation										
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Number of LTIs ¹	1	1	0	2	1	0	0	0	0	0
Severity rate ²	0	13.2	8.1	0	10.9	22.6	0	0	0	0
Frequency rate ³	0.11	0.11	0	0.24	0.15	0	0	0	0	0
Total Recordable Incident Rate ⁴	2.95	4.04	2.89	5.19	5.53	5.02	2.12	1.98	0.70	2.33
Key Lake Operation										
Number of LTIs ¹	0	0	0	2	0	0	0	0	0	0
Severity rate ²	8.5	0	0	71.0	0	0	0	0	0	0
Frequency rate ³	0	0	0	0.41	0	0	0	0	0	0
Total Recordable Incident Rate ⁴	2.21	3.21	3.23	6.17	3.48	2.59	2.22	2.04	1.99	0.77

* The 2022 reporting period is January 1, 2022 to September 30, 2022.

¹ An injury that takes place at work and results in the worker being unable to return to work for a period of time.

² A measure of the total number of days lost to injury for every 200,000 person-hours worked at the facility.
 Accident severity rate = [(# of days lost in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

³ A measure of the number of LTIs for every 200,000 person-hours worked at the facility.
 Accident frequency rate = [(# of injuries in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

⁴ A measure of the number of fatalities, lost-time injuries, and other injuries requiring medical treatment for every 200,000 person-hours worked at the facility.
 Recordable incident rate = [(#incidents in last 12 months) / # hours worked in last 12 months] x 200,000.

Inspections regarding conventional health and safety were also carried out by [Saskatchewan Ministry of Labour Relations and Workplace Safety](#) inspectors during the current licensing period. Inspection reports are shared between CNSC staff and Provincial counterparts, regular oversight is provided by CNSC staff as needed. Safety-related findings and incidents were properly investigated and corrected by Cameco in a timely manner and the resulting reports were acceptable to the CNSC and Saskatchewan Ministry of Labour Relations and Workplace Safety.

Practices

In addition to the [NSCA](#) and its associated regulations, the MRO and KLO activities and operations must comply with applicable federal and provincial health and safety related acts and regulations. For example, [The Saskatchewan Employment Act](#) requires that Cameco establish and maintain a joint occupational health and safety committee at each facility.

To assure continued strong safety performance and continual improvement, Cameco's conventional health and safety programs at the MRO and KLO include the following provisions:

- scheduled safety orientation and training
- five-point daily safety cards
- work permits for specialized work
- planned inspection program
- occupational health committees
- health centre operation
- incident investigations and corrective action performance tracking
- contractor safety management
- management of change
- regular safety meetings

CNSC staff have observed and verified safety practices during compliance inspections. The conventional health and safety SCA is included as a component in many CNSC inspections. Cameco reported safety events in a timely manner and in compliance with the regulations for the MRO and KLO.

Risk assessments are used to compile a list of safety and health hazards and their controls. The list of safety and health hazards and their controls is routinely reviewed and updated to reflect continual improvement and changes at the MRO and KLO.

Cameco uses leading key performance indicators (training compliance, job task observation compliance, etc.) to monitor preventative efforts. Health and safety objectives are developed based upon the review of the hazards, reviews of investigation and inspection reports and reviews of five-point safety cards (figure 3.4). The Five-point safety system is used as a meant to help ensure works are prepared to conduct assigned work in a safe and health manner by providing information to help guide workers to check their workplace and equipment and by providing guidance to ensure the worker is prepared and able to perform their duties safely.

The Cameco integrated safety, health, environment and quality management system requires that both Cameco corporate and site senior management review their respective safety and health management program at scheduled intervals to ensure the program's continuing suitability, adequacy, effectiveness, and sustainability.

3.8.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.8.3.1 Past Performance

Through the review of the occupational health and safety documentation, site conditions and practices during the licence period, CNSC staff concluded that Cameco's occupational health and safety program at the MRO and KLO meets CNSC regulatory requirements. Summaries of Cameco's occupational health and safety program for the [MRO](#) and [KLO](#) are provided on Cameco's licence renewal webpage.

For the current licence period, CNSC staff rated Cameco's overall performance for the conventional health and safety SCA as satisfactory during the current licence term.

3.8.3.2 Regulatory Focus

CNSC staff completed 1 and 2 focused conventional health and safety inspections at the MRO and KLO, respectively, during the current licence term. The conventional health and safety criteria were also included in 24 general inspections conducted by CNSC staff at each of the MRO and KLO during the current licence term. All non-compliances identified were of low safety significance. Cameco addressed all non-compliances and recommendations identified during the current licence period.

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

3.8.3.3 Proposed Improvements

There are no proposed improvements for this SCA.

3.8.4 Conclusion

CNSC staff concluded that Cameco has effectively managed workplace safety hazards at the MRO and KLO. Compliance verification activities will continue to be conducted at the facility to confirm that Cameco's MRO and KLO continue to view conventional health and safety as an important consideration.

Cameco's conventional health and safety program and implementation continue to be effective, meet applicable regulatory requirements, and are rated as satisfactory.

3.9 Environmental Protection

The environmental protection SCA covers programs that identify, control and monitor all releases of nuclear and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

The specific areas that comprise this SCA at the MRO and KLO addressed in this CMD are:

- effluent and emissions control (releases)
- environmental management system (EMS)
- assessment and monitoring
- protection of peoples (including Indigenous Nations and communities)
- environmental risk assessment

3.9.1 Trends

The following table provides the annual compliance ratings for the environmental protection SCA for the current licence period.

TRENDS FOR ENVIRONMENTAL PROTECTION										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented, maintained and continuously improved its environmental protection programs at the MRO and KLO that protects the environment and the public in accordance with CNSC regulatory requirements.</p> <p>During the current licence period, releases to the environment were generally well below the release limits specified in the CNSC licence. CNSC staff monitor Cameco's implementation of the environmental protection program through compliance verification activities.</p> <p>Cameco updated its Environmental Risk Assessment (ERAs) in 2020 for the MRO [11] and KLO [12], respectively. The predicted environmental impacts from the MRO and KLO are consistent with those outlined in previous ERAs.</p>										

3.9.2 Discussion

Under the UMMR, Cameco's MRO and KLO are required to develop and implement environmental protection policies, programs and associated procedures that comply with all applicable federal and provincial regulatory requirements, in order to control the release of nuclear and hazardous substances into the environment, and to protect the environment and human health. Listed below are the environmental protection regulatory documents and standards that Cameco must implement under its licence for the proposed licence period.

Cameco has implemented the requirements of:

- CSA N288.4-10, *Environmental monitoring programs at class I nuclear facilities and uranium mines and mills* [13]
- CSA N288.5-11, *Effluent monitoring programs at class I nuclear facilities and uranium mines and mills* [14]
- CSA N288.6-12, *Environmental risk assessment at class I nuclear facilities and uranium mines and mills* [15]
- CSA N288.7-15, *Groundwater protection programs at class I nuclear facilities and uranium mines and mills* [16]
- CSA N288.8-17, *Establishing and implementing action levels for releases to the environment from nuclear facilities* [17]
- CNSC's [REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures](#).

During the current licence period, CNSC staff verified Cameco's performance with respect to environmental protection through inspections and desktop reviews.

Effluent and emissions control (releases)

At the MRO, there are 2 regulated effluent releases to the environment:

- Collected mine water, ore process waters, wash waters and contaminated surface drainages which are treated in a dedicated treatment plant that utilizes multi-stage chemical and physical separation processes.
- Collected groundwater infiltrating into Shaft 3. This effluent is monitored and released directly to the environment, without treatment. The effluent was well below regulatory limits during the current licence term.

The annual monthly mean concentrations and associated licence limits for the treated effluent are provided in table 3.5. CNSC's [ROR](#) for uranium mine and mill sites include the results of the quality of the treated effluent only. Both effluents discharge to Read Creek through an engineered open channel.

At the KLO, 2 effluent streams are processed in separate treatment facilities before being released to the environment:

- The bulk neutralization circuit, where mill effluent is processed with a treatment system of chemical precipitation and liquid/solid separation, and then released to Wolf Lake in the David Creek system.
- Effluent from dewatering wells of the Gaertner pit and Deilmann pit hydraulic containment systems is treated with a reverse osmosis (RO) system before being released to Horsefly Lake in the McDonald Lake system.

The location of these discharge points is shown on figure 1.3.

Release limits are specified within the LCHs for the respective operation. Draft copies of the proposed LCHs are provided within Part 2 and Part 3 of this report, for the MRO and KLO, respectively. The release limits are stipulated in the [Metal and Diamond Mining Effluent Regulations](#) (MDMER). The CNSC also requires that Cameco meet the provincial limits for selenium and uranium, which are stipulated in [Saskatchewan Ministry of Environment](#) (SMOE), issued approvals to operate and within [The Mineral Industry Environmental Protection Regulations, 1996](#), respectively. Cameco must also demonstrate the principles of ALARA and Best Available Technology Economically Available as [per REGDOC-2.9.1, Environmental Protection: Environmental Principles, Assessments and Protection Measures](#) at the MRO and KLO. The CNSC requirements result in effluent releases substantially lower than those authorized by the province of Saskatchewan.

The CNSC has an interim objective for uranium in effluent of 0.1 mg /L for liquid effluent. The CNSC uses the interim objective to assess the performance of a licensee's effluent monitoring program with respect to uranium. This value is based on a 2006 report of uranium treatment technologies, practices and performance levels within the uranium mining and milling sector [18]. The interim objective has served as a regulatory tool to decrease uranium concentrations in mine/mill effluent below those considered of environmental concern. As presented in table 3.5, the uranium concentrations in effluents from MRO and KLO are consistently below the objective. Should the draft [REGDOC-2.9.2, Controlling Releases to the Environment from Nuclear Facilities](#) be accepted, the requirement for any site-specific licence limit would be assessed.

Table 3.5: Annual monthly mean concentrations of treated effluent released to the environment from the water treatment plants at MRO KLO, 2013-2022*

Year	Limits ⁶	Interim Objective	Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
As mg/L	0.3 ⁵	N/A	MRO	0.0017	0.002	0.0029	0.0011	0.0007	0.0001	0.0001	0.0001	0.0001	0.0002
			KLO	0.008	0.008	0.006	0.007	0.008	0.0076	0.0075	0.0113	0.0109	0.0015
Cu mg/L	0.3 ⁴	N/A	MRO	0.0011	0.0014	0.0011	0.0011	0.0006	0.0004	0.0005	0.0006	0.0005	0.0006
			KLO	0.013	0.014	0.03	0.029	0.023	0.005	0.001	0.001	0.002	0.0007
Pb mg/L	0.1 ⁵	N/A	MRO	0.0001	0.0008	0.0009	0.0009	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
			KLO	<0.01	<0.01	0.01	0.010	0.010	0.010	0.0003	0.0002	0.0004	0.0008
Ni mg/L	0.5 ⁴	N/A	MRO	0.0012	0.0034	0.0035	0.0033	0.0015	0.0016	0.0017	0.0015	0.0022	0.0019
			KLO	0.067	0.049	0.071	0.144	0.167	0.257	0.142	0.153	0.094	0.0925
Zn mg/L	0.5 ⁴	N/A	MRO	0.0014	0.0022	0.0016	0.0016	0.0019	0.0011	0.0032	0.0019	0.0024	0.0017
			KLO	0.009	0.012	0.009	0.010	0.009	0.009	0.007	0.006	0.005	0.0039
TSS mg/L	15 ⁴	N/A	MRO	1	1	1	1	1	1	1	1	1	1
			KLO	1.8	1.8	2.8	2.1	3.1	2	2	2.3	1.7	2
Ra ²²⁶ Bq/L	0.37 ⁴	N/A	MRO	0.052	0.058	0.065	0.082	0.068	0.063	0.052	0.049	0.029	0.024
			KLO	0.05	0.05	0.07	0.05	0.07	0.07	0.09	0.036	0.017	0.02
pH ¹ units	6.0-9.5 ⁴	N/A	MRO	7.2	7.3	7.3	7.3	7.2	7.5	7.4	7.4	7.4	7.35
			KLO	6.3	6.3	6.4	6.4	6.5	6.7	6.6	6.6	7	6.87
Se mg/L	0.6 ³	N/A	MRO	0.0014	0.0024	0.0025	0.0037	0.0019	0.0002	0.0003	0.0003	0.0003	0.0005
			KLO	0.017	0.018	0.018	0.017	0.015	0.01	0.01	0.011	0.01	0.0093
U mg/L	2.5 ³	0.1	MRO	0.0107	0.0095	0.0089	0.0055	0.0048	0.0049	0.0093	0.0073	0.0082	0.0098
			KLO	0.008	0.006	0.008	0.006	0.011	0.013	0.0243	0.0259	0.0239	0.0197
Mo ² mg/L	N/A	N/A	MRO	0.1878	0.1865	0.1458	0.185	0.1393	0.0192	0.0084	0.0094	0.0089	0.0096
			KLO	0.15	0.16	0.10	0.08	0.12	0.07	0.05	0.056	0.038	0.0096

* Mill effluent (station 1.4) for the KLO, station 2.1 for the MRO. The 2022 reporting period is from January 1, 2022 to September 30, 2022.

1 pH taken from daily discharge samples – not measured in monthly composite samples. **2** No provincial or federal limit is available. Level of molybdenum in treated effluent meets the federal water quality guidelines and are below the action level. **3** Provincial limits. **4** Limits as identified in the MDMER. **5** Limit as identified in the MDMER. Limit revised (lowered to value shown) on June 1, 2021. **6** Un-ionized ammonia added to MDMER limits as of June 1, 2021. Refer to [MRO](#) and [KLO](#) EPRRs for these results.

The effluent discharge is also subject to regular toxicity testing as required by the [MDMER](#) and to the action levels specified within either the MRO or KLO environmental code of practice. Action levels provide early indication of a potential loss of control of part of the environmental protection program. Thus, action levels are used to ensure that the licence release limits will not be exceeded. In 2018, Cameco proposed updates to action levels using actual performance data and by following the requirements as outlined in CSA standard N288.8-17 [17]. As part of implementation of requirements under this CSA standard, the action levels were reassessed at both facilities in consideration of actual performance data and adjusted accordingly.

At both the MRO and at the KLO mill water treatment plant, the treated effluent is pumped to a monitoring pond and a sample is collected as the pond is filled. The treated effluent is released in a controlled batch manner if the lab results show that the concentrations of contaminants are lower than action levels and licence limits. The discharge from the RO water treatment plant at the KLO is on a continuous process.

Throughout the previous licensing period, monitoring has verified that effluent from the MRO and KLO poses no environmental concern. The effluent contaminant concentrations were maintained below the effluent discharge limits except for 2 short term exceedances of the pH limit at the KLO, which is detailed below. The effluent discharge from the MRO and KLO was not acutely lethal and met the requirements in the MDMER throughout the current licence term. There was 1 effluent action level exceedance at each of the operations during the licensing period as explained below. Furthermore, all of the average annual concentrations of parameters are within the predictions in the 2020 Environmental Risk Assessments [11, 12]. Cameco published summaries of these documents for the [MRO](#) and [KLO](#) and these summaries are available on [Cameco's licence renewal webpage](#).

McArthur River Operation

On March 9, 2018, Cameco reported a radium action level exceedance at the MRO when they identified the average radium over 10 ponds exceeded the administrative levels of 0.30 Bq/L. At that time, an action level was exceeded when at least 10 consecutive ponds exceed the administrative level. These exceedances were identified during a routine duplicate sample analysis. The duplicate sample analyzed by the Saskatchewan Research Council indicated radium concentrations were higher than the sample analyzed by the MRO lab, indicating that the MRO lab was underestimating the radium concentrations. The Authorized Limit (0.37 Bq/L) under the [MDMER](#) was not exceeded.

The transition of the MRO from operation to care and maintenance resulted in uranium ore production stopping at the MRO. This caused a change in the chemistry of influent and the amount of reagent necessary to bring contaminants in effluent to concentrations necessary for release. The change in the volume of reagent used to account for the change in influent chemistry resulted in excess reagent remaining in the effluent which suppressed the analysis result of radium.

Since the exceedance, Cameco has adjusted its treatment methodology and radium concentrations in effluent have been restored to historical levels.

MRO relied on KLO laboratory results for pond release until the MRO analysis issue for radium was resolved.

MRO increased frequency of sampling in the waterbodies downstream of the effluent discharge point and concluded no increase in radium concentrations was evident.

MRO carried out statistical analysis to estimate radium levels in situations where an archived sample was not available. All raw data and derived concentrations were submitted to the CNSC for review.

Cameco adjusted the analytical methodology at the MRO lab to include a pre-treatment of the samples to remove any potential for the suppression of radium-226 during the analysis.

Cameco has resolved the issue and no impact on the environment or health and safety of persons resulted from this action level exceedance.

Key Lake Operation

There was 1 action level exceedance at the KLO during the licence term. This exceedance of mill effluent occurred on October 28, 2022. After treatment, mill effluent is stored on 1 of 4 monitoring ponds and effluent quality is verified prior to discharge. In this instance, the pond fill sample has a uranium concentration of 60 µg/L, which is acceptable for discharge, however the pond discharge composite sample was 81 µg/L, which is above the action level of 80µg/L. Cameco investigated the incident and determined that fluctuations in uranium concentrations in feedwater from reservoir #1 and the final effluent were occurring at the time of the incident. Accumulated solids/sediment within the reservoir were being removed in the summer by agitating the solids using a water jet and then pumping out the solids/water mixture. This resulted in increased solids, including uranium, in the water column even after the project was suspended for the winter months. Immediately after the incident, water feed for water treatment was switched to reservoir #2 to allow reservoir #1 water quality to improve/stabilize. Although the discharge was above the action level, the effluent quality remained within the CNSC's interim objective for uranium in effluent of 0.1 mg/L and no impact on the environment occurred.

There were also 2 separate short term pH limit exceedances from the RO water treatment plant.

On December 2, 2013, approximately 200 m³ of treated effluent with a pH of approximately 10.8 was released to Horsefly Lake at the discharge location following an upset condition in the water treatment plant. The pH was above the upper pH limit specified in the [MDMER](#) (9.5) and was also above the maximum grab sample limit within the provincial operating approval (9.5). A faulty reject valve on RO treatment Skid B resulted in operational difficulties with pH control. In response, Skids B, E and the Concentrator Skid were taken offline.

The shutdown interlocks were removed to allow the operator to re-establish better pH control. As a result of these operational difficulties, high pH water was unintentionally discharged to the environment for approximately 1 hour. Cameco's environmental monitoring demonstrated that there were no environmental effects as a result of the event. CNSC staff conducted a follow-up inspection to verify effective corrective and preventative actions were implemented.

On October 12, 2018, approximately 10 m³ of high pH (10.16) effluent was released from the RO treatment plant to Horsefly Lake. Although only a small volume of discharge was released, the pH was above the upper pH limit specified in the MDMER (9.5) and was also above the maximum grab sample limit within the provincial operating approval (9.5). As a comparison to the volume of elevated pH discharged during the event, in October 2018, the average daily discharge of treated effluent to the environment was approximately 14,860 m³. An investigation was completed by Cameco and corrective actions developed to improve pH control. Cameco's environmental monitoring demonstrated that there were no environmental effects as a result of the event. A review of the status of the follow-up actions proposed by Cameco was conducted by CNSC staff during an inspection and was found to be acceptable.

Uranium, molybdenum and selenium in effluent

McArthur River Operation

In 2005, MRO completed an ecological risk assessment, which recommended further evaluation and control of molybdenum (Mo), selenium (Se) and uranium (U) in treated effluent. MRO initiated improvements to the mine water treatment system as well as adopted administrative and action actions in the Environmental Protection Program. An Mo removal circuit was commissioned in 2005 and, by 2010, Mo effluent concentration had been reduced from 2.5 mg/L to 0.89 mg/L. Loadings in treated effluent of Mo were similarly reduced. Effluent treatment has since incrementally improved with initiatives related to isolating and treating Mo sources, reducing the liberation of Mo during ore processing, and dynamic reagent additions to reflect incoming waste treatment needs. In 2016, the effluent concentration of Mo was 0.19 mg/L. During the approximate 4-year period of care and maintenance, Mo concentrations in effluent were reduced over an order of magnitude to 0.009 mg/L reflecting the halt in mining.

While no changes to the mine water treatment process have been made specifically to reduce the concentrations of Se in the effluent, the overall process changes have contributed to an average annual reduction from 3.95 µg/L in 2005 to 1.9 µg/L in 2016; reduced further during the period of care and maintenance to 0.3 µg/L in 2021.

As with Se, uranium concentrations in the treated effluent have been reduced and have consistently remained very low (0.005 to 0.010 mg/L) during the licensing period.

Key Lake Operation

As a condition of the licence (UMLOL-MILL-KEY.00/2013) issued October 23, 2008, Cameco implemented Phase 1 of Key Lake Operation – Action Plan for Selenium (Se) and Molybdenum (Mo). This led to the installation of a Mo/Se removal circuit which was expected to reduce the annual average concentrations of both parameters. In 2007, prior to the implementation of the action plan, the annual average concentration of Mo and Se in treated mill effluent was 1.13 mg/L and 0.033 mg/L respectively. As part of the action plan, final effluent targets (administration levels) of 0.3 mg/L for Mo and 0.028 mg/L for Se were established. This equates to maximum loadings of 600 kg/year for Mo and 40 kg/year for Se. Since this time, and during the current licence term, Cameco has been monitoring the environment and providing results in dedicated reports in accordance with the action plan. The reports confirmed the reduction in Mo and Se in effluent and downstream environment.

On July 25, 2018, Cameco submitted the 2017 Molybdenum and Selenium Follow-up Program Closure Report [19]. Within the report Cameco proposed ceasing the dedicated program and incorporating any additional monitoring components into the environmental monitoring program for the KLO. CNSC staff accepted the report and required Cameco to revise the environmental monitoring program to ensure that any impacts from Se and Mo are monitored.

After KLO was placed in care and maintenance, there was a slight increase in uranium concentrations in treated effluent partially due to a reduction in solids in the bulk neutralization thickener and an increase in the volume of treated effluent released. Uranium concentrations have remained stable during care and maintenance.

CNSC staff are satisfied that Cameco is taking the appropriate measures to effectively control and reduce uranium, molybdenum and selenium in effluent.

Annual monthly mean concentrations in treated effluent

The annual monthly mean concentrations and associated licence limits for the treated effluent are provided in table 3.5. At the KLO, 2 effluent streams are processed in separate treatment facilities before being released to the environment as described earlier. The concentration of treated effluent released to the environment from the RO plant are consistently well below those from the mill water treatment plant and therefore consistent with the CNSC's [Regulatory Oversight Reports](#) for uranium mine and mills sites, only the results of the mill treated effluent quality are presented table 3.5. Releases have been substantially lower than the licence limits throughout the current licence term.

Uncontrolled releases

A listing of the uncontrolled releases (spills) to the environment at the MRO and KLO are listed in table 3.6.

Table 3.6: Number of spills, 2013-2022

McArthur River Operation										
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*
Number of spills	2	1	0	1	2	2	1	0	0	0
Key Lake Operation										
Number of spills	3	1	1	1	3	5	4	2	4	4

* The 2022 reporting period is January 1, 2022, to September 30, 2022.

Complete listings and description of each of the uncontrolled releases (spills) to the environment at both the MRO and KLO are included in RORs which are available on the CNSC's [website](#). Information on releases which occurred in 2021 are included in [Regulatory Oversight Report for Uranium Mines and Mills in Canada: 2021](#), which was presented at a Commission meeting December 15, 2022. All spills which occurred in 2022 have been classified as low safety significance and will be reported in the 2022 ROR.

With the exception of the groundwater contamination discovery under the mill terrace at the KLO, all corrective actions related to these spills have been accepted by CNSC staff and implemented by Cameco. As originally noted in the [2018 ROR](#) and most recently updated in the 2021 ROR, uranium contamination of groundwater under the mill terrace was discovered in 2018. The investigation indicated that the likely source was sump No.2 in the molybdenum extraction building. An [event initial report \(EIR\)](#) was prepared by CNSC staff and discussed at a Commission meeting on May 15, 2019. A site assessment was developed by Cameco and accepted by CNSC staff. The assessment confirmed that the uranium contamination is limited in geographic extent; there have been no impacts and no immediate risks to the surrounding environment. The assessment included source sampling, monitoring and borehole well installation, groundwater sampling, and hydraulic conductivity testing. Cameco has also submitted a corrective action plan which was accepted by CNSC staff. The corrective action includes the installation and commissioning of 2 groundwater recovery wells in the first quarter of 2023.

As part of the site assessment uranium in groundwater event, Cameco installed and sampled several new wells. Water quality results from 2 of these newly installed wells showed elevated contaminant levels including ammonia and sulphate. These wells are also located on the mill terrace. This is not associated with the 2018 uranium in groundwater event but is thought to be from a separate discharge which occurred sometime before the facility went into care and maintenance in 2018. Cameco notified CNSC staff of these findings in June 2021 and continue to provide updates. Information provided to date from Cameco indicates that this new contamination is still limited to the mill terrace, and the environment remains protected. On May 17, 2022, Cameco submitted another site assessment report in response to this discovery; this assessment report has also been accepted by CNSC staff. Cameco is now developing a corrective action plan which is scheduled to be submitted to CNSC staff in mid to late 2023.

The environment remains protected while the remediation of the elevated uranium proceeds and the corrective action plan for the elevated ammonia and sulphate is developed and implemented.

Environmental management system

Cameco has implemented and maintained an environmental management system (EMS) at the MRO and KLO to describe the activities associated with the protection of the environment at each site. The EMS is described in the respective environmental management programs for the MRO and KLO and includes programs for effluent and environmental monitoring. The EMSs are in conformance with Cameco's Safety, Health, Environment and Quality Policy and also meets the requirements of the ISO 14001:2015 standard *Environmental Management System – Requirements with Guidance for Use* [20].

Cameco conducts internal audits to determine whether the EMSs have been properly implemented and are effective. Any deficiencies and findings that are identified from internal audits are documented and a plan is devised to address any non-conformance items. Cameco verifies compliance of its EMSs through annual management reviews where minutes and follow-up actions to outstanding issues from the internal audits are documented. Cameco sets objectives, goals, and targets related to the environmental management program every year. The status of these objectives, goals, and targets is evaluated and the results are documented in the annual compliance report for each site.

CNSC staff verify the effectiveness of MRO and KLOs EMS through desktop reviews of annual compliance reports and inspections. CNSC staff confirmed that Cameco's EMS for each site is meeting expectations.

Assessment and monitoring

The core activity of the environmental management program (EMP) is to acquire the data for assessing impacts on the environment from the operation and ensuring that possible impacts are detected as early as possible and mitigated. The environmental monitoring requirements of the EMP provide details about monitoring locations, frequencies and environmental parameters to be measured.

The MRO and KLO EMPs demonstrate that the site emissions and effluent discharge of nuclear and hazardous substances are properly controlled. Key components of the EMP are air quality, surface water hydrology, water quality, terrestrial monitoring, aquatic monitoring, and groundwater monitoring.

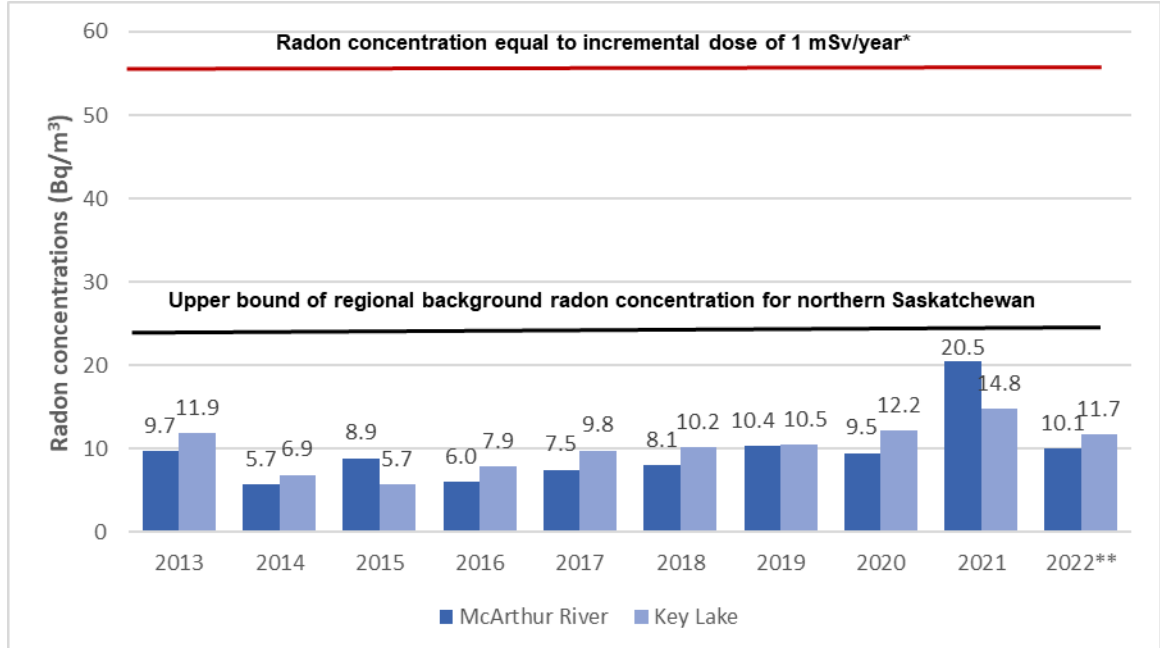
The data collected under the EMPs are compared with predictions in Cameco's ERA to confirm that there is minimal risk to the environment and human health from site emissions and effluent discharge. Additional details and results are provided within the *Environmental Protection Review Report: McArthur River Operation* ([EPPR-MRO](#)) and the *Environmental Protection Review Report: Key Lake Operation* ([EPPR-KLO](#)).

Air monitoring

Air quality at both operations is monitored through ambient air quality near the operations and indirectly through measurements of metal accumulations in the terrestrial environment. Air quality monitoring includes programs for ambient radon and total suspended particulates (TSP). Environmental monitoring for radon concentrations is conducted using the passive method of track-etch cups.

Figure 3.5 shows that the average concentrations of radon in ambient air for 2013 to 2022 were below the reference level for radon. The radon concentrations were also typical of the northern Saskatchewan regional baseline which range from 7.4 Bq/m³ to 25 Bq/m³.

Figure 3.5: Concentrations of radon in ambient air, 2013-2022**

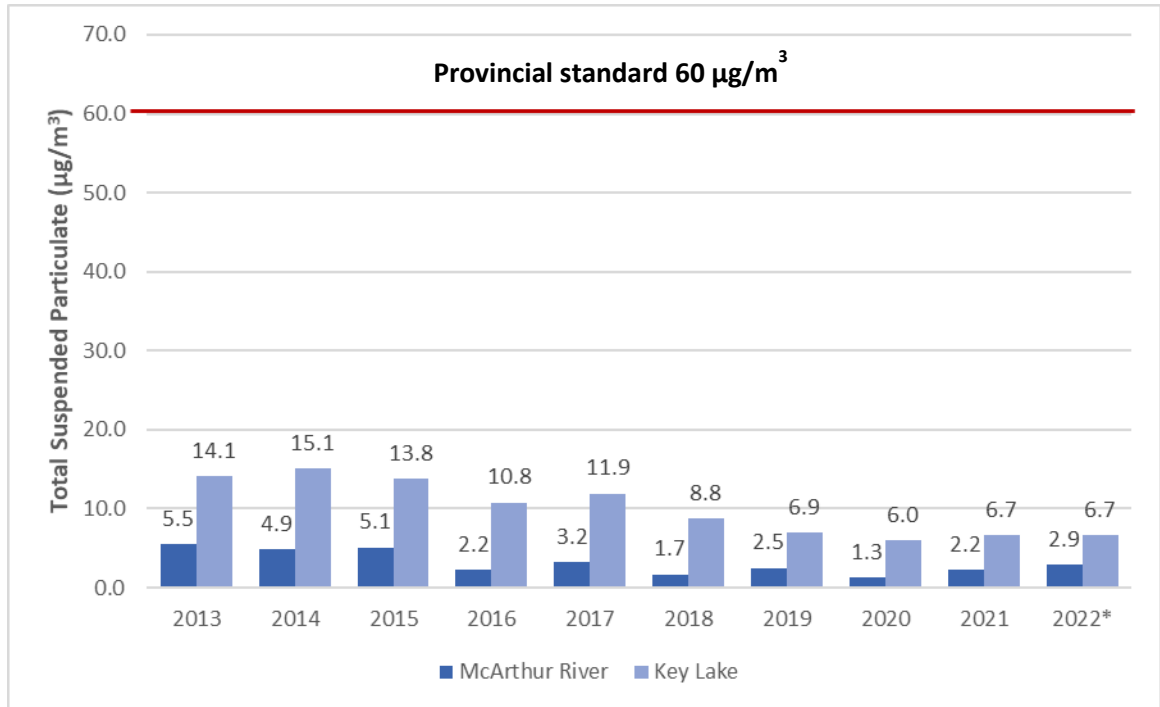


* Upper-bound of the incremental dose of 1 mSv per year above background (i.e., an incremental radon concentration of 30 Bq/m³ above natural background) based on ICRP Publication 115. Values are calculated as geometric means.

** The 2022 reporting period values are based on samples collected up to June 30, 2022.

Environmental monitoring for dust, particulates and associated contaminants is conducted using high volume sampling units located at each site in the prevailing downwind direction. TSP values remained low and well below the provincial standard of $60 \mu\text{g}/\text{m}^3$ as shown in figure 3.6.

Figure 3.6: Concentrations of total suspended particulate, 2013–2022**



* Values are calculated as geometric mean.

** The 2022 reporting period values are from January 1, 2022, to September 30, 2022 data.

TSP samples are also analyzed for concentrations of metals and radionuclides. The mean concentrations of metal and radionuclides adsorbed to TSP are low and below reference annual air quality levels identified in table 3.7.

Table 3.7: Concentrations of metals and radionuclides in air, 2013-2022

Parameter	Reference annual air quality levels*	Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022**
As ($\mu\text{g}/\text{m}^3$)	0.06 ⁽¹⁾	MRO	0.0001	0.0001	0.0001	0.00009	0.0001	0.00006	0.00004	0.00005	0.00005	0.00005
		KLO	0.00166	0.00444	0.0016	0.0008	0.0043	0.0021	0.0021	0.0008	0.0006	0.0003
Cu ($\mu\text{g}/\text{m}^3$)	9.6 ⁽¹⁾	MRO	0.0067	0.00835	0.00513	0.0065	0.0064	0.0072	0.0063	0.0042	0.007	0.00577
		KLO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ni ($\mu\text{g}/\text{m}^3$)	0.04 ⁽¹⁾	MRO	0.0007	0.00085	0.00067	0.0007	0.0007	0.0006	0.00054	0.00049	0.00064	0.00046
		KLO	0.00118	0.0034	0.0013	0.0007	0.0029	0.0011	0.0017	0.0006	0.0007	0.0003
Pb ($\mu\text{g}/\text{m}^3$)	0.10 ⁽¹⁾	MRO	0.0014	0.0012	0.00118	0.0011	0.0006	0.0008	0.00063	0.00046	0.00419	0.0009
		KLO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Se ($\mu\text{g}/\text{m}^3$)	1.9 ⁽¹⁾	MRO	0.00003	0.00004	0.00004	0.00004	0.00004	0.00003	0.000025	0.00003	0.00003	0.00003
		KLO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zn ($\mu\text{g}/\text{m}^3$)	23 ⁽¹⁾	MRO	0.01065	0.01225	0.0098	0.0106	0.0084	0.0295	0.023	0.01	0.00608	0.00588
		KLO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pb ²¹⁰ (Bq/m ³)	0.021 ⁽²⁾	MRO	0.00034	0.00032	0.00032	0.0002	0.0004	0.0003	0.0003	0.0003	0.0003	0.000267
		KLO	0.00032	0.00044	0.0003	0.0003	0.0004	0.0002	0.0003	0.0002	0.0002	0.0002
Po ²¹⁰ (Bq/m ³)	0.028 ⁽²⁾	MRO	0.0001	0.00009	0.00008	0.0000725	0.0001	0.0001	0.0001	0.0001	0.00009	0.000085
		KLO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ra ²²⁶ (Bq/m ³)	0.013 ⁽²⁾	MRO	0.00001	0.00002	0.00001	0.000008	0.00001	0.00001	0.000006	0.0000044	0.000004	0.000005
		KLO	0.0001	0.00022	0.0001	0.0001	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001
Th ²³⁰ (Bq/m ³)	0.0085 ⁽²⁾	MRO	0.00001	0.00001	0.00002	0.000007	0.000007	0.00001	0.000008	0.000008	0.000008	0.000008
		KLO	0.0001	0.00022	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	<0.0001
U ($\mu\text{g}/\text{m}^3$)	0.06 ⁽¹⁾	MRO	0.0005	0.0005	0.0003	0.0004	0.0003	0.0001	0.0001	0.00009	0.000085	0.00014
		KLO	0.0065	0.00794	0.008	0.0076	0.0085	0.0012	0.0008	0.0002	0.0003	0.0003

* Province of Ontario and ICRP reference annual air quality levels are shown for reference only, as no federal or province of Saskatchewan limits are currently established.

**The 2022 reporting period values are from January 1, 2022 to September 30, 2022 data.

1 Reference annual air quality levels have been derived from *Ontario 24-hour Ambient Air Quality Criteria* (Ontario Ministry of Environment 2012).

2 Reference level has been derived from ICRP 96.

Terrestrial monitoring

Cameco's terrestrial monitoring program at the MRO and KLO determines if there is influence on the environment from aerial deposition, as soil and lichen and associated ecological receptors may be affected by atmospheric deposition of particulate and adsorbed metals and radionuclides associated with onsite activities. Cameco executes terrestrial monitoring programs at the MRO and KLO every 5 and 6 years, respectively in accordance with the EMPs.

McArthur River Operation

During the current licensing period, terrestrial monitoring data were collected in 2015, 2018 and 2021.

Soil Monitoring

Results from soil samples collected show that concentrations in soil metal parameters were below available [Canadian Environmental Quality Guidelines](#) for residential/parkland land use. These results are provided in CNSC's [EPRR-MRO](#). Radionuclide concentrations in soils were also low, near, or at background levels and analytical detection limits. CNSC staff found that the concentrations of constituents of potential concern in soil surrounding the MRO are acceptable and do not pose a risk to ecological receptors in the vicinity of the facility.

Lichen Monitoring

Lichen samples are analyzed to determine the level of airborne particulate contaminants deposited on the surface of the lichen as a means of ensuring that a significant level of contamination is not entering lichen consumers, such as caribou. As shown in the EPRR-MRO, levels of arsenic, nickel, and uranium in lichen are generally declining with time and saw some of the lowest levels reported in 2021, possibly due to the recent care and maintenance status of the facility and improvements to effluent control practices over time. Levels of radionuclides have been relatively low over time and again some 2021 parameters were the lowest recorded since the inception of the monitoring program.

CNSC staff concluded that the level of airborne particulate contaminants produced by the MRO is acceptable and does not pose a risk to lichen consumers such as caribou.

Key Lake Operation

During the current licensing period, terrestrial monitoring data were collected in 2013, 2016 and 2021.

Soil Monitoring

Results from soil samples collected show that concentrations in soil metal parameters were below available [Canadian Environmental Quality Guidelines](#) for residential/parkland land use. These results are provided in CNSC's [EPRR-KLO](#).

Radionuclide concentrations in soils were also low, near or at background levels and analytical detection limits. CNSC staff found that the concentrations of constituents of potential concern in soil surrounding the KLO are acceptable and do not pose a risk to ecological receptors in the vicinity of the facility.

Lichen Monitoring

As shown in the EPRR-KLO, similar to the MRO, levels of arsenic, nickel, and uranium in lichen around the KLO are generally declining with time and saw some of the lowest levels reported in 2021, possibly due to the recent care and maintenance status of the facility and improvements to effluent control practices over time. Levels of radionuclides have been relatively low over time and again some parameters in 2021 were the lowest recorded since the inception of the monitoring program. Results from the 2016 soil sampling program illustrate that licensed parameter concentrations at all stations were comparable to, or lower than, historical results, with the exception of lead-210 and polonium-210 which increased in 2016, but returned to lower levels during the 2021 sampling period.

CNSC staff concluded that the level of airborne particulate contaminants produced by the KLO is acceptable and does not pose a risk to lichen consumers such as caribou.

Surface water monitoring

McArthur River Operation

Surface water quality at the MRO is influenced by the use of freshwater from Toby Lake and the release of treated effluent and clean Shaft #3 water into the Read Creek drainage. Cameco conducts an extensive water quality monitoring program within the Read Creek drainage on a monthly or quarterly basis, which depending on the station may evaluate physical properties, nutrients, inorganic ions, metals, and radionuclides. Several monitoring stations have been established in the area to assess possible influence of the mining operations on water quality.

The location of each monitoring station and results of staff's assessment of the water quality are provided in the [EPRR-MRO](#), and summarized here. The MRO conducts a water quality monitoring program within the Read Creek drainage on a monthly or quarterly basis, depending on the station for physical properties, nutrients, inorganic ions, metals and radionuclides. Several monitoring stations have been established in the area to assess possible influence of the mining operations on water quality. Concentrations of uranium, molybdenum and selenium have been stable or decreasing over the previous 5 years, and other parameters have remained below [Saskatchewan Environmental Quality Guidelines](#).

Based on the review of Cameco's 2020 ERA and the results of the environmental monitoring program for the MRO, CNSC staff have found that the aquatic environment remains protected from radiological and hazardous releases from the MRO.

Key Lake Operation

Surface water quality at the KLO is influenced by 2 main activities: the release of treated mill effluent to the David Creek drainage and the release of treated dewatering effluent from the RO treatment plant to the McDonald Creek drainage. Cameco conducts an extensive water quality monitoring program for physical properties, nutrients, inorganic ions, metals, and radionuclides. Surface water monitoring sampling stations have been strategically placed along near- and mid-field points within both drainage areas ([EPRR-KLO](#)) to capture the potential influence of these discharges on the environment and to provide the necessary data for the completion of quantitative ERAs. Monitoring stations downstream of the confluence with the Wheeler River allow for the assessment of far-field influences within the Wheeler River drainage. Reference waterbodies are also monitored which includes David Creek, Wheeler River and Zimmer Lake. The water quality results are reported to the CNSC on a quarterly basis.

The results of CNSC staff's assessment of the water quality are provided in the EPRR-KLO and summarized here. Within the David Creek drainage, the station closest to the mill effluent discharge point has a gradual increase in uranium levels over the previous 5 years, although it should be noted the treated effluent quality remained well below the CNSC's interim objective of 0.1 mg/L throughout this period. Also, over the previous 5 years molybdenum and selenium have remained relatively constant and other parameters have remained below [Saskatchewan Environmental Quality Guidelines](#).

Within the McDonald Creek drainage, the main parameter of concern in dewatering is nickel. In 2021, the Horsefly Lake Outflow (station 1.2.1) annual average nickel concentration of 0.0431 mg/L was lower than the dewatering discharge (station 1.2) annual average nickel concentration (0.0487 mg/L) but exceeded the Saskatchewan Environmental Quality Guidelines of 0.025 mg/L. At various stations within the drainage there were some increases in aluminum, iron, manganese, nickel, uranium, sulphate, nitrate, total suspended solids, conductivity, and turbidity compared to the previous 4 years of data (EPRR-KLO). These parameters will continue to be monitored to identify any emerging trends. Overall, the small changes in concentrations within the McDonald Creek drainage reflect the low concentrations and changes in treated (reverse osmosis) dewatering well water discharged to Horsefly Lake over time.

The 2020 ERA identified that there is the potential that aquatic biota may be influenced from continued operation and long-term post-decommissioning loads at the KLO. Potential influences on the aquatic community are limited to the near-field exposure zone and the aquatic community further downstream in the Wheeler River drainage is expected to remain protected and not adversely influenced by KLO.

Environmental effects monitoring

Environmental effects monitoring at Saskatchewan uranium mines and mills is necessary to meet the requirements of the [MDMER](#) as well as any additional requirements from CNSC and SMOE.

Based on the 2020 ERAs for the MRO and KLO, the public, Indigenous Nations and communities and the environment remain protected. Based on CNSC staff's review of the ERAs, CNSC staff confirmed that the environment in the vicinity of the MRO and KLO remains protected.

CNSC Independent Environmental Monitoring Program

The CNSC implements its Independent Environmental Monitoring Program (IEMP) as an added measure of verification that Indigenous Nations and communities, the public and the environment around nuclear facilities are protected. It is separate from, but complementary to, the CNSC's ongoing compliance verification program. The IEMP involves taking samples from publicly accessible areas around licensed facilities and measuring and analyzing the amount of radiological (nuclear) and hazardous contaminant substances in those samples. In 2021, samples of surface water, fish (lake whitefish, white sucker, and northern pike), moose, Labrador tea and blueberries were collected in publicly accessible exposure and reference locations in the vicinity of the MRO and KLO.

Similar to previous IEMP campaigns in northern Saskatchewan, CNSC staff developed a sampling plan in consultation with interested Indigenous Nations and communities. CNSC staff consulted with the Ya'thi Néné Land and Resource Office, Métis Nation of Saskatchewan and English River First Nation. English River First Nation reviewed the draft sampling plan and provided suggestions, including sampling locations where traditional activities occur and species of interest, such as moose that they harvest near the sites. CNSC staff incorporated their suggestions in the final sampling plan, and English River First Nation provided the moose samples which were included in this sampling campaign. Figure 3.7 shows moose harvesting at English River First Nation's Culture Camp (located south of the KLO).

Figure 3.7: Moose Harvesting at English River First Nation Culture Camp, 2021



Source: CNSC

Similar to previous IEMP campaigns in northern Saskatchewan, CNSC staff contracted CanNorth Environmental Services, an Indigenous-owned northern Saskatchewan contractor, to collect the samples. The samples were analyzed for radionuclides, including radium-226, thorium-230, polonium-210, lead-210, and hazardous substances including arsenic, copper, lead, molybdenum, nickel, selenium, uranium, and zinc. These parameters were chosen because they had the most regulatory and public interest based on operations at the MRO and KLO. The samples were analyzed by an accredited laboratory.

The results are posted on the CNSC's [IEMP](#) web page and a IEMP brochure with the results was created and shared with interested Indigenous Nations and communities. The IEMP results from 2021 and 2014 (last IEMP campaign) are consistent with the results submitted by Cameco, supporting CNSC staff's assessment that Cameco's environmental protection programs are effective. The results add to the body of evidence that people and the environment in the vicinity of both the MRO and KLO are protected and that there are no anticipated health impacts from these operations.

Protection of people

Cameco is required to demonstrate that the health and safety of the public and Indigenous Nations and communities are protected from exposures to hazardous and nuclear substances released from the MRO and KLO. The effluent and environmental monitoring programs currently conducted by Cameco at the MRO and KLO are used to confirm that releases of hazardous substances do not result in environmental concentrations that may affect public health.

CNSC receives reports of discharges to the environment through the reporting requirements outlined in the MRO and KLO LCHs. CNSC staff's review of discharges to the environment confirmed that these releases are below regulatory limits and are within those predicted in the environmental assessments and environmental risk assessments, which concluded negligible risks to the environment, the public and Indigenous Nations and communities.

Estimated dose to the public

Radiological releases to the environment are controlled and monitored by the effluent and emissions control, and the environmental monitoring programs. The [RPR](#) require licensees to implement an RP program for the protection of the public. The focus for RP within the environmental protection framework is on radiological protection of the environment and the public.

The [RPR](#) define prescribed dose limits for workers and members of the public, and require doses to be monitored by direct measurement or by estimation of the quantities and concentrations of any nuclear substance released as a result of a proposed activity.

Licensees must meet the requirements of the [NSCA](#) and the regulations for radiological protection of workers and members of the public. Accordingly, a human health risk assessment is completed for radioactive and hazardous substances. Cameco completed human health risk assessments in 2020 for the MRO and KLO. The predicted maximum incremental dose resulting from KLO was 0.49 mSv per year for a camp worker. The predicted maximum incremental dose resulting from the MRO was 0.18 mSv per year for a camp worker. The majority of the incremental radiation dose for both of these camp workers comes from radon exposure. CNSC staff reviewed Cameco's assessment and concluded that public doses for all receptors are well below the annual public dose limit of 1 mSv.

Environmental risk assessment

Cameco submitted an Environmental Risk Assessment (ERA) in 2020 for both the MRO [11] and KLO [12] as per CSA standard N288.6-12, *Environmental risk assessment at class I nuclear facilities and uranium mines and mills* [15]. CNSC staff reviewed the ERAs and determined that they were in compliance with this standard. Summaries of these documents are posted on [Cameco's licence renewal webpage](#). The ERA's considered Indigenous users/usage of the area when evaluating potential impacts to human receptors, including trappers, seasonal residents and permanent residents (post-decommissioning) in the areas surrounding the operations. Dietary information from the local Indigenous community, as well as specific information from a trapper in the area, was also used to calculate country food consumption rates.

McArthur River Operation

As part of the ERA, Cameco completed a human health risk assessment which evaluated numerous human receptors (including workers, and families using the area in various ways, such as hunting and fishing) and found that human exposure to radionuclides and hazardous substances are not expected to pose a risk to human health under the assessed project scenario. This evaluation included exposure to radionuclides, non-carcinogens as well as carcinogens. The contributions from the operation do not add significantly to the overall exposure; thus, no adverse effects are expected due to the releases from the MRO.

Overall, the results of the 2020 ERA are consistent with previously approved ERAs and demonstrate that the environment and human health in the vicinity of the operation remain protected. This conclusion is consistent with the conclusions of the environmental impact statements and risk assessments that describe the site licensing basis for the MRO. CNSC staff have accepted the conclusions from the 2020 ERA.

Key Lake Operation

As part of the ERA, Cameco completed a human health risk assessment which evaluated numerous human receptors (including workers, and families using the area in various ways, such as hunting and fishing) and found that human exposure to radionuclides and hazardous substances are not expected to pose a risk to human health under the assessed project scenario. This evaluation included exposure to radionuclides, non-carcinogens as well as carcinogens.

Overall, the results of the 2020 ERA are consistent with previously approved ERAs and demonstrate that the environment and human health in the vicinity of the operation remain protected. This conclusion is consistent with the conclusions of the environmental impact statements and risk assessments that describe the site licensing basis for the KLO. CNSC staff have accepted the conclusions from the 2020 ERA.

3.9.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.9.3.1 Past Performance

Cameco has developed, implemented and maintained an effective environmental protection program at the MRO and KLO that protects the environment and the public in accordance with CNSC regulatory requirements. During the current licensing period, monitored releases to the environment were generally well below licence limits specified in the CNSC LCH and in the provincial approvals. CNSC staff monitor implementation of the environmental protection program through compliance verification activities. CNSC staff rate Cameco's overall performance at the MRO and KLO for this SCA as satisfactory for the current licence period.

3.9.3.2 Regulatory Focus

CNSC staff will continue to monitor performance in this area through regulatory oversight activities, inspections, and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA. CNSC staff conducted 1 and 2 focused inspections at the MRO and KLO, respectively. In addition, environmental protection criteria were included in 15 and 18 general inspections at the MRO and KLO, respectively during the current licence term. All findings were of low safety significance and have been adequately addressed.

The results of these inspections allowed CNSC staff to conclude that Cameco's implementation of the environmental protection programs at the MRO and KLO meets CNSC's regulatory requirements and expectations. This includes monitoring treated effluent and environmental monitoring results to confirm that the environment remains protected as Cameco continues to transition back to normal operation at both the MRO and KLO after the care and maintenance period.

3.9.3.3 Proposed Improvements

In March 2021 the CNSC issued REGDOC-2.9.2, *Controlling Releases to the Environment* in draft form for public consultation. This document, sets out the CNSC's requirements and guidance for controlling releases to the environment, through:

- applying the concept of best available technology and techniques, economically achievable
- establishing and implementing licensed release limits and action levels for releases to the environment
- commissioning a treatment system and confirming performance
- implementing adaptive management where required

This draft regulatory document was presented to the Commission in September 2022, and as an outcome, the Commission has directed CNSC staff to undertake further consultation with parties who may be impacted by the regulatory document if published. CNSC staff are undertaking this consultation and expect to return before the Commission in mid-2023. After this regulatory document is finalized, and subject to approval by the Commission, it is expected that Cameco will implement the document during the proposed licence term. This may lead to the creation and implementation of site-specific release limits for certain constituents of potential concern at each of MRO and KLO.

CNSC staff, as part of on-going compliance activities, will review any proposed modifications to Cameco's environmental management program documentation to ensure effective implementation with updates to CSA Group standards and CNSC's regulatory framework.

3.9.4 Conclusion

Cameco has implemented and maintained environmental protection programs for both the MRO and KLO that adequately protect the environment and the public in accordance with regulatory requirements. No adverse effects are expected on human health during operation.

Cameco's environmental protection program at the MRO and KLO continues to be effective in protecting the environment and minimizing adverse impacts to human health. Summaries of Cameco's environmental protection programs at the MRO and KLO are provided on Cameco's [licence renewal webpage](#). As documented in the applicable [EPRR-MRO](#) and [EPRR-KLO](#), CNSC staff have found that the potential risks from radiological and hazardous releases to the atmospheric, aquatic, terrestrial and human environments from the operations are low to negligible. The potential risks to the environment from these releases are similar to natural background, and the potential risks to humans health are indistinguishable to health outcomes in similar northern Saskatchewan communities. CNSC staff have found that Cameco has and will continue to implement and maintain effective environmental protection measures to adequately protect the environment and the health and safety of persons.

3.10 Emergency Management and Fire Protection

The emergency management and fire protection SCA covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions.

This SCA also includes the requirement for Cameco's MRO and KLO to each have a comprehensive fire protection program to minimize the risk to the health and safety of persons and to the environment from fire; through appropriate fire protection system design, fire safety analysis, fire safe operation and fire prevention.

The specific areas that comprise this SCA at the MRO and KLO and addressed individually in this document are:

- emergency preparedness and response
- fire protection

3.10.1 Trends

The following table indicates the overall rating trends for the emergency management and fire protection SCA over the current licensing period:

TRENDS FOR EMERGENCY MANAGEMENT AND FIRE PROTECTION										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has acceptable emergency preparedness and response programs that meet CNSC regulatory and performance requirements at both the MRO and KLO. Cameco's fire protection programs are in place to minimize both the probability of occurrence and the consequences of fire and meets CNSC regulatory requirements.</p>										

3.10.2 Discussion

Emergency preparedness and response

Uranium mines and mills are required to have emergency plans in place for the protection of the health and safety of workers, the public and the environment. Cameco's emergency response program and emergency response plans contain the necessary guidelines and responsibilities for an MRO or KLO response should an emergency occur. The plan identifies the onsite emergency response organization members and their duties and responsibilities for responding to emergencies. The plan also specifies the required equipment to be used in responding to such emergencies, maintenance of equipment and detailed response procedures. The emergency response plan addresses both general emergency response and firefighting response procedures.

As required by the CNSC and also by [The Mines Regulations, 2018](#), administered by [Saskatchewan Ministry of Labour Relations and Workplace Safety](#), Cameco must train emergency response team (ERT) members. Cameco utilizes classroom and field training as well as drills and exercises to ensure the preparedness of licensee personnel and the ERT and mine rescue team. The knowledge and performance for the ERTs are tested during planned emergency exercises. Ongoing field training includes drills and exercises to ensure the preparedness of site personnel. To test specific skills, the teams are mobilized for events such as medical emergencies and transportation of ill or injured personnel, rescue drills, fire drills with search and rescue, ventilation and fire suppression activities. As well, Cameco's teams train for, and regularly compete in, emergency mine rescue and industrial fire and response competitions.

CNSC staff verified Cameco's implementation of its emergency response program at the MRO and KLO in accordance with CNSC regulatory requirements through inspections and desktop reviews during the current licence period.

Fire protection

Cameco has fire protection programs in place at the MRO and KLO to minimize the probability of occurrence and the consequences of fire at the facility. The program has been established to comply with the requirements of the [National Building Code of Canada](#) and the [National Fire Code of Canada](#), subject to exclusions and/or amendments, as contained in Saskatchewan's [Codes Adoption 2015](#).

Cameco maintains a fire safety plan (FSP) at the MRO and KLO that describes the facilities, systems, activities and training designed to prevent the outbreak of fire, to protect the health and safety of all persons and to minimize the loss of property in the event of a fire. The FSP is a province of Saskatchewan requirement of the [Occupational Health and Safety Regulations](#) and the [National Fire Code of Canada](#). The province administers fire protection requirements in accordance with [The Mines Regulations, 2018](#) that provides specific requirements applicable to mines including underground workings.

The FSP provides information on specific responsibilities, emergency instructions in the event of a fire, training provided to personnel during orientation, fire protection inspections, execution of fire drills, description of how fire hazards are controlled and descriptions of specific fire hazards at the site. The FSP is reviewed annually at a minimum.

The maintenance, tests and inspections performed on the fire protection system at the MRO and KLO are designed to meet the requirements of the [National Building Code of Canada](#) and the [National Fire Code of Canada](#), applicable [National Fire Protection Association](#) standards, provincial regulations and [Occupational Health and Safety Assessment Series \(OHSAS\):18001](#) standards. Cameco utilizes a third-party consultant to review proposed projects with potential impact to fire protection. The third-party consultant evaluates the proposed change(s), assesses its potential fire hazards, appropriate fire protection system and features used to mitigate the fire hazards. These third-party reports were submitted to and reviewed by CNSC staff.

The objective of the fire hazard assessment (FHA) is to demonstrate that a comprehensive assessment has been made of the potential fires and that its impacts on people, equipment, buildings and the environment are within acceptable limits. This was accomplished by demonstrating that the fire protection objective for a facility, as defined by the CNSC, can be met under foreseeable fire events.

As required by CNSC staff, an FHA was initiated in 2009 at the MRO by a third-party consultant for buildings at the site. Following an inspection, additional assessment work was completed in 2011 and an updated FHA was submitted [21].

As required by CNSC staff, an FHA was initiated in 2010 at the KLO by a third-party consultant for buildings at the site. At the request of CNSC staff, additional assessment work was completed in 2011 and the consultant submitted an FHA report in 2012 [22]. The report was reviewed by CNSC staff and found to be acceptable.

Cameco arranged for updated FHAs to be conducted by a third-party consultant at both the MRO and KLO in 2020 and the reports were prepared in 2021.

3.10.3 Summary

A summary of the licensee's past performance, challenges and proposed improvements are presented in the following subsections.

3.10.3.1 Past Performance

Emergency preparedness program

Based on CNSC staff's desktop reviews and inspections, CNSC staff concluded that Cameco's emergency preparedness program continues to be satisfactory at the MRO and KLO. Cameco continues to improve its emergency preparedness and response program, including implementing lessons learned from exercises and drills. In addition, CNSC staff performed an emergency preparedness inspection during an exercise at the KLO in September 2022. CNSC staff concluded that KLO personnel demonstrated the ability to adequately respond to an emergency while ensuring the safety and protection of onsite personnel, the public and the environment.

Fire protection program

Cameco's MRO and KLO have acceptable fire protection programs in place to minimize both the probability of occurrence and the consequences of fire. The contents of the fire protection programs contain elements that would be expected for a mine/mill facility and comply with the requirements of the [National Building Code of Canada](#) and the [National Fire Code of Canada](#), subject to exclusions and/or amendments, as contained in Saskatchewan's [Codes Adoption 2015](#).

In conclusion, Cameco's fire protection programs and their implementation at the MRO and KLO continue to meet regulatory requirements.

3.10.3.2 Regulatory Focus

CNSC staff completed 2 focused emergency management and fire protection inspections at each of the MRO and KLO during the licence term. Emergency management and fire protection criteria was also included in 5 and 8 general inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term. All non-compliances identified were of low safety significance and have been adequately addressed.

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

[Saskatchewan Ministry of Labour Relations and Workplace Safety](#), under its agreement with Employment and Social Development Canada and the CNSC, also conduct regular compliance inspections including fire protection. Inspection reports are shared between the CNSC and Saskatchewan Ministry of Labour Relations and Workplace Safety.

3.10.3.3 Proposed Improvements

During the current licence term, Cameco was requested by CNSC staff to submit a gap analysis and implementation plan for CSA standard N393, *Fire protection for facilities that process, handle, or store nuclear substances* [23] by May 31, 2022. Cameco submitted the requested analysis and implementation plan. CNSC staff reviewed Cameco's response and are satisfied with its gap analysis and the proposed implementation timeline.

For the proposed licence term, CNSC staff added CSA N393 as compliance verification criteria to the draft LCH for the MRO and KLO with requirement that Cameco implement the standard by December 31, 2023. In the current LCHs, CSA N393 is listed as guidance only. CNSC staff will continue to monitor implementation through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting on this matter.

3.10.4 Conclusion

As part of the licence renewal application, revised emergency preparedness and fire protection program documents and associated procedures were submitted by Cameco to demonstrate continued compliance with applicable regulatory requirements. CNSC staff performed a desktop review of the documents. Cameco addressed CNSC staff comments satisfactorily and in a timely manner.

Based on desktop reviews and inspections, CNSC staff concluded the overall performance for this SCA is satisfactory and that Cameco is qualified to carry out the authorized activities at the MRO and KLO in this SCA.

3.11 Waste Management

The waste management SCA covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility or placed into long-term storage on site. This area also covers the planning for decommissioning.

The specific areas that comprise this SCA addressed individually in this document are:

- waste management facilities
- solid and liquid wastes
- decommissioning plans

3.11.1 Trends

The following table indicates the overall rating trends for the waste management SCA over the current licensing period:

TRENDS FOR WASTE MANAGEMENT										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco's programs are adequate for the management of domestic, industrial and chemically/radiologically contaminated waste at both the MRO and KLO. CNSC staff monitor Cameco's implementation of this program through compliance verification activities.</p> <p>Cameco's MRO and KLO each have a valid preliminary decommissioning plan in place, which have been accepted by CNSC staff and the financial guarantees have been accepted by the Commission.</p> <p>CNSC staff are satisfied with Cameco's waste management program and its implementation.</p>										

3.11.2 Discussion

The CNSC requires the licensees of uranium mines and mills to have in place a waste management program which covers the generation, transport, handling, processing, storing, or disposing of the wastes that are produced as a result of licensed activities. The CNSC requires Cameco to take all reasonable precautions for the safe management of waste to protect workers and the environment and to control releases of nuclear and hazardous substances.

Cameco has implemented waste management programs to effectively control wastes generated and stored at the MRO and KLO. The objectives of these programs are to minimize the generation of waste at the facility and dispose of wastes and by-products generated in accordance with CNSC regulatory requirements. The MRO and KLO waste management programs referenced in the respective LCHs describe how waste is managed throughout its lifecycle to the point of disposal. This includes waste generation, storage, processing, recycling and removal/transfer activities.

Waste Management Facilities

Waste management facilities at the MRO include the following:

- storage areas for mineralized and potentially acid-generating waste rock
- clean waste rock and overburden piles
- contaminated industrial waste storage

- storage and recycling facilities for hazardous wastes
- landfill for uncontaminated industrial and domestic waste
- domestic sewage treatment

Waste management facilities at the KLO include the following:

- Deilmann special waste pad
- Gaertner special waste pad
- Gaertner, Deilmann North, and Deilmann South waste rock piles
- ore/cobble ore and mineralized waste pads
- Gaertner Pond
- water treatment plants-dewatering collection, reverse osmosis treatment and discharge, contaminated water handling and storage, mill effluent treatment and discharge
- tailings preparation circuit and Deilmann tailings management facility
- above ground tailings management facility with contaminated waste disposal
- hazardous substance or waste dangerous goods storage facilities
- site run-off containment systems and ponds
- contaminated industrial waste storage
- storage and recycling facilities for hazardous wastes
- landfill for uncontaminated industrial and domestic waste
- domestic sewage treatment

McArthur River Operation

MRO continues to transport mineralized waste rock to the KLO for processing in the mill. Clean rock, mineralized waste rock and potentially acid generating rock are stored at the MRO. Mineralized waste rock is temporarily stored on lined storage pads with leak detection systems. MRO also has areas where potentially acid generating rock is stored. Potentially acid-generating material is used onsite in concrete production.

As part of the licence renewal application, Cameco submitted its revised waste management program, CNSC staff reviewed the program against CNSC requirements and found it to be acceptable.

Key Lake Operation

Open Pits

Both the Gaertner and Deilmann open pits were mined using standard open pit methods. The Gaertner Pit was mined out in 1987, while mining of the Deilmann Pit was completed in 1997.

Gaertner Pit

Completion of mining of the Gaertner Pit occurred in 1987. In 1998, previously segregated nickel-rich waste rock (nickel concentration > 200 ppm) was removed from the Deilmann North Waste Rock Pile and placed in the Gaertner Pit. The purpose of this process was to inhibit oxidation of the waste rock once the pit was flooded, which commenced in 1998.

Partial diversion of the Deilmann Pit dewatering water to the Gaertner Pit began in 2001 in order to maintain a minimum water level in the Gaertner Pit. This diversion is not only useful in controlling the water level in the Deilmann Tailings Management Facility (DTMF), but it also stabilizes the quality of raw water fed to the RO plant.

Hydraulic containment at Gaertner Pit is achieved by maintaining the water level in the pond below the natural groundwater elevation and below the surrounding lake elevations.

Ore and waste rock management

Currently, low grade ore and mineralized waste rock (i.e., low-grade mineralized material) and high-grade ore slurry from the MRO are transferred to the KLO for milling and for use as blend material, respectively, to adjust mill feed to the targeted grade.

Deilmann Special Waste Pad

The Deilmann Special Waste Pad is a waste management facility which was constructed in 1998 for the storage of special waste from the development and mining of the Deilmann Pit. The special waste is utilized as a blend material with MRO high-grade ore slurry.

The inventory of special waste is reduced through its use as blending material in the milling process during operation of the mill. It is anticipated that all of this waste rock will be removed and consumed as blend material in the KLO mill before the KLO is decommissioned.

Gaertner Special Waste Pad

The Gaertner Special Waste Pad is a waste management facility constructed in 1982 for the storage of special waste resulting from past development and mining of the Gaertner Pit.

The current inventory on the Gaertner Special Waste Pad is being reduced through its use as blend material in the milling process and by relocating boulders. It is anticipated that all this waste rock will be removed and consumed as blend material prior to KLO being decommissioned.

Gaertner Waste Rock Pile

The Gaertner Waste Rock Pile is located immediately south of the Gaertner Pit and was constructed during the Gaertner mining period (1981 to 1987). The Gaertner Waste Rock Pile was not designed or constructed with containment facilities as clean waste rock was and is considered to represent negligible risk to the environment as it contains background levels of metals and radionuclides.

Deilmann Waste Rock Piles

The Deilmann North Waste Rock Pile and Deilmann South Waste Rock pile are situated near the Deilmann Pit. The piles were created during the overburden removal and mining of the Deilmann Pit. The waste rock piles were not designed or constructed with containment facilities it was considered to represent negligible risk to the environment.

Ore Pad and Mineralized Material Pad

The ore storage facility was constructed next to the crushing and grinding plant in 1982 to store ore originating from the mining operations.

Tailings Management Facilities

There are 2 tailings management facilities at the KLO: the Above Ground TMF (AGTMF) and the DTMF. The AGTMF is not currently used for tailings placement, although it was used for tailings placement during the mining phase at the KLO. Both facilities have been designed to minimize potential impacts to the environment. The AGTMF uses fully engineered components, such as seepage collection systems and bentonite amended containment liners, while the DTMF uses an existing open pit and a water management system to contain the tailings and seepage water.

Above Ground Tailings Management Facility

The AGTMF was constructed to full design capacity in 1982 and 1983. The AGTMF comprises an area of approximately 30 hectares (ha) within the containment berms at the base and 45 ha at the top. The design of the AGTMF included the installation of a bentonite amended soil liner and drainage collection system at the base of the facility (known collectively as the underdrain or seepage collection system) to capture tailings water and minimize seepage into the groundwater. There are currently no plans to use this facility for future tailings placement, however the facility is used for disposal of contaminated waste material.

Deilmann Tailings Management Facility

The Deilmann Pit was converted to a pervious-surround sub aerial tailings management facility in 1995. Seepage from the tailings is collected from the under-drainage system, comprised of a horizontal drift and vertical raise. The raise water is pumped through to the crushing and grinding circuit for use as process water and/or diverted to the DTMF water surface. The current approval allows deposition of tailings to a level that will result in consolidated tailings to elevation 505 metres above sea level at the end of decommissioning.

Solid and liquid waste generation and handling (MRO and KLO)

Industrial, radiologically contaminated, chemically contaminated, dangerous goods and domestic wastes are generated in liquid and solid forms at the MRO and KLO. Waste management systems have been implemented at the sites to track and control the appropriate disposition of contaminated and non-contaminated wastes. In August 2018, CNSC staff verified through an inspection that wastes are being disposed of in an appropriate manner in approved facilities.

Decommissioning plans

In accordance with paragraph 3(a)(viii) of the [UMMR](#) and the CNSC [REGDOC-2.1.2, Decommissioning](#), the CNSC requires Cameco to maintain decommissioning plans throughout the lifecycle of the MRO and KLO. The CNSC and SMOE staff work closely to ensure regulatory requirements are met. A Memorandum of Understanding with the province of Saskatchewan guides the nature of the cooperation between the parties [24]. The financial guarantees associated with the decommissioning plans must be reviewed and updated every 5 years, or if there are material changes to the licensee's operational activities. Although both the CNSC and SMOE require financial guarantees be established, in accordance with a Memorandum of Understanding between the agencies, SMOE holds the financial instruments associated with the financial guarantee for uranium mine and mill sites in Saskatchewan.

McArthur River Operation

To fulfill the 5-year update requirement, on January 19, 2018, Cameco submitted a revised Preliminary Decommissioning Plan (PDP), which included a preliminary decommissioning cost estimate [25] and a request to the CNSC to update its financial guarantee for the MRO. This request included a proposed revision to the value of Cameco's financial guarantee from C\$48.4 million to C\$42.1 million. The reduction in the financial guarantee was due to changes to the annual discount rate; removal of costs for the creation and submission of an additional Environmental Impact Statement prior to the beginning of decommissioning; and cost refinement based on experience at other facilities. The PDP sets out the strategy and the preliminary plan by which the MRO will be decommissioned in the future. The PDP must remain current to reflect any changes in the facility of operations, and meet the requirements of CSA standard N294, *Decommissioning of facilities containing nuclear substances* [26], and [CNSC Regulatory Guide G-219](#). A summary of the PDP and cost estimate is provided on Cameco's licence renewal [webpage](#).

The licensee's submitted plan was reviewed and assessed by CNSC staff in accordance with these documents and found to be acceptable. A CMD was created for consideration of the updated financial guarantee by the Commission, and the Commission [accepted](#) the financial guarantee on June 26, 2019.

On December 21, 2022, Cameco submitted an updated PDP and Preliminary Decommissioning Cost Estimate for the MRO to CNSC staff and SMOE staff for review. In addition to meeting the requirements of CSA N294, the submission must also meet the requirements of [REGDOC-2.1.2, *Decommissioning*](#), which was published in January 2021. The documents are currently undergoing review and should they be deemed acceptable by CNSC staff and SMOE staff, a CMD will be created for the Commission's consideration of the reviewed financial guarantee.

Key Lake Operation

To fulfill the 5-year update requirement, on October 11, 2019, Cameco submitted its PDP [27] and Preliminary Decommissioning Cost Estimate [28] and a request to the CNSC to update their financial guarantee for the KLO. This request included a proposed revision to the value of Cameco's financial guarantee from C\$218.3 million to C\$222.5 million, primarily to account for inflation. The PDP sets out the strategy and the preliminary plan by which the KLO will be decommissioned in the future. The PDP must remain current to reflect any changes in the facility or operations, and meet the requirements of CSA standard N294, *Decommissioning of facilities containing nuclear substances* [26], and [CNSC Regulatory Guide G-219](#). A summary of the [preliminary decommission plan and cost estimate](#) is provided on Cameco's licence renewal webpage. Relative to the MRO financial guarantee, the KLO financial guarantee is significantly higher due to costs associated with decommissioning the TMFs and larger waste rock piles.

The licensee's submitted plan was reviewed and assessed by CNSC staff in accordance with these documents and found to be acceptable. A CMD was created for consideration of the updated financial guarantee by the Commission and the Commission [accepted](#) the financial guarantee in July 2020.

On December 5, 2022, Cameco submitted an updated PDP and Preliminary Decommissioning Cost Estimate to CNSC staff and SMOE staff for review. Similar to the MRO, the documents are currently undergoing review. Staff will prepare separate CMDs for the Commission's consideration of any proposed revision of the existing financial guarantee for the KLO.

3.11.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.11.3.1 Past Performance

Through the review of waste management documentation and inspections during the licence period, CNSC staff concluded that Cameco's MRO and KLO waste management programs meet regulatory requirements.

For the current licence period, CNSC staff rated Cameco's overall performance for the waste management SCA as satisfactory for the MRO and KLO.

3.11.3.2 Regulatory Focus

CNSC staff completed 1 and 2 focused waste management inspections at the MRO and KLO, respectively during the current licence term. Waste management criteria was also included in 5 and 9 general inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term. All non-compliances identified were of low safety significance and have been adequately addressed.

CNSC staff will continue to monitor performance in this area through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

3.11.3.3 Proposed Improvements

There are no proposed improvements for this SCA.

For the proposed licence term, CNSC staff added the following regulatory documents as compliance verification criteria to the draft LCH for the MRO and KLO:

- [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#)
- [REGDOC-2.11.2, Decommissioning](#)
- [REGDOC-3.3.1, Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities.](#)

Cameco's submissions of financial guarantees are required to meet the respective requirements of REGDOC-3.3.1. Cameco's PDP and cost estimate submissions for the MRO and KLO, which are currently undergoing internal CNSC staff review, are being assessed against this regulatory document.

REGDOC-2.11.1 and REGDOC-2.11.2. have been added as compliance verification criteria to the draft LCH for the MRO and KLO. CNSC staff will continue to monitor implementation of these regulatory documents through regulatory oversight activities including inspections and desktop reviews of Cameco's compliance reporting on this matter.

3.11.4 Conclusion

Based on desktop reviews and inspections, CNSC staff have concluded that the overall performance for this SCA is satisfactory, and that Cameco is qualified to carry out the authorized activities at the MRO and KLO in this SCA.

3.12 Security

The security SCA covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.

The specific areas that comprise this SCA are not addressed individually in this document.

3.12.1 Trends

The following table indicates the overall rating trends for the security SCA over the current licensing period:

TRENDS FOR SECURITY										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has implemented security programs that meet regulatory requirements under the <i>General Nuclear Safety and Control Regulations</i> to prevent the loss or unauthorized removal of nuclear substances, radioactive sources, prescribed equipment or information at both the MRO and KLO. CNSC staff monitor Cameco's implementation of this program through compliance verification activities.</p> <p>CNSC staff are satisfied with Cameco's security program and its implementation.</p>										

3.12.2 Discussion

Pursuant to the [NSCA](#) and its regulations, Cameco is obligated to protect the environment, the health and safety of persons, and maintain security.

Cameco maintains a security program (technical and administrative) at the MRO and KLO in order to minimize risk to the public, employees, the environment and to protect company assets from sabotage, theft, criminal acts by internal or external agents and potential vulnerabilities.

Based on CNSC staff's review of Cameco's vulnerability at the MRO and KLO, the lack of past incidents involving theft and sabotage to the operation, the remote location of the operation, the percentage of long-term employees, and the lack of evidence of any threats to the operation, the security risk is considered low. There is no change to the security threat at the MRO and KLO and the security measures currently in place are adequate.

During the current licensing period, no theft of nuclear material from the MRO or KLO was reported. A physical inventory of all uranium material is conducted annually by an external auditor, and monthly by Cameco personnel. There is no history of sabotage or any evidence of intent of actual or planned sabotage threats conveyed to CNSC.

CNSC staff monitor implementation of this program through compliance verification activities. Two inspections conducted during the current licence period included criteria related to the security SCA. No non-compliances were identified related to this SCA.

CNSC staff concluded that the security measures are sufficient to address the current threat level.

3.12.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.12.3.1 Past Performance

Cameco's MRO and KLO have implemented security programs that meet regulatory requirements. CNSC staff monitor implementation of these programs through compliance verification activities.

During the current licence period, there have been no thefts or any evidence of malicious acts or planned sabotage against nuclear substances at the MRO or KLO.

3.12.3.2 Regulatory Focus

Cameco's MRO and KLO are required to meet the applicable requirements of sections 3 and 12 of the [GNSCR](#) and section 3(e) of the [UMMR](#). The regulations require reasonable measures and precautions be in place to: maintain site security; implement means for alerting the licensee in the event of illegal use, illegal removal, sabotage or attempted sabotage; and train workers on the security program at the licensed site.

CNSC's [REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material](#), Version 2.1, sets out the minimum security measures that must be implemented to prevent the loss, sabotage and illegal use, possession, or illegal removal of sealed sources during its entire lifecycle.

Due to the low risk associated with the MRO and KLO, a focused security inspection is not scheduled by CNSC staff. However, security criteria were included in 1 and 3 inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term. No non-compliances have been observed by staff.

3.12.3.3 Proposed Improvements

There are no proposed improvements or changes for this SCA.

3.12.4 Conclusion

CNSC staff assessed Cameco's documentation and analyses under the security SCA and have found it to be acceptable. CNSC staff concluded that the overall performance for this SCA is satisfactory, and that Cameco is qualified to carry out the authorized activities at the MRO and KLO in this SCA.

CNSC staff also concluded that Cameco has acceptable security programs in place at the MRO and KLO that meet regulatory requirements and make adequate provisions for the maintenance of national security.

CNSC staff will continue ongoing compliance activities and monitoring activities in the security area to verify that Cameco's security programs at the MRO and KLO, including its implementation, continue to meet regulatory requirements.

3.13 Safeguards and Non-Proliferation

The safeguards and non-proliferation SCA covers the programs and activities required for the successful implementation of the obligations arising from the Government of Canada and the [International Atomic Energy Agency \(IAEA\)](#) safeguards agreements as well as other measures arising from the [Treaty on the Non-Proliferation of Nuclear Weapons](#).

The scope of the non-proliferation program for this licensee is limited to the tracking and reporting of foreign obligations and origins of nuclear material. This tracking and reporting assists the CNSC in the implementation of Canada's bilateral Nuclear Cooperation Agreements with other countries. The import and export of controlled nuclear substances, equipment and information identified in the [Nuclear Non-proliferation Import and Export Control Regulations](#) require separate authorization from the CNSC, consistent with subsection 3(2) of the [GNSCR](#).

The specific areas that comprise this SCA are not addressed individually in this document.

3.13.1 Trends

The following table indicates the overall rating trends for the safeguards and non-proliferation SCA over the current licensing period:

TRENDS FOR SAFEGUARDS AND NON-PROLIFERATION										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco continues to implement and maintain effective programs for safeguards measures and nuclear non-proliferation commitments arising from Canada's international obligations under the <i>Treaty on the Non-Proliferation of Nuclear Weapons</i> at both the MRO and KLO.</p> <p>CNSC staff are satisfied with Cameco's programs for safeguard measures and meeting nuclear non-proliferation commitments.</p>										

3.13.2 Discussion

CNSC's regulatory mandate includes ensuring conformity with measures required to implement Canada's international obligations. Cameco has an effective safeguards program at the MRO and KLO that conforms to measures required by the CNSC to meet Canada's international safeguards obligations as well as other measures arising from the [Treaty on the Non-Proliferation of Nuclear Weapons](#).

Pursuant to that treaty, Canada has entered into a Comprehensive Safeguards Agreement and Additional Protocol with the IAEA (herein after, the safeguards agreements). The objective of the safeguards agreements is for the IAEA to provide annual assurance to Canada and to the international community that all declared nuclear material is in peaceful, non-explosive uses, and that there is no indication of undeclared nuclear material or activities.

The CNSC provides the mechanism, through the [NSCA](#), regulations and a licence condition, for the IAEA to implement the safeguards agreements at the MRO and KLO. Conditions for the application of IAEA safeguards are contained in the operating licence and criteria in order to meet the conditions contained in the LCH and in CNSC's [REGDOC-2.13.1, Safeguards and Nuclear Material Accountancy](#). Compliance includes the timely provision of reports on the movement and location of all nuclear materials; operational records, and access and assistance to IAEA inspectors for safeguards activities.

To comply with the safeguards agreements, Cameco's MRO and KLO ensure that:

- controlled nuclear substances exports or imports follow appropriate permitting and licensing
- operational records are maintained
- required information is provided and an annual update for the IAEA Additional Protocol is submitted to the CNSC.

The MRO and KLO have been subject to complementary access by the IAEA. In 2014, complementary access was conducted at the KLO from July 7 to 8, 2014. In 2019, complementary access at the MRO and KLO were conducted from August 26 to 27, 2019 and August 27 to 29, 2019, respectively. Assistance was provided by Cameco and CNSC staff to the IAEA to carry out the complementary access inspections. No issues were identified by the IAEA as part of these activities.

3.13.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.13.3.1 Past Performance

During the current licence period, Cameco provided CNSC staff with documentation required for the implementation of safeguards agreements.

Cameco's programs for safeguards and non-proliferation at the MRO and KLO continues to meet CNSC requirements and expectations.

3.13.3.2 Regulatory Focus

CNSC staff will continue to monitor performance through participation in IAEA activities and through CNSC regulatory oversight activities independent of the IAEA. Monitoring will include inspections and desktop reviews of Cameco's compliance with reporting and revisions to relevant program documentation pertaining to this SCA.

3.13.3.3 Proposed Improvements

There are no proposed improvements or changes for this SCA.

3.13.4 Conclusion

CNSC staff assessed the MRO and KLO documentation and performance under the safeguards and non-proliferation SCA and found it to be acceptable. CNSC staff concluded that the overall performance for this SCA is satisfactory, and that Cameco is qualified to carry out the authorized activities at the MRO and KLO in this SCA.

3.14 Packaging and Transport

The packaging and transport SCA covers programs for the safe packaging and transport of nuclear substances to and from the licensed facility. The specific areas that comprise this SCA at the MRO and KLO are not addressed individually in this document.

3.14.1 Trends

The following table indicates the overall rating trends for the packaging and transport SCA over the current licensing period:

TRENDS FOR PACKAGING AND TRANSPORT										
Overall Compliance Ratings										
Facility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MRO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KLO	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments										
<p>Cameco has packaging and transportation programs at both the MRO and KLO that ensure compliance with the <i>Packaging and Transport of Nuclear Substances Regulations, 2015</i>, and the <i>Transportation of Dangerous Goods Regulations</i>. CNSC staff monitor Cameco's implementation of these programs through compliance verification activities.</p> <p>CNSC staff have confirmed that the packaging and transport activities are conducted in a safe manner.</p>										

3.14.2 Discussion

Cameco has developed and implemented a packaging and transport program for activities at all Cameco operated sites to ensure compliance with the [Packaging and Transport of Nuclear Substances Regulations, 2015](#), and the [Transportation of Dangerous Goods Regulations](#) for all shipments to and from the site. Cameco's packaging and transport program also covers elements of package design and package maintenance as required by the regulations.

Uranium ore, in slurry form, is transported from Cameco's MRO to KLO for milling. Ore slurry transportation from the MRO to the KLO mill is the responsibility of the MRO. The requirements for radiation-related clearances of uranium ore slurry containers departing from MRO are described in the MRO RP program.

Ore slurry shipments from MRO began in 1999. These containers meet the regulatory requirements for industrial packages (Type IP-2) as defined in the *Packaging and Transport of Nuclear Substances Regulations, 2015*. The concentrate (commonly referred to as yellowcake) is transported in drums which meet the Type IP-1 packaging requirements in accordance with the *Packaging and Transport of Nuclear Substances Regulations, 2015* and are also labeled in with the information required by these regulations.

In 2022 the system used to load drums at the KLO facility was upgraded and consisted of automating the existing packaging process in order to automatically de-stack drums, fill drums with yellowcake, lid and clean the drums, complete final weighing, and apply the necessary labelling. A new dust collection and filtration system was also constructed.

During the licence term, minor packaging and transport incidents involving ore slurry totes slightly exceeding surface contamination limits were reported by Cameco. None of the incidents resulted in health or radiological effects, or releases to the environment. Corrective actions were taken by the licensee to CNSC staff's satisfaction.

In support of the licence renewal, Cameco submitted documents related to the packaging and transportation SCA for CNSC staff's review. CNSC staff concluded that Cameco's packaging and transportation documents meet applicable regulatory requirements.

3.14.3 Summary

A summary of Cameco's past performance, challenges and proposed improvements are presented in the following subsections.

3.14.3.1 Past Performance

Cameco is performing satisfactorily in the packaging and transport SCA at the MRO and KLO and continues to demonstrate compliance with the [Packaging and Transport of Nuclear Substances Regulations, 2015](#) and the [Transportation of Dangerous Goods Regulations](#). For the current licence period, CNSC staff rated Cameco's overall performance for the packaging and transport SCA as satisfactory.

3.14.3.2 Regulatory Focus

There was 1 focused inspection of the packaging and transport program by CNSC staff at each of the MRO and KLO during the current licence term. Cameco was found to be in compliance with the inspection criteria. CNSC staff concluded that the packaging and transport program and associated procedures complied with regulatory requirements. Packaging and transport criteria were also included in 4 and 2 inspections conducted by CNSC staff at the MRO and KLO, respectively during the current licence term. All non-compliances identified were of low safety significance and have been adequately addressed.

CNSC staff will continue to monitor performance in this area including Cameco's commitment of continual improvement for the packaging and transport system through regulatory oversight activities. Monitoring includes inspections and desktop reviews of Cameco's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

3.14.3.3 Proposed Improvements

There are no proposed improvements for this SCA.

3.14.4 Conclusion

CNSC staff concluded that Cameco has an effective program for the safe packaging and transport of radioactive materials at the MRO and KLO that meet regulatory requirements. CNSC staff rate this SCA as satisfactory.

4. Indigenous and Public Consultation and Engagement

4.1 Indigenous Consultation and Engagement

The common-law duty to consult with Indigenous peoples applies when the Crown contemplates actions that may adversely affect potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licence decisions under the [Nuclear Safety and Control Act](#) (NSCA) uphold the honour of the Crown and consider Indigenous peoples' potential or established Indigenous and/or treaty rights pursuant to section 35 of the [Constitution Act, 1982](#).

CNSC staff are committed to building long-term relationships with Indigenous Nations and communities who have interest in CNSC-regulated facilities within their traditional and/or treaty territories. The CNSC's Indigenous engagement practices include but are not limited to sharing of information, discussing topics of interest, community tours, seeking feedback and input from leadership on CNSC regulatory processes, and providing opportunities to participate in environmental monitoring in the region. The CNSC also provides funding support (through the CNSC's Participant Funding Program) for Indigenous peoples to meaningfully participate in Commission proceedings and ongoing regulatory activities.

4.1.1 Discussion

CNSC staff have identified the Indigenous Nations and communities which may have an interest in the proposed licence renewal of Cameco's MRO and KLO:

- English River First Nation
- Kineepik Métis Local #9
- Lac La Ronge Indian Band
- Ya'thi Néné Land and Resource Office (representing Black Lake, Hatchet Lake, and Fond du Lac Denesūliné First Nations as well as the municipalities of Stony Rapids, Uranium City, Wollaston Lake, and Camsell Portage).
- Black Lake, Hatchet Lake, and Fond du Lac Denesūliné First Nations
- Métis Nation Saskatchewan (Northern Region 1)
- Prince Albert Grand Council

In addition, the [Northern Saskatchewan Environmental Quality Committee](#) (NSEQC) was identified as potentially having an interest in these licence renewals. The NSEQC has representatives from the majority of the northern municipal and First Nation communities located in the Northern Saskatchewan Administration District.

These Indigenous Nations and communities, and organizations were identified because they all have previously expressed interest in being kept informed of CNSC-licensed uranium mine and mill sites in their treaty lands and/or asserted traditional territories. CNSC staff have been engaging with all of the identified Indigenous Nations, communities and organizations concerning the MRO and KLO on an ongoing basis since the last licence renewals for the MRO and KLO sites in 2013. CNSC staff received Cameco's applications for a licence renewal for the [MRO](#) [1] and [KLO](#) [2] in April of 2021. CNSC staff began communication and engagement activities, including in-person meetings with the identified Indigenous Nations in May 2021 with regards to Cameco's indefinite licence applications.

On September 15, 2022, CNSC staff hosted Indigenous Nations and communities at a hybrid engagement session in Saskatoon on the [Regulatory Oversight Report for Uranium Mines and Mills in Canada: 2021](#) and to provide an update on the status and performance of the operating uranium mines and mills, including the MRO and KLO operations, and other topics of interest to the Indigenous Nations and communities in northern Saskatchewan. CNSC staff presented information and answered questions on upcoming hearings taking place in 2023, including Cameco's MRO and KLO licence renewals, requests for longer licensing periods, as well as various other topics. At this engagement session, CNSC staff heard from a number of representatives from Indigenous Nations and communities that they had serious concerns with regards to Cameco's request that the licences for the MRO and KLO be renewed for an indefinite term. CNSC staff shared their position and approach to consultation and engagement on these upcoming licence applications and that CNSC staff would not be supporting an indefinite licence term that was being proposed. At the meeting CNSC staff were asked to share their position on the [United Nations Declaration of the Rights of Indigenous Peoples](#), specifically the interpretation of free, prior and informed consent, in regards to longer licence terms and its interplay with CNSC's work. CNSC staff committed to following up with each of the Indigenous Nations and communities in attendance on this which led to a written letter and response on our position [29]. CNSC staff also offered to arrange additional meetings and discussions with Indigenous leadership to further discuss their concerns and ensure that this information is shared with proponents and submitted to the Commission to help inform the decision-making process.

CNSC staff sent letters of notification on September 26, 2022, to all of the Indigenous Nations and communities identified above, providing information regarding the proposed licence renewal application, the availability of participant funding to facilitate participation in the hearing process, and details on how to participate in the Commission's public hearing process proposed for June 2023.

CNSC staff followed up with the identified Indigenous Nations and communities to ensure they had received the letters and to answer any questions about the regulatory process and how to get involved in the Commission proceedings. Additional communication and updates on the regulatory process in relation to the MRO and KLO licence renewal applications were provided throughout the fall

and winter of 2022. This is in addition to the ongoing dialogue between CNSC staff and Indigenous Nations, communities and organizations on a number of topics of interest on an ongoing basis.

All of the identified Indigenous Nations, communities and organizations were encouraged to participate in the Commission's hearing process in order to advise the Commission directly of any concerns they may have in relation to this decision-making matter. In October of 2022, CNSC staff met in person with English River First Nation in Saskatoon and with the Hatchet Lake Denesuline First Nation leadership in Hatchet Lake where concerns regarding the length of licensing term were again raised with respect to the MRO and the KLO licence renewal applications. In addition, as discussed in greater detail in section 4.2.1, CNSC staff participated in a community tour along with Cameco which included visits to 8 Indigenous Nations and communities across northern Saskatchewan. As part of these community tours, CNSC staff listened to feedback, concerns and perspectives from leadership and community members regarding the licence renewal applications and answered questions related to the CNSC's regulatory oversight of the MRO and KLO sites, their performance and CNSC staff's assessment of the licence renewal applications.

Throughout these consultation and engagement activities, CNSC staff have consistently heard from representatives of Indigenous Nations and communities that there are concerns with Cameco potentially receiving licence terms longer than 10 years from the CNSC. This is due to Indigenous Nations and communities understanding that Commission hearings are an important mechanism to share their perspectives with the decision makers and thereby influence decisions on these sites which are in their treaty and traditional territories, and that the number of such opportunities and meaningful interactions with the Commission could be reduced with a longer licence term.

Indigenous Nations and communities expressed to CNSC staff that in general they support the presence of Cameco's operations in their territories, and few direct concerns were raised regarding the performance of MRO and KLO, but in general Indigenous Nations and communities indicated that they did not feel that there was enough trust between themselves, Cameco, and the CNSC, to create the right conditions for significantly longer licence terms at this time.

CNSC staff take these concerns seriously, and as part of our engagement efforts, these concerns helped to inform the CNSC's recommendations for 20-year licence renewal terms, as opposed to an indefinite licensing term as Cameco originally proposed. It also helped inform the requirements for mid-term updates to the Commission with interventions from the public and Indigenous Nations and communities, as well as the submission of an engagement report by Cameco. CNSC staff also offered to continue to develop long-term relationship arrangements with interested Nations and communities. In 2022, CNSC staff and the Ya'thi Néné Land and Resource Office signed a Terms of Reference for long-term engagement which commits the CNSC to engage and collaborate on a regular and ongoing basis throughout the lifecycle of these facilities.

Regarding concerns over the reduced number of Commission proceedings that could come with longer licensing terms, CNSC staff have proposed the requirement for Cameco to prepare and submit an engagement report as part of the mid-term update to the Commission at the 10-year mark, as described in section 5.5. CNSC staff are committed to meeting and continuing to listen to community concerns and address them where possible, and to continuing to provide information pertaining to the MRO and KLO licence renewal.

In addition to CNSC staff's direct engagement and efforts to hear concerns and look to reach consensus on issues raised, CNSC staff also encourage all Indigenous Nations and communities with an interest in MRO and KLO licence renewals to intervene in the Commission hearing, so that they can share their views with the Commission directly. The [uranium mines and mills ROR](#) is also an annual opportunity for Indigenous Nations and communities to get engaged and have their concerns and views heard by the Commission. Also, as noted in section 3.9.2, CNSC staff regularly engage with Indigenous Nations and communities on Independent Environmental Monitoring Program ([IEMP](#)) campaigns and will continue to do so.

CNSC's REGDOC-3.2.2, *Indigenous Engagement*, Version 1.1, published in August 2019, sets out requirements and guidance for licensees whose proposed projects may raise the Crown's duty to consult. While the CNSC cannot delegate its obligation, it can delegate procedural aspects of the consultation process to licensees, where appropriate. The information collected and measures proposed by licensees to avoid, mitigate or offset adverse impacts from the proposed licence renewal, may be used by CNSC staff in meeting its consultation obligations. Cameco's application for a CNSC licence renewal of its MRO and KLO does not raise the formal requirements of REGDOC-3.2.2. However, CNSC staff recognize that Cameco has a well-established engagement and communications program with interested Indigenous Nations and communities and are committed to keeping CNSC staff informed of their engagement activities and any issues raised by the identified Indigenous Nations, communities and organizations. CNSC staff encourage Cameco to continue engaging with these communities regarding their facilities and activities including the licence renewal applications. Cameco, following further consultation with Indigenous Nations and communities in the region, amended its renewal request from an indefinite term to a 20-year term.

To demonstrate engagement efforts conducted as part of the proposed licence renewals, Cameco agreed to use the guidance in REGDOC-3.2.2 to prepare an engagement report for CNSC staff. The engagement report will be included in Cameco's commission member document (CMD) submission.

4.1.2 Conclusion

As Cameco's licence renewal applications do not propose any changes to the facilities or its operations at either the MRO or KLO, CNSC staff concluded that a licence renewal for the MRO and KLO will likely not cause new adverse impacts to any potential or established Indigenous and/or treaty rights. The identified

Indigenous Nations and communities have been meaningfully consulted and engaged by both CNSC staff and Cameco with regards to the licence renewal applications. Their concerns have been clearly heard, documented and measures have been proposed to address them including a 20-year licence renewal term with a mid-term update to the Commission with interventions and funding opportunities. There will also be annual opportunities to engage with the Commission through the UMM ROR, as well as opportunities to continue developing and formalizing long-term relationships with the aim of building trust and collaboration with interested Indigenous Nations and communities, including monitoring and oversight activities as appropriate. In addition, the identified Nations and communities have been encouraged to apply for participant funding, engage their community members and leadership and participate in the Commission hearing, to advise the Commission directly of any concerns they may have in relation to the licence renewal applications. CNSC staff are committed to ongoing engagement and working with each Nation and community to address any ongoing concerns with regards to the licence renewal applications and the MRO and KLO sites and activities as appropriate.

4.2 CNSC Public Consultation and Engagement

The [NSCA](#) mandates the CNSC to disseminate objective scientific, technical and regulatory information to the public concerning its activities and the activities it regulates. CNSC staff fulfill this mandate in a variety of ways, including hosting in-person and virtual information sessions and through annual regulatory reports.

Public consultation and engagement activities were conducted by Cameco and CNSC staff in support of the licence renewals. However, because of travel restrictions resulting from the COVID-19 pandemic, outreach in 2020 and 2021 was conducted virtually. With health and safety measures implemented and restrictions reduced, in-person meetings, community tours and site tours of the MRO and the KLO resumed in 2022.

4.2.1 Discussion

As per its normal public notification process for Commission proceedings, CNSC staff informed the public via the CNSC's website, email subscription list and social media channels of the public Commission hearing and availability of participant funding. CNSC staff additionally informed Indigenous Nations and communities directly verbally, via email, and by phone.

The availability and clarity of information pertaining to nuclear activities is essential to establishing an atmosphere of openness, transparency and trust between the licensee and the public. Licensees have an important role to inform the public about their nuclear facility and activities. Since 2012, the CNSC requires major licensees to develop and implement a public information and disclosure program (PIDP) supported by a robust disclosure protocol that addresses local communities and stakeholders' needs, discussed fully in section 4.2.

CNSC staff annually report to the Commission and the public on the regulatory oversight of all the uranium mines and mills in northern Saskatchewan, including the MRO and KLO. The RORs for uranium mines and mills are provided on the [CNSC's website](#). The public has the opportunity to review, question and comment on the ROR and appear before the Commission. Through CNSC's Participant Funding Program (PFP), financial support was made available for participation in the review of this CMD.

As noted in section 4.1, engagement with Indigenous Nations, communities and organizations and is an ongoing process. CNSC staff engage with interested communities and their leadership. CNSC staff participated in various meetings and local community events to offer 2-way discussion, clarity and explanation of the regulatory process and scientific data to key audiences interested in the uranium mines and mills in northern Saskatchewan (figure 4.1 to figure 4.3). For example, CNSC and licensee staff continued to participate in [NSEQC](#) meetings and facility tours in 2022. The NSEQC represents over 30 communities throughout the greater northern Saskatchewan region. Established in 1995, the NSEQC enables Northerners to learn more about uranium mining activities and to see first-hand the environmental protection measures being employed. Scheduled meetings of the NSEQC occurred throughout the licence period. CNSC staff also participate in NSEQC meetings when requested.

Figure 4.1: CNSC session with Environmental Quality Committee members



Source: CNSC

In 2019, as a result of recommendations from the Commission, CNSC staff took an initiative to meet with Indigenous Nations, communities and organizations to provide information and seek opportunity for improvement on the ROR (figure 4.2). In 2020 and 2021 these outreach sessions took place virtually due to travel and gathering restrictions imposed by the COVID-19 pandemic. On September 15, 2022, an in-person session resumed with staff providing information related to the ROR, and other items, including the proposed licence renewals for the MRO and KLO. These information sessions are conducted prior to the ROR being presented at the Commission meetings in order to get early input and feedback. Individuals from Indigenous Nations and communities travelled to Saskatoon to participate in the CNSC's annual outreach activity and there were also participants who attended virtually.

**Figure 4.2: CNSC staff hybrid outreach, Saskatoon, Saskatchewan
September 2022**



Source: CNSC

During public engagement activities, the CNSC often staffs an information booth to provide important information on its regulatory role and mandate, as well as to answer any questions that community members may have. The CNSC is committed to keeping interested communities informed of regulatory activities occurring at the mines and mills and will continue to look for ways to enhance the involvement of interested Indigenous Nations, communities, and organizations in northern Saskatchewan.

Figure 4.3: CNSC information session, northern Saskatchewan community, 2022



Source: CNSC

With the easing of COVID-19 travel restrictions, Cameco conducted site tours with Indigenous Nations and communities. This included a site tour of the MRO on June 2, 2022, at which CNSC staff participated. Site tours at the KLO were conducted on September 21, 2022, and October 26, 2022. CNSC staff participated on the September 21, 2022, tour and were available to answer questions virtually during the October 26, 2022, tour.

A number of CNSC staff also participated in a series of community outreach events and meetings with Indigenous Nation leadership in November 2022 which were coordinated by Cameco. The tour included presentations by both CNSC and Cameco staff regarding the proposed licence renewals, followed by opportunities for questions and discussion. Two separate tours were conducted between November 21 to 23, 2022. The first tour included communities in closer proximity to the MRO and KLO and included meetings in Pinehouse, La Ronge and Patuanak. The second tour conducted as part of the Rabbit Lake licence renewal was focused on Athabasca communities and included meetings in Uranium City, Stony Rapids and Black Lake, Hatchet Lake and Fond du Lac Denesūliné First Nations. While geographic proximity can be a driver of community interest, CNSC and Cameco presentations included information on all 3 operations. At these meetings, CNSC staff provided information and answered questions on the proposed licence renewals, CNSC staff's evaluations of Cameco's performance, and on the CNSC's capacity to regulate potentially longer licence terms.

4.2.2 Conclusion

CNSC staff continued to inform the public of our regulatory activities through regular website updates, local magazine updates, publicly webcast Commission proceedings, social media and regular face-to-face discussion with key audiences in northern Saskatchewan.

CNSC staff encourage the public to participate in the Commission's public hearing. The CNSC offered assistance to interested members of the public, Indigenous Nations and communities, and other stakeholders, through the PFP, to prepare for and participate in the Commission's public hearing.

4.3 Licensee Public Information and Engagement

A public information and disclosure program (PIDP) is a regulatory requirement for licence applicants and licensees of Class I nuclear facilities, uranium mines and mills and certain Class II nuclear facilities. These requirements are found in [REGDOC-3.2.1, Public Information and Disclosure](#).

The primary goal of the PIDP is to ensure that information related to the health, safety and security of persons and the environment, and other issues associated with the lifecycle of nuclear facilities, are effectively communicated to the public. The program must include a commitment to, and protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

CNSC's expectations of a licensee's public information program and disclosure protocol are commensurate with the level of risk of the facility, as well as the level of public interest in the licensed activities. The program and protocol may be further influenced by the complexity of the nuclear facility's lifecycle and activities, and the risks to public health and safety and the environment perceived to be associated with the facility and activities.

4.3.1 Discussion

Cameco's MRO and KLO are required under their respective licences to maintain PIDPs as per CNSC's [REGDOC-3.2.1](#).

CNSC staff have reviewed MRO and KLO's respective PIDPs and determined that they each:

- identify clear goals and objectives in terms of dissemination of information to the Athabasca Basin Communities, the Northern Administrative District and the province of Saskatchewan
- are available to the public and is posted on the licensee's website
- provide information on the facilities requiring a CNSC licence for nuclear related activities.

Cameco provides this information in a variety of ways including:

- community information sessions, facility tours, technical briefings, social media, and its website
- targeting multiple audiences including the impacted communities as well as the broader regions
- providing contact information for those who want to obtain additional information.

All licensees have faced many challenges due to the COVID-19 pandemic and had to adapt their public information programs accordingly. This included moving away from traditional in-person meetings and events and offering increased digital communications whenever possible. Cameco completed this for the MRO and KLO during the COVID-19 pandemic, and in 2022 resumed in-person meetings, tours, etc.

4.3.2 Improvements to PIDP during the Current Licence Period

Cameco continues to conduct public opinion surveys, to help gain insight into specific community interests based on the geographical distribution of the population of northern Saskatchewan. The data collected serves as a baseline to identify topical areas of interest among the distributed population and to support incorporating modern communication practices. Communication products are created and distributed to local areas with the information of interest to the audience, helping solidify Cameco's relationships and openness among its multiple key audiences.

Social media has evolved significantly during the current licence period and Cameco has increased its online presence. As identified by their target audience polling, using a variety of social media platforms is beneficial to communicate directly to some primary audiences. Cameco uses these online tools to share information and monitor its public environment.

4.3.3 Conclusion

CNSC staff concluded that Cameco's PIDPs for the MRO and KLO meets the regulatory requirements for public information and disclosure. CNSC staff continue to oversee Cameco's implementation of the PIDPs to ensure that it meets obligations regarding disseminating and notifying its target audiences of operational changes, and impacts on health, safety and the environment specific to its licensed activities. CNSC staff also encourage Cameco to refine and update its PIDPs on a regular basis to meet the changing information needs of its target audiences.

4.4 Participant Funding Program

The CNSC made available through its Participant Funding Program (PFP) to assist members of the public, Indigenous Nations and communities, and other stakeholders in providing value-added information to the Commission through informed and topic-specific interventions. This funding was offered to review Cameco's licence renewal applications and associated documents, and to prepare for and participate in the Commission's public hearing. Due to the close geographic location between the MRO and the KLO, history of interventions and coordinated documentation, it was decided to combine the PFP for the MRO and KLO renewals, rather than offering separate PFPs for each operation. Although CNSC staff chose to combine the MRO and KLO in one CMD, in order to ensure adequate consideration of Cameco's applications, participant funding was offered in an amount reflective of 2 separate licensing matters being considered.

The PFP application deadline was November 18, 2022. The Funding Review Committee, independent from CNSC staff, reviewed the applications received, and made recommendations on the allocation of funding to eligible recipients. Based on the recommendations from the Funding Review Committee, the CNSC awarded a total of C\$231,784, in funding. Funding was provided to the following entities:

- English River First Nation
- Kineepik Métis Local #9 Métis Nation-Saskatchewan
- Ya'thi Néné Land and Resource Office
- Birch Narrows Dene Nation
- Canadian Environmental Law Association

5. Other Matters of Regulatory Interest

5.1 Cost Recovery

Paragraph 24(2)(c) of the [NSCA](#) requires that a licence application is accompanied by the prescribed fee. The [CNSC Cost Recovery Fees Regulations](#) (CRFR) set out the specific requirements based on the activities to be licensed. An applicant for a Class I facility licence is subject to Part 2 of CRFR, which is based on Regulatory Activity Plan fees.

5.1.1 Discussion

Cameco is in good standing with respect to CRFR requirements for MRO and KLO.

Cameco's licence renewal applications are not initial applications, and as such, the applicant is not required to submit the initial fee of C\$25,000 as described in paragraph 7(1)(a), which is only for initial applicants. In this case, Cameco is subject to subsection 5(2) of the CRFR, which relates to quarterly invoices sent to licensees.

5.1.2 Conclusion

After assessing CNSC records, CNSC staff concluded that Cameco is in good standing with respect to MRO and KLO meeting CRFR requirements.

No licence condition is required for this matter.

5.2 Financial Guarantees

Under subsection 24(5) of the NSCA, the licensee is required to provide a financial guarantee in a form that is acceptable to the Commission. [GNSCR](#), paragraph 3(1)(l) stipulates that, "an application for a licence shall contain a description of any proposed financial guarantee related to the activity for which a licence application is submitted." The financial guarantee for decommissioning is established to fund the activities described in the PDP. These requirements are found in [REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities*](#).

5.2.1 Discussion

Cameco maintains financial guarantees for the decommissioning of the MRO and KLO. The current financial guarantees are C\$42.1 million and C\$222.5 million, respectively. These financial guarantees meet the requirements of both the CNSC and Saskatchewan Ministry of Environment (SMOE). A summary of the decommissioning plans for each of the [MRO](#) and [KLO](#) are provided on Cameco's webpage. As discussed in subsection 3.11.2, Cameco submitted updated PDP and cost estimate documentation for the decommissioning of the MRO and KLO. These submissions are currently undergoing CNSC staff review. Once this review is complete and Cameco has addressed all CNSC staff's comments, CMDs will be prepared for the Commission's consideration of any proposed changes to the financial guarantee for each facility.

The Government of Saskatchewan, under [The Mineral Industry Environmental Protection Regulations, 1996](#), also requires that mining and milling projects be covered by financial guarantees. The provincial review of Cameco's PDP and cost estimate is independent to CNSC staff's review. The Memorandum of Understanding between CNSC and the province of Saskatchewan allows a single PDP and financial assurance, subject to consultation and mutual acceptance [24].

The Memorandum of Understanding also specifies that the financial guarantee is conditional until approved by the Commission. The SMOE is the beneficiary of the financial guarantee for all the operating and decommissioned uranium mine and mill sites as they are located on provincial crown land.

5.2.2 Conclusion

The MRO and KLO currently have valid financial guarantees that were approved by the Commission on [June 26, 2019](#) and [July 29, 2020](#), respectively.

5.3 Improvement Plan and Significant Future Activities

5.3.1 Discussion

In addition to the activities during the current licence term, Cameco identified activities which may be undertaken during the next licence term with the Mining Facility Licensing Manual [[5](#), [7](#)].

During the next licence term, Cameco may undertake the activities identified below at the MRO:

- continue to investigate alternative mining methods
- review and management of the mine water pumping and treatment capacity
- continue to advance mine workings towards exploration targets for delineation drilling
- upgrade and expand freeze capabilities for mining future zones
- upgrade underground ventilation capacity to meet air volume requirements associated with future underground mine development, including possible installation of a ventilation raise(s) as required
- maintain, optimize or upgrade infrastructure to ensure safe operations

For the KLO, Cameco has outlined the following activities that may be conducted during the next licence term:

- conduct work on the bulk neutralization circuit to improve the quality of effluent released to the environment
- conduct work to the contaminated water routing at site in order to improve the quantity of effluent released to the environment
- upgrades to containment systems and associated inspection and maintenance programs
- continued examination for opportunities to digitalize and/or automate processes
- evaluation of ore blend strategies to optimize feed grade to the mill
- changes to water management strategies within the DTMF and Gaertner Pit
- demolish and dispose of equipment and buildings made obsolete

When sufficient information has been gathered and plans developed, including any additional information necessary to support the licensed activity within those areas, Cameco would provide notification, including supporting information to CNSC staff. Should Cameco wish to complete activities at the MRO or KLO, they will provide CNSC staff with notification in advance of conducting the activities. Any activity that is proposed during the licence term that is not considered to be within the licensing basis will be presented to the Commission for their consideration.

5.3.2 Conclusion

CNSC staff will continue to conduct regulatory oversight of these activities during inspections as part of compliance verification. CNSC staff will report to the Commission on these improvements through annual [RORs](#). For any future significant activities and improvement plans, CNSC staff will review the information submitted by Cameco to determine if the proposed activity meets the licensing basis. Any proposed changes not within the licensing basis will be brought to the Commission for consideration.

5.4 Nuclear Liability Insurance

Pursuant to section 7 of the [Nuclear Liability and Compensation Act](#) (NLCA), which came into force on January 1, 2017, and previously under the [Nuclear Liability Act](#), the licensee for designated nuclear installations is required to maintain nuclear liability insurance.

Neither Cameco's MRO nor KLO are designated as nuclear installations under the NLCA because Cameco only processes natural uranium ore which is excluded from the definition of nuclear material under the NLCA. As a result, Cameco's MRO and KLO do not meet the criteria to be designated as a nuclear installation therefore are not under the purview of the NLCA. Cameco maintains industrial insurance as a commercial necessity.

5.5 Proposed Licence Period

Cameco originally submitted applications [[1](#), [2](#)] with a request to renew its CNSC-issued operating licences for the MRO and KLO for an indefinite operational period. Cameco subsequently revised its original request on November 4, 2022, and asked that the licences be renewed by the CNSC for a 20-year term [[3](#)]. Cameco noted that this request was made in response to the questions and concerns raised by Indigenous Nations and communities during its early engagement activities conducted in support of the licence renewal.

5.5.1 Discussion

In the early 2000's the typical licence period for uranium mines and mills was approximately 2 years. In 2002, following the coming into force of the [NSCA](#) and the evolution of CNSC's licensing process and regulatory framework, CNSC staff reviewed the feasibility of granting longer term licences. As an outcome of this review, CNSC staff developed an approach to recommending appropriate licence periods, which was based on benchmarking with international practices. This approach is outlined in CMD 02-M12 and was presented to the Commission in March 2002 [30]. CMD 02-M12 provides a risk-informed process that has been used previously by CNSC staff to support recommendations regarding licence periods to the Commission. Since 2002, CNSC's regulatory framework has continued to evolve and the typical licence period for uranium mines and mills has gradually lengthened to a 10-year term. The current licence periods for the MRO and KLO is 10 years. Cameco's Cigar Lake Operation, which is the most recent uranium mine or mill licence renewal, was [granted](#) a 10-year licence in June 2021.

More recently, CNSC has received applications from licensees requesting renewal of licences with terms in excess of 10 years. Following a review of those applications and consideration of the existing CNSC regulatory framework, CNSC staff recommended the Commission grant a 15-year licence to SRB Technologies Canada Inc. (SRBT) ([CMD 22-H8](#)) and a 20-year licence be granted for the Point Lepreau Generating Station ([CMD 22-H2.B](#)). In June 2022, the Commission issued its decision on these 2 licence renewal applications. A 12-year licence was [granted](#) for SRBT, and a 10-year licence was [granted](#) for the Point Lepreau Nuclear Generating Station. While these licence terms are shorter than requested by the respective applications, they are longer than the term on the existing licences for both licensees and both decisions identified a midterm update. Most recently, it was [announced](#) that, further to a public hearing held on November 23, 2022, the Commission renewed the Class IB nuclear fuel facility licence held by Cameco Fuel Manufacturing Inc. for its facility located in the Municipality of Port Hope, Ontario. A 20-year licence was issued. The Reasons for Decision will be posted on the [CNSC website](#), once issued.

CNSC staff reviewed Cameco's MRO and KLO licence term request against the criteria from CMD 02-M12 and concluded that a 20-year licence period is reasonable based on those criteria. CNSC staff confident that regulatory effectiveness can be maintained over the 20-year licence term. This review is summarized in table 5.1. In addition to the criteria listed in table 5.1, CNSC staff incorporated other considerations before arriving at a recommendation on the proposed licence period. These include considerations of the international approach to fuel cycle facility licensing, CNSC's regulatory oversight framework, ongoing communication and engagement during the licence term, and ongoing Commission engagement opportunities. These considerations are discussed in the subsections below.

Table 5.1: CNSC staff assessment of the proposed 20-year licence term against CMD 02-M12 criteria

CMD 02-M12 Licence Period Criteria	CNSC Staff Position for 20-year Licence
<p><i>The recommended duration of the licence should be commensurate with the licensed activity.</i></p>	<p>The MRO and KLO mine and mill uranium ore for the production of U₃O₈ (yellowcake). Beyond natural uranium, other nuclear substances are present only in very limited quantities. Both operations have been in operation for decades. Cameco has not requested any changes to the specific activities authorized by in the respective licences (see section IV of the current and proposed licences in Part 2 and 3 of this CMD). Although new regulatory requirements have been added (regulatory documents), the principal authorized activities have not changed for these facilities over several iterations of the licences. The estimated remaining operational life for the MRO and KLO is over 20 years.</p> <p>There is no specific limitation on the licence term on the basis of the licensed activity or facility life stage.</p>
<p><i>A longer licence period can be recommended when the hazards associated with the licensed activity are well characterized and their impacts well predicted, and they are within the scope considered in the environmental safety case.</i></p>	<p>Cameco has successfully characterized, and mitigated hazards associated with the MRO and KLO. Cameco has implemented control measures that ensure adequate measures are in place to protect the health and safety of persons and the environment.</p> <p>Key documents describing the safety case include Fire Hazard Assessments, Hazard and Operability Assessments, Environmental Risk Assessments (ERA) and Environmental Performance Reports. The ERAs are part of the licensing basis and Cameco is required to review each at a minimum 5-year frequency, or more frequently if there are any significant changes to the facility, to ensure environmental protection measures remain current and appropriate and that predictions made in environmental assessments remain valid.</p> <p>CNSC staff have prepared an Environmental Protection Review Report for both the MRO and KLO. These reports provide assessments of Cameco's environmental protection measures for the purpose of confirming whether Cameco is providing adequate protection for the environment and health of persons. Rather than solely completing these reports as part of a licensing decision/action, CNSC staff will now issue these reports on a 5-yearly basis, and these will be posted on CNSC's website for public viewing. These reports will be used to document CNSC staff's determination of whether Cameco's environmental protection measures provide adequate protection for the environment and health of persons, independent of the licence term.</p> <p>Regardless of the licence term, CNSC staff will continue to verify and ensure that, through ongoing licensing and compliance activities and reviews, Cameco provides adequate protection of the environment and the health and safety of persons.</p>

CMD 02-M12 Licence Period Criteria	CNSC Staff Position for 20-year Licence
<p><i>A longer licence period can be recommended when licensees have in place a management system, such as a quality assurance program, to provide assurance that their safety-related activities are effective and maintained.</i></p>	<p>As noted in section 3.1, Cameco has a management system that meets the requirements of CSA N286-12 at the MRO and KLO. CNSC staff have inspected Cameco's management systems at the MRO and KLO and found they meet the requirements of CSA N286-12. The requirements in N286-12 in the areas of Self Assessments, Independent Assessments, Continual Improvement, Problem Identification and Resolution, Design and Change Control, and Maintenance (to name a few) provides a framework to ensure that all work activities are planned and carried out effectively. Cameco has demonstrated its ability to update its management systems over time, in response to operational experience and changing regulatory requirements.</p> <p>Cameco's safety performance over the previous 10-year licence period provides further demonstration that effective programs are maintained to ensure safety while performing licensing activities.</p>
<p><i>A longer licence period can be recommended when effective compliance programs are in place on the part of both the applicant/licensee and the CNSC.</i></p>	<p>Cameco has established programs describing the implementation of control measures to ensure that the MRO and KLO remain in compliance within their respective licensing basis. CNSC staff have reviewed these programs to confirm regulatory expectations are being met. In accordance with the change notification process defined in the LCHs, CNSC staff are required to be notified of revisions to licensing basis documents, which triggers CNSC staff review of those revised documents to ensure compliance with the licensing basis is not adversely impacted. During the previous licence period, CNSC staff formalized expectations and added additional requirements through publication of new/revised regulatory documents and adoption of the new standards. In each case, Cameco has reviewed and revised its programs where necessary to implement these requirements.</p> <p>The CNSC has a robust and effective compliance verification program to ensure there is adequate regulatory oversight over the licensed activities at the MRO and KLO. CNSC staff verify compliance through desktop reviews, inspections and event reviews.</p> <p>CNSC has established and implemented a compliance strategy for the MRO and KLO, which identifies a risk-informed frequency for inspections of each SCA. CNSC staff have created rolling 10-year inspection schedules to ensure that inspections are conducted in accordance with the SCA risk ranking, and the risk categorization of the MRO and KLO activities. The inspection plan is reviewed on an annual basis to ensure that any changes in site operation are accounted for (facility in care and maintenance, restart of operations, etc.) In total, CNSC staff conducted 42 and 45 inspections at the MRO and KLO, respectively since the beginning of the current licence term.</p>

CMD 02-M12 Licence Period Criteria	CNSC Staff Position for 20-year Licence
	<p>In addition to program documentation reviews, CNSC performs desktop reviews of quarterly and annual compliance reports submitted by Cameco in accordance with requirements specified in the LCH. CNSC staff also review event reports, which are submitted by Cameco in accordance with requirements specified in REGDOC 3.1.2. CNSC staff review these reports to verify that Cameco implements appropriate corrective actions, where necessary, to prevent recurrence and ensure that adequate provisions ensuring protection of the health and safety of persons and the environment remain in place.</p>
<p><i>A longer licence period can be recommended when the licensee has shown a consistent and good history of operating experience and compliance in carrying out the licensed activity.</i></p>	<p>CNSC staff review and assess licensee performance on an ongoing basis. During the current licence period CNSC staff rated Cameco's performance as satisfactory across all SCA's each year, for both the MRO and KLO. These ratings and other compliance highlights have been published and reported to the Commission in public meetings, through the Regulatory Oversight Report for Uranium Mines and Mills in Canada. When CNSC staff have identified areas of non-compliance, these have been of low safety significance and Cameco has ensured that effective corrective actions have been taken to correct the non-compliances.</p> <p>As described in this CMD, Cameco has demonstrated satisfactory performance over the current licence period and has conducted operations in accordance with its licensing basis. Worker doses and doses to the public have been kept below regulatory limits at all times (section 3.7), and releases to the environment have been maintained at a small fraction of the licensed release limits (section 3.9). Cameco has also demonstrated good performance in the conventional health and safety SCA (section 3.8).</p> <p>Cameco has adhered to events reporting and response requirements detailed in REGDOC-3.1.2. The events reported to the CNSC during the current licence period is provided in sections 3.7, 3.8 and 3.9. CNSC staff are satisfied with Cameco's reporting and response to events during the previous licence period, and all actions associated with these events are considered closed.</p>
<p><i>The licence period must be consistent with the requirements of the CNSC Cost Recovery Fees Regulations.</i></p>	<p>As per section 5.1, Cameco is currently in good standing with the CNSC Cost Recovery Fees Regulations.</p>

CMD 02-M12 Licence Period Criteria	CNSC Staff Position for 20-year Licence
<p><i>The licence period should take account of the planning cycle of the facility and the licensee's plans for any significant change in licensed activity.</i></p>	<p>Cameco has conveyed its intent to continue to operate both the MRO and KLO for the mining and milling of uranium ore, respectively.</p> <p>In its application Cameco has not identified any specific internal project, contract, or milestone which is currently planned or ongoing that should inform a recommendation for a specific licence term length. However, Cameco noted that facility change control and design control are utilized at both operations to ensure that any physical change to the facility is reviewed and approved by the appropriate personnel prior to implementation. Prior notification is provided to CNSC staff regarding any changes to the facilities or their operation that have the potential to be outside of the licensing basis. Any proposed changes determined to be outside of the licensing basis are subject to Commission approval.</p> <p>Both the MRO and the KLO have estimated operational lifetimes greater than 20 years (i.e., mine life, and tailings storage capacity) in their current configurations. Future Commission proceedings can and will consider later stages in the MRO and KLO lifecycles.</p>

International approach to fuel cycle facility licensing

Internationally, nuclear fuel cycle facilities are issued licences for periods ranging from a few years to the entire lifecycle of the facility, supported by periodic, comprehensive assessments of facility safety. On June 29, 2022, the new [Subsoil Use Code](#) came into effect in Kazakhstan. Under the code, the maximum term for a production licence which covers uranium mining, mineral processing and operational exploration, is 25 years with a possible extension for the same period, which may be granted several times. The United States [Nuclear Regulatory Commission](#) also updated the policy on licence terms in 2017. The maximum licence terms for new applications and licence renewals for uranium recovery facilities was changed from 10 years to 20 years under this policy.

In addition to the review and summarization of licensee performance undertaken as part of a licence renewal, the CNSC has a number of processes in place to achieve these objectives on a continual basis. The Canadian regulatory framework includes requirements for periodic review and update of essential documentation. Licensees are required to update environmental risk assessments, preliminary decommissioning plans and financial guarantees on a minimum 5-year frequency. Additionally, CSA N286-12, *Management system requirements for nuclear facilities* [4] requires that the licensee periodically review and assess all program documentation. The CNSC staff-issued LCH requires prior notification of any changes to licensing basis programs before implementation. CNSC staff reviews the updated version to ensure continued compliance with the licensing basis. This provides assurance that the licensing basis remains valid and that programs in place are acceptable on a continual basis.

The CNSC requires that Canadian nuclear fuel cycle licensees establish and implement fitness for service (maintenance) programs for their facilities. These programs are in place to support the ongoing safety of their operation by identifying maintenance needs, including monitoring, inspection, testing, assessment, calibration, service, overhaul, repairs and replacement of parts.

The programs identify the maintenance activities that are needed and CNSC staff verify compliance with the maintenance programs during planned compliance activities. It is significant to note that in cases where replacement of equipment is necessary, nuclear fuel cycle facilities are able to plan and carry out these activities on an ongoing basis, typically without the need for complicated outage scheduling. Systems important to safety for nuclear fuel cycle facilities are comparatively simple to maintain or replace (i.e., relative to nuclear power plants, for example) and this work can usually be done during normal outages. With the maintenance programs and effective regulatory oversight of maintenance activities in place, CNSC staff remain satisfied that the adequacy of structures, systems and components is appropriately controlled at MRO and KLO.

CNSC regulatory oversight

The CNSC nuclear fuel cycle regulatory program is effective and independent of the licence period granted by the Commission. CNSC staff have established a 10-year baseline compliance plan for all nuclear fuel cycle facilities. This baseline compliance plan is carried out regardless of the licence period and verifies continued safety through planned assessments and reviews. The plan establishes a minimum number of inspections to be carried out at a given facility based on the facility's risk profile and is augmented by additional inspections tailored to the specific features of the facility itself. CNSC staff review the plan annually as well as the licensee's planned activities for the year to determine if additional verification activities should be added or moved. This approach is flexible and agile to ensure that appropriate, risk-informed regulatory oversight is in place, regardless of the licence period. The baseline inspection plan establishes a minimum level of inspections for each facility, and CNSC staff can add additional compliance activities whenever there is a need.

CNSC requirements are updated through changes of regulations made under the [NSCA](#) or other relevant legislation, and updates to the suite of [CNSC regulatory documents](#) or the set of CSA standards. Changes to regulation come into force automatically at the completion of the regulation making process. CNSC staff have also established a process, through the LCH, to ensure updated requirements in regulatory documents and CSA standards are implemented within the licence term. The process involves CNSC staff requesting licensee plans for implementation of the updated requirements supported by a gap analysis against the updated requirements. Once the licensee responds to the request, the commitment to implement the document is recorded and entered into the LCH at the next update. Once implemented, updated requirements are considered to be in-force and CNSC staff begin to verify compliance with them. This ensures that modern codes, standards and practices are implemented continually, rather than using a periodic assessment. The past decade has been a very active period for the

development of regulatory documents and CSA N-series standards, which are applicable to the management of nuclear facilities. The process outlined above, has therefore been followed during the current licence period. The implementation of updated requirements involves a substantial effort by the licensee, and Cameco has been compliant in regard to continuously implementing the requirements and guidance during the licence period at both the MRO and KLO. This example demonstrates the flexibility of the current regulatory framework to continually introduce, update, modernize requirements within the licence term to ensure licensed activities continue to be carried out safely.

Ongoing communication and engagement

To deliver on the CNSC mandate to disseminate objective scientific, technical and regulatory information to the public, CNSC remains committed to openness and transparency through effective communication and engagement. Licensing hearings currently represent an opportunity to engage with Indigenous Nations and communities as well as the public. However, this type of engagement was often focused on upcoming Commission proceedings.

To modernize the approach to engagement and ongoing communications, CNSC staff have implemented a number of improvements in recent years, including:

- Signing terms of reference with Indigenous Nations and communities to formalize a forum for collaboration, which creates space to address areas of interest with ongoing, respectful and open dialogue.
- Posting CNSC staff's EPR reports online, independently of the documents drafted during the licensing process, to ensure that information related to environmental protection is easily accessible to the public at any time, and well ahead of any Commission meetings or hearings.
- Updating nuclear facility web pages on the CNSC public website to provide useful and easily accessible information for interested parties.
- Initiating a review of the annual regulatory oversight reports presented to the Commission and associated engagement, to ensure they provide useful information to Indigenous Nations and communities.
- Proposing the adoption of mid-term licensing basis reviews for MRO and KLO, to provide facility-specific information to Indigenous Nations and communities and the public on the current frequency, along with an associated opportunity to interact with the Commission. This is further described below.

In addition to these improvements, CNSC staff are planning reviews of [REGDOC-3.2.2, *Indigenous Engagement*](#) and [REGDOC-3.2.1, *Public Information and Disclosure*](#), to ensure requirements related to engagement and communications are modernized and aligned with best practices. The CNSC is also evaluating the potential for representatives from Indigenous Nations and communities observing CNSC inspections. A working group has been established within the CNSC with representatives from across the organization for this initiative.

These improvements and planned reviews demonstrate CNSC staff's commitment to the modernization of information sharing and engagement. As additional improvements are identified over time, CNSC staff will review them to determine practical steps that can be taken to adopt the improvements. CNSC staff will continue to monitor ongoing communication and engagement efforts, regardless of the licence term, to ensure that the approach is modern, agile and focused on the effectiveness of communication with interested parties.

Mid-term reporting for licence periods greater than 10 years

Historically, public and Indigenous Nations and communities in northern Saskatchewan have expressed interest in CNSC licensing activities for uranium mines and mills. Concerns were expressed to CNSC staff during engagement activities that opportunities for meaningful engagement may not be adequate within an extended licence term, due to Commission hearings becoming less frequent. CNSC staff are therefore recommending that in addition to the opportunities outlined above, if the Commission grants a 20-year licence term to Cameco, Cameco shall provide a comprehensive performance update to the Commission at the mid-term point of the licence period, for each of the MRO and KLO. The update would consist of a report documenting a thorough licensing basis review, that is, a report documenting Cameco's performance across all 14 SCAs as well as the submission of revised programs as needed for CNSC staff review and acceptance. Cameco's submission would include a report on Indigenous engagement activities in accordance with [REGDOC-3.2.2, Indigenous Engagement](#), and covering the licence term to date, as well as other regulatory matters of interest, and a future outlook for the remainder of the licence period. The performance update would be made available for public review in advance of the Commission meeting. Cameco's presentation during a Commission meeting would provide an opportunity for Indigenous Nations and communities and the public to provide input and perspective to the Commission at a frequency in line with current norms. Note that in line with the principle of continuous improvement, CNSC staff expect that Cameco will update and address necessary changes to programs as they arise rather than delaying these updates to the mid-term review.

In conjunction with Cameco's mid-term licensing basis review report, CNSC staff will continue to report on Cameco's performance, CNSC activities conducted (including inspections and engagement and outreach activities conducted), the status of licensing documentation and a future outlook via the applicable ROR. CNSC staff's recommendation that a mid-term update be put in place for MRO and KLO is in alignment with the recent decisions of the Commission (SRBT and Point Lepreau Nuclear Generating Station) and proposed for Cameco Fuel Manufacturing.

Commission engagement opportunities

CNSC staff's capability to deliver on its mandate is not impacted by the licence period. Irrespective of the period of a licence granted by the Commission, the powers of the Commission will not be impacted. The Commission has the authority to call public proceedings on any matter of interest to the Commission at any time, to include intervenor participation and to make participant funding available in such proceedings. The Commission may, at any time, amend, suspend, revoke or replace a licence under the conditions prescribed in the [GNSCR](#). As prescribed in paragraph 25(2) of the GNSCR, conditions under which the Commission may take such action include: if the licensee is not qualified to carry out the licensed activity; the licensee has failed to comply with the Act, the regulations made under the Act, or its licence; or the licensed activity poses an unreasonable risk to the environment.

CNSC staff activities and licensee performance for all nuclear facilities, including MRO and KLO, are reported to the Commission through annual RORs, which is presented to the Commission during a meeting with licensee, Indigenous and public participation. CNSC staff also engage the Commission through Event Initial Reporting, which provides notification of significant events or issues, potentially requiring a Commission decision.

Any concerns identified by CNSC staff can be raised to the Commission for consideration at any time, and any requested changes from Cameco that are deemed to be outside the licensing basis are subject to additional Commission approvals, regardless of the licence period.

5.5.2 Conclusion

CNSC staff concluded that the regulatory approach in place is effective, is aligned with international practices and is able to provide appropriate regulatory oversight for the MRO and KLO for any licence period chosen by the Commission. Cameco's performance at the MRO and KLO has been consistently satisfactory over the past licence period and reporting processes are in place to cover any licensing period chosen by the Commission. If the Commission approves CNSC staff's recommendation for a 20-year term and associated mid-term update, the CNSC regulatory approach is agile and can adapt to address any future changes in the regulatory landscape.

5.5.3 Recommendation

It is recommended that the Commission grant licenses to Cameco's MRO and KLO for a period of 20 years. If a 20-year licence term is granted, CNSC staff recommend that the Commission require that Cameco provide a comprehensive performance update to the Commission at the mid-point of the licence term, to provide reassurance to the Commission of Cameco's continued satisfactory performance and would provide an opportunity for Indigenous Nations and communities and the public to provide input on the MRO and KLO directly to the Commission. CNSC staff would also provide an update to the Commission in the applicable ROR.

5.6 Delegation of Authority

The Commission may include in a licence any condition it considers necessary for the purposes of the [NSCA](#). The Commission may delegate authority to CNSC staff with respect to the administration of licence conditions, or portions thereof.

There is 1 proposed licence condition in each of the proposed MRO and KLO licences, UML-MINE-MCARTHUR.00/2043 and UML- MILL-KEY-00/2043 that contains the phrase below:

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

This licence condition is in the existing licences and the delegation for reporting has previously been authorized.

CNSC staff recommend the Commission delegate its authority for the purposes described in the above licence condition in both licences to the following staff:

- Director, Uranium Mines and Mills Division
- Director General, Directorate of Nuclear Cycle and Facilities Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

6. Overall Conclusions and Recommendations

CNSC staff conclusions and recommendations consider an overall assessment of Cameco's compliance with the [NSCA](#) and its regulations during the current licence period (2013 to 2022). Cameco has programs, resources, and measures in place at the MRO and KLO to ensure the health and safety of persons and the environment and of the measures related to security and Canada's international obligations during the proposed licence period.

6.1 Overall Conclusions

CNSC staff's assessment determined that the application complies with regulatory requirements. CNSC staff also concluded that the licensee's performance during the licensing term was satisfactory and met regulatory requirements, as reported to the Commission annually through the [uranium mines and mills RORs](#).

6.2 Overall Recommendations

CNSC staff recommend the following, in regard to the McArthur River Operation:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [*Nuclear Safety and Control Act*](#) (NSCA) in that Cameco Corporation:
 - a) Is qualified to carry on the activities authorized by the licence
 - b) Will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
2. Issue the proposed licence UML-MINE-MCARTHUR.00/2043
3. Delegate authority as set out in section 5.6 of this CMD

CNSC staff recommend the following, in regard to the Key Lake Operation:

1. Conclude, pursuant to paragraphs 24(4)(a) and (b) of the [*Nuclear Safety and Control Act*](#) (NSCA) in that Cameco Corporation:
 - a) Is qualified to carry on the activities authorized by the licence
 - b) Will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
2. Issue the proposed licence UML-MILL-KEY.00/2043
3. Delegate authority as set out in section 5.6 of this CMD.

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Glossary

For definitions of terms used in this document, see [REGDOC-3.6, *Glossary of CNSC Terminology*](#), which includes terms and definitions used in the *Nuclear Safety and Control Act* and the Regulations made under it, and in CNSC regulatory documents and other publications.

Additional terms and acronyms used in this CMD are listed below.

Acronym	Term
AECB	Atomic Energy Control Board
AGTMF	Above Ground Tailings Management Facility
ALARA	As Low As Reasonably Achievable
BE	Below Expectations
Cameco	Cameco Corporation
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CRFR	<u><i>Cost Recovery Fees Regulations</i></u>
CSA	CSA Group (formerly Canadian Standards Association)
DTMF	Deilmann Tailings Management Facility
EMP	Environmental Management Program
EMS	Environmental Management System
EPR	Environmental Protection Reviews
ERA	Environmental Risk Assessment
ERT	Emergency Response Team
FHA	Fire Hazard Analysis
FSP	Fire Safety Plan
GNSCR	<u><i>General Nuclear Safety and Control Regulations</i></u>
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IEMP	Independent Environmental Monitoring Program
Kg	Kilogram
KLO	Key Lake Operation

LCH	Licence Conditions Handbook
LLRD	Long-lived Radioactive Dust
LTI	Lost-time Injury
MDMER	<i><u>Metal and Diamond Mining Effluent Regulations</u></i>
MKg	Million Kilograms
Mo	Molybdenum
MRO	McArthur River Operation
mSv	Millisievert
NEW	Nuclear Energy Worker
NLCA	<i><u>Nuclear Liability and Compensation Act</u></i>
NSCA	<i><u>Nuclear Safety and Control Act</u></i>
NSEQC	Northern Saskatchewan Environmental Quality Committee
Orano	Orano Canada Inc.
PAD	Personal Alpha Dosimeters
PDP	Preliminary Decommissioning Plan
PFP	Participant Funding Program
PIDP	Public Information and Disclosure Program
PPE	Personal Protective Equipment
p-mSv	Person Millisievert
REGDOC	Regulatory Document
RO	Reverse Osmosis
ROR	Regulatory Oversight Report
RP	Radiation Protection
RPR	<i><u>Radiation Protection Regulations</u></i>
SA	Satisfactory
SAT	Systematic Approach to Training
SCA	Safety and Control Area
Se	Selenium
SMOE	Saskatchewan Ministry of Environment
SRBT	SRB Technologies Canada Inc.
TSP	Total Suspended Particulate

TSS	Total Suspended Solids
U₃O₈	Uranium Oxide
UA	Unacceptable
UMMR	<i>Uranium Mines and Mills Regulations</i>
µg	microgram
µSv	microSievert

A. Safety Performance Rating Levels

Satisfactory (SA)

Licensee meets all of the following criteria:

- Performance meets CNSC staff expectations
- Licensee non-compliances or performance issues, if any, are not risk-significant
- Any non-compliances or performance issues have been, or are being, adequately corrected

Below Expectations (BE)

One or more of the following criteria apply:

- Performance does not meet CNSC staff expectations
- Licensee has risk-significant non-compliance(s) or performance issue(s)
- Non-compliances or performance issues are not being adequately corrected

Unacceptable (UA)

One or both of the following criteria apply:

- Risk associated with a non-compliance or performance issue is unreasonable
- At least one significant non-compliance or performance issue exists with no associated corrective action

Note: Starting in 2019, facility performance assessment ratings were simplified and the “Fully Satisfactory (FS)” was replaced by the “Satisfactory (SA)” rating. It is important to recognize that a facility that received an SCA performance rating of FS in previous Regulatory Oversight Reports and now has a rating of SA, does not necessarily indicate a reduction in performance.

B. Basis for the Recommendations(s)

B.1 Regulatory Basis

The recommendations presented in this CMD are based on compliance objectives and expectations associated with the relevant SCAs and other matters. The regulatory basis for the matters that are relevant to this CMD are as follows.

Management System

The regulatory foundation for the recommendation(s) associated with management system includes the following:

- The [*General Nuclear Safety and Control Regulations*](#) (GNSCR) requires that an application for a licence shall contain, under paragraph:
 - 3(1)(k), the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the Act and the regulations made under the Act, including the internal allocation of functions, responsibilities and authority.
- It is a requirement of the GNSCR under section 15 that every applicant for a licence and every licensee shall notify the Commission of:
 - 15(a), the persons who have the authority to act for them (the applicant/licensee) in their dealings with the Commission.
 - 15(b), the names and position titles of the persons who are responsible for the management and control of the licensed activity and the nuclear substance, nuclear facility, prescribed equipment or prescribed information encompassed by the licence.
 - 15(c), any change in the information referred to in paragraphs (a) and (b) within 15 days after the change occurs.
- It is a requirement of the [*Uranium Mines and Mills Regulations*](#) (UMMR) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(b) of the GNSCR, in relation to the activity to be licensed:
 - 3(b)(v), the proposed quality assurance program for the activity.

Operating Performance

The regulatory foundation for the recommendation(s) associated with operating performance includes the following:

- It is a requirement of the [GNSCR](#) under subsection 29(1), that every licensee who becomes aware of any of the following situations shall immediately make a preliminary report to the Commission of the location and circumstances of the situation and of any action that the licensee has taken or proposes to take with respect to it:
 - 29(1)(a), a situation referred to in paragraph 27(b) of the Act.
 - 29(1)(b), the occurrence of an event that is likely to result in the exposure of persons to radiation in excess of the applicable radiation dose limits prescribed by the [Radiation Protection Regulations](#) (RPR).
 - 29(1)(c) a release, not authorized by the licence, of a quantity of radioactive nuclear substance into the environment.
 - 29(1)(d), a situation or event that requires the implementation of a contingency plan in accordance with the licence.
 - 29(1)(f), information that reveals the incipient failure, abnormal degradation or weakening of any component or system at the site of the licensed activity, the failure of which could have a serious adverse effect on the environment or constitutes or is likely to constitute or contribute to a serious risk to the health and safety of persons or the maintenance of security.
 - 29(1)(h), a serious illness or injury incurred or possibly incurred as a result of the licensed activity.
 - 29(1)(i) the death of any person at a nuclear facility.
- It is a requirement of the GNSCR under subsection 29(2), that every licensee who becomes aware of a situation referred to in subsection (1) shall file a full report of the situation with the Commission within 21 days after becoming aware of it, unless some other period is specified in the licence, and the report shall contain the following information:
 - 29(2)(a), the date, time and location of becoming aware of the situation.
 - 29(2)(b), a description of the situation and the circumstances.
 - 29(2)(c), the probable cause of the situation.
 - 29(2)(d), the effects on the environment, the health and safety of persons and the maintenance of security that have resulted or may result from the situation.
 - 29(2)(e), the effective dose and equivalent dose of radiation received by any person as a result of the situation.
 - 29(2)(f), the actions that the licensee has taken or proposes to take with respect to the situation.

- It is a requirement of the [UMMR](#) under paragraphs 6(1)(a) and 6(2)(a), that an application for a licence in respect of a uranium mine and mill shall contain the results of any commissioning work.
- It is a requirement of the UMMR under paragraphs 6(1)(c) that an application for a licence in respect of a uranium mine and mill shall contain the proposed policies, methods and programs for operating and maintaining the mine.
- It is a requirement of the UMMR under subsection 10(a), that every licensee shall establish, implement and maintain written operating procedures for the licensed activity.

Safety Analysis

The regulatory foundation for the recommendation(s) associated with safety analysis includes the following:

- It is a requirement of the [GNSCR](#) under paragraph 3(1)(i) an application for a licence shall contain a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.
- It is a requirement of the UMMR under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(c) of the GNSCR, in relation to the environment and waste management, and (d) health and safety:
 - 3(c)(iii), effects on the environment that may result from the activity to be licensed and the measures that will be taken to prevent or mitigate those effects.
 - 3(d)(i) the effects on the health and safety of persons that may result from the activity to be licensed, and the measures that will be taken to prevent or mitigate those effects.

Physical Design

The regulatory foundation for the recommendation(s) associated with physical design includes the following:

- Paragraph 3(1)(d) of the [GNSCR](#) requires that an application for a licence shall contain a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.
- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(a) of the GNSCR, in relation to the plan and description of the mine or mill:
 - 3(a)(ii), a surface plan indicating the boundaries of the mine or mill and the area where the activity to be licensed is proposed to be carried on.
 - 3(a)(iii), a plan showing existing and planned structures, excavations and underground development.
 - 3(a)(iv) a description of the mine or mill, including the installations, its purpose and capacity, and any excavations and underground development.
- It is a requirement of the UMMR under subsection 5(2), that an application for a licence to prepare a site for and construct a uranium mill shall contain the following information in addition to the information required by section 3 and subsection 4(2):
 - 5(2)(h), a description of all proposed laboratory facilities and programs.
- It is a requirement of the UMMR under paragraphs 6(1)(b) and 6(2)(b), that an application for a licence to operate a uranium mine and mill shall contain a description of the structures, components, systems and equipment including any changes to its design and its design operating conditions as a result of the commissioning.
- It is a requirement of the UMMR under paragraphs 16(1)(e) that every licensee shall keep a record of the design of the uranium mine or mill and of the components and systems installed at the mine or mill.

Radiation Protection

The regulatory foundation for the recommendation(s) associated with radiation protection includes the following:

- The [GNSCR](#) require, under subsection 3(1), that a licence application contain the following information under paragraphs:
 - 3(1)(e), the proposed measures to ensure compliance with the [RPR](#).
 - 3(1)(f), any proposed action level for the purpose of section 6 of the RPR.
- The GNSCR require, under subsection 17(b), that a worker comply with the measures established by the licensee to protect the environment and the health and safety of persons, maintain security, control the levels and doses of radiation, and control releases of radioactive nuclear substances and hazardous substances into the environment.
- It is a requirement for uranium mines and mills licensee to follow the RPR.
- It is a requirement of the [UMMR](#) under subsection 4(2), that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain a proposed code of practice that includes:
 - 4(2)(a), any action level that the applicant considers appropriate for the purpose of this subsection.
 - 4(2)(b), a description of any action that the applicant will take if an action level is reached.
 - 4(2)(c), the reporting procedures that will be followed if an action level is reached.
- It is a requirement of the UMMR under section 9, that every licensee shall post a copy of the code of practice referred to in the licence at a location within the uranium mine or mill that is accessible to all workers and where it is most likely to come to their attention.
- It is a requirement of the UMMR under section 13, that no licensee shall rely on the use of a respirator to comply with the RPR unless the use of the respirator:
 - 13(a), is for a temporary or unforeseen situation.
 - 13(b), is permitted by the code of practice referred to in the licence.
- It is a requirement of the UMMR under section 14, that every licensee shall:
 - 14(a), post signs at all entrances to each area where the dose rate of gamma radiation exceeds 25 $\mu\text{Sv/h}$, designating the area as a radiation area and indicating the dose rate of gamma radiation in that area.
 - 14(b), provide every worker who is to enter an area where the dose rate of gamma radiation exceeds 100 $\mu\text{Sv/h}$ with a direct-reading dosimeter.

- It is a requirement of the UMMR under subsection 16(1), that every licensee shall keep a record of:
 - 16(1)(f), the method and relevant data used to ascertain the doses of radiation received by the workers at the uranium mine or mill and the intake of radioactive nuclear substances by those workers.

Conventional Health and Safety

The regulatory foundation for the recommendation(s) associated with conventional health and safety includes the following:

- The [GNSCR](#) require, under paragraph 12(1)(c), that every licensee shall take all reasonable precautions to protect the environment and the health and safety of persons and to maintain the security of nuclear facilities and of nuclear substances.
- The GNSCR require, under subsection 16(1), that every licensee shall make available to all workers the health and safety information with respect to their workplace that has been collected by the licensee in accordance with the Act, the regulations made under the Act and the licence.
- It is a requirement of the GNSCR under section 17, that every worker shall:
 - 17(a), use equipment, devices, facilities and clothing for protecting the environment or the health and safety of persons, or for determining doses of radiation, dose rates or concentrations of radioactive nuclear substances, in a responsible and reasonable manner and in accordance with the Act, the regulations made under the Act and the licence.
 - 17(b), comply with the measures established by the licensee to protect the environment and the health and safety of persons, maintain security, control the levels and doses of radiation, and control releases of radioactive nuclear substances and hazardous substances into the environment.
 - 17(c)(i), promptly inform the licensee or the worker's supervisor of any situation in which the worker believes there may be a significant increase in the risk to the environment or the health and safety of persons.
 - 17(e), take all reasonable precautions to ensure the worker's own safety, the safety of the other persons at the site of the licensed activity, the protection of the environment, the protection of the public and the maintenance of the security of nuclear facilities and of nuclear substances.
- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(d) of the GNSCR, in relation to health and safety:
 - 3(d)(i), the effects on the health and safety of persons that may result from the activity to be licensed, and the measures that will be taken to prevent or mitigate those effects.

- 3(d)(ii), the proposed program for selecting, using and maintaining personal protective equipment.
- 3(d)(iii), the proposed worker health and safety policies and programs.

Environmental Protection

The regulatory foundation for the recommendation(s) associated with environmental protection includes the following:

- The [GNSCR](#), under paragraphs 12(1)(c) and (f), require that each licensee take all reasonable precautions to protect the environment and the health and safety of persons, and to control the release of radioactive nuclear substances and hazardous substances within the site of the licensed activity and into the environment.
- The [RPR](#) prescribe dose limits for the general public, which under subsection 1(3) is 1 mSv per calendar year.
- It is a requirement of the GNSCR under section 17, that every worker shall:
 - 17(a), use equipment, devices, facilities and clothing for protecting the environment or the health and safety of persons, or for determining doses of radiation, dose rates or concentrations of radioactive nuclear substances, in a responsible and reasonable manner and in accordance with the Act, the regulations made under the Act and the licence.
 - 17(b), comply with the measures established by the licensee to protect the environment and the health and safety of persons, maintain security, control the levels and doses of radiation, and control releases of radioactive nuclear substances and hazardous substances into the environment.
 - 17(c)(i), promptly inform the licensee or the worker's supervisor of any situation in which the worker believes there may be a significant increase in the risk to the environment or the health and safety of persons.
 - 17(e), take all reasonable precautions to ensure the worker's own safety, the safety of the other persons at the site of the licensed activity, the protection of the environment, the protection of the public and the maintenance of the security of nuclear facilities and of nuclear substances.
- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(c) of the GNSCR, in relation to the environment and waste management:
 - 3(c)(ii), the program to determine the environmental baseline characteristics of the site and the surrounding area.
 - 3(c)(iii), effects on the environment that may result from the activity to be licensed and the measures that will be taken to prevent or mitigate those effects.
 - 3(c)(iv), the proposed positions for and qualifications and responsibilities of environmental protection workers.

- 3(c)(v), the proposed environmental protection policies and programs.
- 3(c)(vi), the proposed effluent and environmental monitoring programs.
- 3(c)(vii), the proposed location, the proposed maximum quantities and concentrations, and the anticipated volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including its physical, chemical and radiological characteristics.
- 3(c)(viii), the proposed measures to control releases of nuclear substances and hazardous substances into the environment.
- 3(c)(ix), a description of the anticipated liquid and solid waste streams within the mine or mill, including the ingress of fresh water and any diversion or control of the flow of uncontaminated surface and ground water.
- It is a requirement of the [UMMR](#) under subsection 4(2), that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain a proposed code of practice that includes:
 - 4(2)(a), any action level that the applicant considers appropriate for the purpose of this subsection.
 - 4(2)(b), a description of any action that the applicant will take if an action level is reached.
 - 4(2)(c), the reporting procedures that will be followed if an action level is reached.
- It is a requirement of the UMMR under section 9, that every licensee shall post a copy of the code of practice referred to in the licence at a location within the uranium mine or mill that is accessible to all workers and where it is most likely to come to their attention.
- The MRO and KLO licences require Cameco to control, monitor and record releases of effluent concentrations from the facility and that the releases shall not exceed the limits found in the licence.

Emergency Management and Fire Protection

The regulatory foundation for the recommendation(s) associated with emergency management and response includes the following:

- It is a requirement of the [GNSCR](#) under subsection 12(1) that every licensee shall:
 - 12(1)(c), take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security of nuclear facilities and of nuclear substances.
 - 12(1)(f), take all reasonable precautions to control the release of radioactive nuclear substances or hazardous substances within the site of the licensed activity and into the environment of the licensed activity.

- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(a) of the GNSCR, in relation to the plan and description of the mine or mill:
 - 3(a)(ix), a description of the proposed emergency power systems and its capacities.
- It is a requirement of the UMMR under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by subsection 3(c) of the [GNSCR](#), in relation to the environment and waste management:
 - 3(c)(viii), the proposed measures to control releases of nuclear substances and hazardous substances into the environment.
 - 3(c)(x), the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of security, including measures to:
 - ❖ 3(c)(x)(A), assist off-site authorities in planning and preparing to limit the adverse effects of an accidental release.
 - ❖ 3(c)(x)(B), notify off-site authorities of an accidental release or the imminence of an accidental release.
 - ❖ 3(c)(x)(C), report information to off-site authorities during and after an accidental release.
 - ❖ 3(c)(x)(D), assist off-site authorities in dealing with the adverse effects of an accidental release.
 - ❖ 3(c)(x)(E), test the implementation of the measures to control the adverse effects of an accidental release.

Safeguards and Non-Proliferation

The regulatory foundation for the recommendation(s) associated with safeguards and non-proliferation includes the following:

- It is a requirement of the [GNSCR](#) under paragraph 12(1)(i) that each licensee take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement.
- Under subsection 21(1) of the GNSCR, information that concerns any of the following, including a record of that information, is prescribed information for the purposes of the Act:
 - 21(1)(a), a nuclear substance that is required for the design, production, use, operation or maintenance of a nuclear weapon or nuclear explosive device, including the properties of the nuclear substance.
 - 21(1)(b), the design, production, use, operation or maintenance of a nuclear weapon or nuclear explosive device.

- 21(1)(c), the security arrangements, security equipment, security systems and security procedures established by a licensee in accordance with the Act, the regulations made under the Act or the licence, and any incident relating to security.
- 21(1)(d), the route or schedule for the transport of Category I, II or III nuclear material, as defined in section 1 of the [Nuclear Security Regulations](#).
- It is a requirement of the [GNSCR](#) under subsection 30(1), that every licensee who becomes aware of any of the following situations shall immediately make a preliminary report to the Commission of the situation and of any action that the licensee has taken or proposes to take with respect to it:
 - 30(1)(a), interference with or an interruption in the operation of safeguards equipment or the alteration, defacement or breakage of a safeguards seal, other than in accordance with the safeguards agreement, the Act, the regulations made under the Act or the licence.
 - 30(1)(b), the theft, loss or sabotage of safeguards equipment or samples collected for the purpose of a safeguards inspection, damage to such equipment or samples, or the illegal use, possession, operation or removal of such equipment or samples.
- It is a requirement of the GNSCR under subsection 30(2), that every licensee who becomes aware of a situation referred to in subsection (1) shall file a full report of the situation with the Commission within 21 days after becoming aware of it, unless some other period is specified in the licence, and the report shall contain the following information:
 - 30(2)(a), the date, time and location of becoming aware of the situation.
 - 30(2)(b), a description of the situation and the circumstances.
 - 30(2)(c), the probable cause of the situation.
 - 30(2)(d), the adverse effects on the environment, the health and safety of persons and the maintenance of national and international security that have resulted or may result from the situation.
- The Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the [Treaty on the Non-Proliferation of Nuclear Weapons](#).
- The Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the [Treaty on the Non-Proliferation of Nuclear Weapons](#).

Decommissioning Strategy and Financial Guarantees

The regulatory foundation for the recommendation(s) associated with Cameco's MRO and KLO post-decommissioning financial guarantees includes:

- The [GNSCR](#) requires under paragraph 3(1)(l) that a licence application contains a description of any proposed financial guarantee relating to the activity to be licensed.
- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by section 3 of the [GNSCR](#), in relation to the plan and description of the mine or mill:
 - 3(a)(viii), the proposed plan for the decommissioning of the mine or mill.

Licensee's Public Information Program

- It is a requirement of the [UMMR](#) under section 3, that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain the following information in addition to the information required by section 3 of the [GNSCR](#), in relation to the environment and waste management:
 - 3(c)(i), the program to inform persons living in the vicinity of the mine or mill of the general nature and characteristics of the anticipated effects of the activity to be licensed on the environment and the health and safety of persons.

B.2 Detailed Summary of CNSC Assessment of Application

CNSC's staff assessment of Cameco's licence applications for the MRO and KLO included a completeness check, a sufficiency check, and a technical assessment against regulatory requirements. The completeness check verified whether the application included the prescribed information in accordance with the [NSCA](#) and applicable regulations. For all facilities (i.e., Class I and Class II facilities), it is important to consider and address all licence application requirements within the applicable CNSC regulations.

The sufficiency check verified whether the application included sufficient and quality information in order for CNSC staff to conduct the technical assessment. The technical assessment verified whether the application included adequate safety and control measures to address CNSC requirements. Documents originally submitted as part of the application may have been revised, updated or replaced over the course of the assessment to address CNSC requirements.

Pursuant to Section 3 of the General Nuclear Safety and Control Regulations Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Cameco	Complete?	Sufficient?	Adequate?
(1) An application for a licence shall contain the following information:				
(a) the applicant's name and business address;	<i>MRO</i> - Mining Facility Licensing Manual <i>KLO</i> – Mining Facility Licensing Manual	Y	Y	Y
(b) the activity to be licensed and its purpose;	<i>MRO</i> - Mining Facility Licensing Manual <i>KLO</i> - Mining Facility Licensing Manual	Y	Y	Y
(c) the name, maximum quantity, and form of any nuclear substance to be encompassed by the licence;	<i>MRO</i> - Mining Facility Licensing Manual, Waste Management Program, Radiation Protection Program <i>KLO</i> - Mining Facility Licensing Manual, Waste Management Program, Radiation Protection Program	Y	Y	Y

Pursuant to Section 3 of the General Nuclear Safety and Control Regulations Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Cameco	Complete?	Sufficient?	Adequate?
(d) a description of any nuclear facility, prescribed equipment, or prescribed information to be encompassed by the licence;	<i>MRO</i> - Mining Facility Licensing Manual, Waste Management Program, Radiation Protection Program <i>KLO</i> - Mining Facility Licensing Manual, Facilities Program, Waste Management Program, Radiation Protection Program	Y	Y	Y
(e) the proposed measures to ensure compliance with the RPR , the Nuclear Security Regulations and the Packaging and Transport of Nuclear Substances Regulations, 2015 ;	<i>MRO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program, Transportation Program <i>KLO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program, Transportation Program	Y	Y	Y
(f) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment, or prescribed information;	<i>MRO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program <i>KLO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program	Y	Y	Y

<p>Pursuant to Section 3 of the <u>General Nuclear Safety and Control Regulations</u> Licences – General Application Requirements</p>	<p>Location in Application or Supporting Document(s) as Noted by Cameco</p>	<p>Complete?</p>	<p>Sufficient?</p>	<p>Adequate?</p>
<p>(g) the proposed measures to prevent loss or illegal use, possession, or removal of the nuclear substance, prescribed equipment, or prescribed information;</p>	<p><i>MRO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program <i>KLO</i> - Mining Facility Licensing Manual, Radiation Protection Program, Security Program</p>	<p>Y</p>	<p>Y</p>	<p>Y</p>
<p>(h) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;</p>	<p><i>MRO</i> - Mining Facility Licensing Manual, Facilities Program, Radiation Protection Program, Waste Management Program, Security Program, Transportation Program <i>KLO</i> - Mining Facility Licensing Manual, Facilities Program, Radiation Protection Program, Waste Management Program, Security Program, Transportation Program</p>	<p>Y</p>	<p>Y</p>	<p>Y</p>

<p>Pursuant to Section 3 of the <u>General Nuclear Safety and Control Regulations</u> Licences – General Application Requirements</p>	<p>Location in Application or Supporting Document(s) as Noted by Cameco</p>	<p>Complete?</p>	<p>Sufficient?</p>	<p>Adequate?</p>
<p>(i) the name, quantity, form, origin and volume of any radioactive waste or hazardous waste that may result from the activity to be licensed, including waste that may be stored, managed, processed, or disposed of at the site of the activity to be licensed, and the proposed method for managing and disposing of that waste;</p>	<p><i>MRO - KLO - Mining Facility Licensing Manual, Radiation Protection Program, Waste Management Program, Mining Operations Program</i> <i>KLO - Mining Facility Licensing Manual, Radiation Protection Program, Waste Management Program, Facilities Program</i></p>	<p>Y</p>	<p>Y</p>	<p>Y</p>
<p>(j) the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the <u>Act</u> and the regulations made under the <u>Act</u>, including the internal allocation of functions, responsibilities and authority;</p>	<p><i>MRO - Mining Facility Licensing Manual</i> <i>KLO - Mining Facility Licensing Manual</i></p>	<p>Y</p>	<p>Y</p>	<p>Y</p>

Pursuant to Section 3 of the <u>General Nuclear Safety and Control Regulations</u> Licences – General Application Requirements	Location in Application or Supporting Document(s) as Noted by Cameco	Complete?	Sufficient?	Adequate?
(k) a description of any proposed financial guarantee relating to the activity to be licensed;	<p><i>MRO</i> - Mining Facility Licensing Manual, Preliminary Decommissioning Plan, Preliminary Decommissioning Cost Estimate</p> <p><i>KLO</i> - Mining Facility Licensing Manual, Preliminary Decommissioning Plan, Preliminary Decommissioning Cost Estimate</p>	Y	Y	Y
(l) any other information required by the <u>Act</u> or the regulations made under the <u>Act</u> for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.	<p><i>MRO</i> - Mining Facility Licensing Manual and various programs</p> <p><i>KLO</i> - Mining Facility Licensing Manual and various programs</p>	Y	Y	Y

B.3 Technical Basis

The technical basis for recommendations, including several guidance documents, national standards and regulatory documents has been presented in this CMD and is addressed in detail in the LCH for each operation.

C. Safety and Control Area Framework

C.1 Safety and Control Areas Defined

The safety and control areas (SCAs) discussed in sections 3.1 through 3.14 are comprised of specific areas of regulatory interest which vary between facility types.

The following table provides a high-level definition of each SCA. The specific areas within each SCA are to be identified by the CMD preparation team in the respective areas within section 3 of this CMD.

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	Safety and Control Area	Definition
Management	Management System	Covers the framework which establishes the processes and programs required to ensure an organization achieves its safety objectives and continuously monitors its performance against these objectives and fostering a healthy safety culture.
	Human Performance Management	Covers activities that enable effective human performance through the development and implementation of processes that ensure that a sufficient number of licensee personnel are in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.
	Operating Performance	Includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.
Facility and Equipment	Safety Analysis	Covers maintenance of the safety analysis that supports the overall safety case for the facility. Safety analysis is a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards.
	Physical Design	Relates to activities that impact on the ability of systems, components and structures to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.
	Fitness for Service	Covers activities that impact on the physical condition of systems, components and structures to ensure that they remain effective over time. This area includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	Safety and Control Area	Definition
Core Control Processes	Radiation Protection	Covers the implementation of a radiation protection program in accordance with the Radiation Protection Regulations . This program must ensure that contamination levels and radiation doses received by individuals are monitored and controlled and maintained ALARA.
	Conventional Health and Safety	Covers the implementation of a program to manage workplace safety hazards and to protect workers.
	Environmental Protection	Covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.
	Emergency Management and Fire Protection	Covers emergency plans and emergency preparedness programs which exist for emergencies and for non-routine conditions. This also includes any results of participation in exercises.
	Waste Management	Covers internal waste-related programs which form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. This area also covers the planning for decommissioning.
	Security	Covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.
	Safeguards and Non-Proliferation	Covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the Treaty on the Non-Proliferation of Nuclear Weapons .
	Packaging and Transport	Covers programs for the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility.

C.2 Specific Areas for this Facility Type

The following table identifies the specific areas that comprise each SCA for a uranium mine or mill:

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
Management	Management System	<ul style="list-style-type: none"> ▪ Management system and organization ▪ Performance assessment, improvements and management review ▪ Change management and records management ▪ Contractor management program ▪ Safety Culture
	Human Performance Management	<ul style="list-style-type: none"> ▪ Personnel Training
	Operating Performance	<ul style="list-style-type: none"> ▪ Not addressed individually
Facility and Equipment	Safety Analysis	<ul style="list-style-type: none"> ▪ Hazard Analysis
	Physical Design	<ul style="list-style-type: none"> ▪ Not addressed individually
	Fitness for Service	<ul style="list-style-type: none"> ▪ Not addressed individually
Core Control Processes	Radiation Protection	<ul style="list-style-type: none"> ▪ Estimated Dose to Public ▪ Application of ALARA ▪ Worker Dose Control ▪ Radiation Protection Program Performance ▪ Radiological Hazard Control
	Conventional Health and Safety	<ul style="list-style-type: none"> ▪ Performance ▪ Practices ▪ Awareness
	Environmental Protection	<ul style="list-style-type: none"> ▪ Effluent and Emissions Control (releases) ▪ Environmental Management System (EMS) ▪ Assessment and Monitoring ▪ Protection to the Public ▪ Environmental Risk Assessment
Core Control Processes (cont.)	Emergency Management and Fire Protection	<ul style="list-style-type: none"> ▪ Emergency Preparedness and Response ▪ Fire Emergency Preparedness and Response
	Waste Management	<ul style="list-style-type: none"> ▪ Waste Rock Piles ▪ Tailings Management Facilities

SPECIFIC AREAS FOR THIS FACILITY TYPE		
Functional Area	Safety and Control Area	Specific Areas
		<ul style="list-style-type: none"> ▪ Solid and Liquid Wastes ▪ Decommissioning Plans
	Security	<ul style="list-style-type: none"> ▪ Not addressed individually
	Safeguards and Non-Proliferation	<ul style="list-style-type: none"> ▪ Not addressed individually
	Packaging and Transport	<ul style="list-style-type: none"> ▪ Not addressed individually

PART 2 – MCARTHUR RIVER OPERATION

Part 2 of this CMD provides all relevant information pertaining directly to the McArthur River Operation licence, including:

1. the current licence;
2. any proposed changes to the conditions, licensing period, or formatting of an existing licence;
3. the proposed licence; and
4. the draft licence conditions handbook.

Current Licence

e-Doc 5634478 (PDF)



**URANIUM MINE LICENCE
CAMECO CORPORATION
MCARTHUR RIVER OPERATION**

I) LICENCE NUMBER: UML-MINE-MCARTHUR.01/2023

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

**Cameco Corporation
2121 – 11th Street West
Saskatoon, Saskatchewan S7M 1J3
Corporate Number 332981-0**

III) LICENCE PERIOD:
This licence is valid from November 1, 2013 to October 31, 2023, unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

- a) prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) for the mining of uranium ore at a site known as the McArthur River Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;
- b) mine a nuclear substance (uranium ore);
- c) possess, transfer, import, use, store, and dispose of nuclear substances; and
- d) possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).

V) EXPLANATORY NOTES:

- a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and its associated Regulations.
- c) The UML-MINE-MCARTHUR.01/2023 Licence Conditions Handbook (LCH) identifies the criteria that will be used by Canadian Nuclear Safety Commission staff to assess the licensee’s compliance with the conditions listed in this licence. The LCH also provides information regarding delegation of authority and applicable version control of documents comprising compliance verification criteria.

VI) CONDITIONS:

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter “the Commission”).

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

1. *MANAGEMENT SYSTEM*

1.1 Management System

The licensee shall implement and maintain a management system.

2. *HUMAN PERFORMANCE MANAGEMENT*

2.1 Training Program

The licensee shall implement and maintain a training program.

3. *OPERATING PERFORMANCE*

3.1 Operations Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

3.3 Nuclear Substances and Radiation Devices

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

4. *SAFETY ANALYSIS*

4.1 Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

5. *PHYSICAL DESIGN*

5.1 Design Program

The licensee shall implement and maintain a design program.

6. *FITNESS FOR SERVICE*

6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

7. *RADIATION PROTECTION*

7.1 Radiation Protection Program

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

8. *CONVENTIONAL HEALTH AND SAFETY*

8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

9. *ENVIRONMENTAL PROTECTION*

9.1 Environmental Protection Program

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

10.2 Fire Protection Program

The licensee shall implement and maintain a fire protection program.

11. WASTE MANAGEMENT

11.1 Waste Management Program

The licensee shall implement and maintain a waste management program.

11.2 Decommissioning Plan

The licensee shall maintain a decommissioning plan.

12. SECURITY

12.1 Security Program

The licensee shall implement and maintain a security program.

13. SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

The licensee shall implement and maintain a safeguards program.

14. PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

SIGNED at OTTAWA, this 26th day of June, 2019.

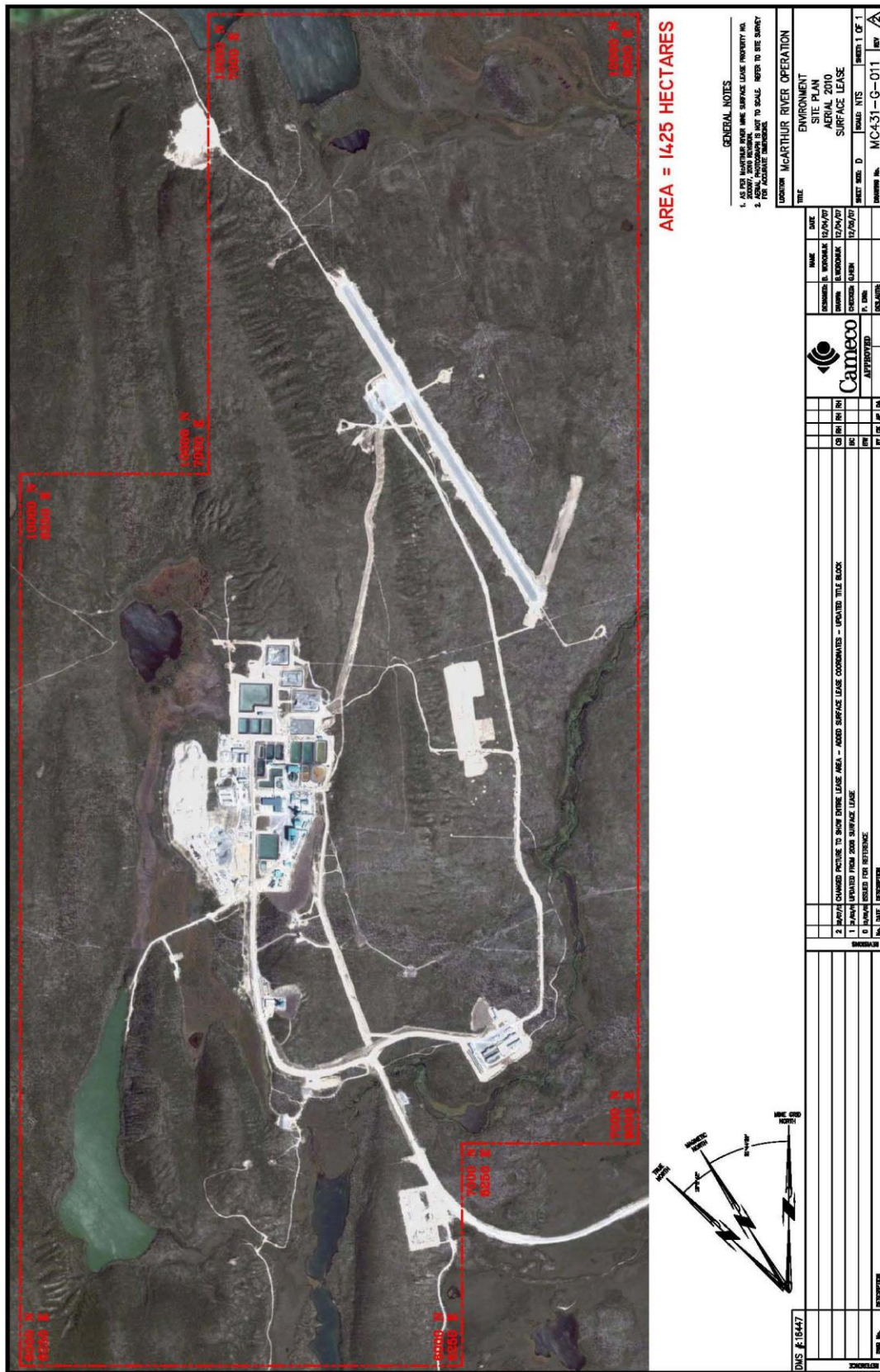


Rumina Velshi, President
on behalf of the Canadian Nuclear Safety Commission

APPENDIX A

LOCATION OF CAMECO'S OPERATION AT MCARTHUR RIVER

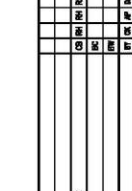
The location of the Cameco's operation at McArthur River is shown on Drawing No. MC431-G-011 (e-Doc. 3876932).



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TITLE		ENVIRONMENT	
PROJECT	MCARTHUR RIVER OPERATION	PER PLAN	12/04/07
PROJECT	MCARTHUR RIVER OPERATION	AREA	12/04/07
PROJECT	MCARTHUR RIVER OPERATION	SURFACE LEASE	12/04/07
SHEET NO. D	0001	SHEET NTS	0001
SHEET NO. D	0001	SHEET NTS	0001
PROJECT NO.	MC-431-G-011	SHEET 1 OF 1	
PROJECT NO.	MC-431-G-011	REV	A

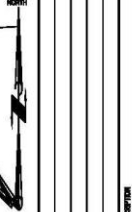
NAME	DATE	APPROVED
CONTRACT NO.	12/04/07	
CONTRACT NO.	12/04/07	
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NO.	DATE	DESCRIPTION
1	12/04/07	ISSUED FOR REFERENCE
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5	12/04/07	ISSUED FOR REFERENCE
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NO.	DATE	DESCRIPTION
1	12/04/07	ISSUED FOR REFERENCE
2	12/04/07	ISSUED FOR REFERENCE
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5	12/04/07	ISSUED FOR REFERENCE
6	12/04/07	ISSUED FOR REFERENCE
7	12/04/07	ISSUED FOR REFERENCE
8	12/04/07	ISSUED FOR REFERENCE
9	12/04/07	ISSUED FOR REFERENCE
10	12/04/07	ISSUED FOR REFERENCE



PROJECT NO.	MC-431-G-011
PROJECT NO.	MC-431-G-011
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PROJECT NO.	MC-431-G-011
PROJECT NO.	MC-431-G-011
PROJECT NO.	MC-431-G-011

Proposed Licence Changes

There are no changes to the licence conditions or format. The licence term recommended is for a 20-year period.

Licence Conditions

There are no changes to the existing licence conditions.

Licence Format

The licence format was updated previously as part of [CMD 19-H105, Cameco Corporation McArthur River Operation Financial Guarantee Review and Licence Modernization Amendments](#). No further changes to the licence format are proposed at this time.

Licence Period

Cameco has requested a renewal of its licence for a 20-year period. As discussed in section 5.5 of this CMD, CNSC staff are recommending that the Commission approve the renewal of the CNSC-issued licence for the MRO for a 20-year period. CNSC staff have concluded that a 20-year licence term is acceptable following an assessment of Cameco's application and supporting documents, and considering Cameco's satisfactory performance history across all SCAs during the current licence period. Additionally, CNSC staff have also given consideration to the risk profile of the MRO, the ability of CNSC's regulatory framework to support a uranium mine licence for a 20-year period, including the continued ability to provide effective regulatory oversight and appropriate Indigenous and public engagement. Based on these considerations, and recent decisions issued by the Commission, CNSC staff are recommending the Commission approve CNSC staff's proposed 20-year licence term.

Proposed Licence

e-Doc 6942715 (PDF)



DRAFT
URANIUM MINE LICENCE
CAMECO CORPORATION
MCARTHUR RIVER OPERATION

I) LICENCE NUMBER: UML-MINE-MCARTHUR.00/2043

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

Cameco Corporation
2121 – 11th Street West
Saskatoon, Saskatchewan S7M 1J3
Corporate Number 332981-0

III) LICENCE PERIOD:

This licence is valid from November 1, 2023 to October 31, 2043, unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

- a) prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) at a site known as the McArthur River Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;
- b) mine a nuclear substance (uranium ore);
- c) possess, transfer, import, use, store, and dispose of nuclear substances; and
- d) possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).

V) EXPLANATORY NOTES:

- a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and its associated Regulations.
- c) The UML-MINE-MCARTHUR.00/2043 Licence Conditions Handbook (LCH) identifies the criteria that will be used by Canadian Nuclear Safety Commission staff to assess the licensee's compliance with the conditions listed in this licence. The LCH also provides information regarding delegation of authority and applicable version control of documents comprising compliance verification criteria.

VI) CONDITIONS:

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

1. *MANAGEMENT SYSTEM*

1.1 Management System

The licensee shall implement and maintain a management system.

2. *HUMAN PERFORMANCE MANAGEMENT*

2.1 Training Program

The licensee shall implement and maintain a training program.

3. *OPERATING PERFORMANCE*

3.1 Operations Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

3.3 Nuclear Substances and Radiation Devices

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

4. *SAFETY ANALYSIS*

4.1 Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

5. *PHYSICAL DESIGN*

5.1 Design Program

The licensee shall implement and maintain a design program.

6. *FITNESS FOR SERVICE*

6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

7. *RADIATION PROTECTION*

7.1 Radiation Protection Program

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

8. *CONVENTIONAL HEALTH AND SAFETY*

8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

9. *ENVIRONMENTAL PROTECTION*

9.1 Environmental Protection Program

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

10.2 Fire Protection Program

The licensee shall implement and maintain a fire protection program.

11. WASTE MANAGEMENT

11.1 Waste Management Program

The licensee shall implement and maintain a waste management program.

11.2 Decommissioning Plan

The licensee shall maintain a decommissioning plan.

12. SECURITY

12.1 Security Program

The licensee shall implement and maintain a security program.

13. SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

The licensee shall implement and maintain a safeguards program.

14. PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

SIGNED at OTTAWA, this XX day of XX, 2023.

Rumina Velshi, President
on behalf of the Canadian Nuclear Safety Commission

APPENDIX A

LOCATION OF CAMECO'S OPERATION AT MCARTHUR RIVER

The location of the Cameco's operation at McArthur River is provided on Drawing No. MC431-G-011 (e-Doc 6974387).

DRAFT



Draft Licence Conditions Handbook

e-Doc 6961356 (PDF)



e-Doc 6899315 (Word)
e-Doc 6961356 (PDF)

LICENCE CONDITIONS HANDBOOK

LCH-MINE-MCARTHUR.00/2043

MCARTHUR RIVER OPERATION URANIUM MINE LICENCE

UML-MINE-MCARTHUR.00/2043

DRAFT

Revision 0



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Licence Conditions Handbook

Effective: XX 2023

LCH-MINE-MCARTHUR.00/2043, Revision 0

**McArthur River Operation
Uranium Mine Licence**

UML-MINE-MCARTHUR.00/2043

(Effective: XX, 2023)

SIGNED at OTTAWA this Xth day of 2023

**Patrick Burton, Director
Uranium Mines and Mills Division
Directorate of Nuclear Cycle and Facilities Regulation
CANADIAN NUCLEAR SAFETY COMMISSION**

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Revision History:

Effective Date	Revision	Section(s) Changed	Description of the Changes	DCR e-DOC
xx, 2023	0	N/A	Original Document. Updated REGDOC listings, updated to reflect new licence and LCH number from LCH issued as part of past licence	6899315 (Word) 6961356 (PDF)

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TABLE OF CONTENTS

PART I - INTRODUCTION	1
PART II – FRAMEWORK FOR EACH LICENCE CONDITION	2
G. GENERAL 2	
G.1 Licensing Basis for Licensed Activities	2
G.2 Notification of Changes	5
G.3 Financial Guarantee	6
G.4 Public Information and Disclosure	8
1. MANAGEMENT SYSTEM	9
Licence Condition 1.1	9
2. HUMAN PERFORMANCE MANAGEMENT	10
Licence Condition 2.1	10
3. OPERATING PERFORMANCE	11
Licence Condition 3.1	11
Licence Condition 3.2	12
Licence Condition 3.3	14
4. SAFETY ANALYSIS	16
Licence Condition 4.1	16
5. PHYSICAL DESIGN	17
Licence Condition 5.1	17
6. FITNESS FOR SERVICE	18
Licence Condition 6.1	18
7. RADIATION PROTECTION	20
Licence Condition 7.1	20
8. CONVENTIONAL HEALTH AND SAFETY	22
Licence Condition 8.1	22
9. ENVIRONMENTAL PROTECTION	24
Licence Condition 9.1	24
10. EMERGENCY MANAGEMENT AND FIRE PROTECTION	27
Licence Condition 10.1	27
Licence Condition 10.2	29
11. WASTE MANAGEMENT	30
Licence Condition 11.1	30
Licence Condition 11.2	32
12. SECURITY	33
Licence Condition 12.1	33
13. SAFEGUARDS AND NON-PROLIFERATION	34
Licence Condition 13.1	34

14. PACKAGING AND TRANSPORT	36
Licence Condition 14.1	36
15. FACILITY SPECIFIC	37
APPENDIX A CHANGE CONTROL PROCESS	38
APPENDIX B LICENSEE DOCUMENTS THAT REQUIRE NOTIFICATION OF CHANGE	43
APPENDIX C LIST OF DOCUMENTS USED AS GUIDANCE OR COMPLIANCE VERIFICATION CRITERIA*	44

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PART I - INTRODUCTION

The purpose of the licence conditions handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC). This will help ensure that the licensee will maintain facility operations in accordance with the licence and the intent of the licensing basis. The LCH also provides information regarding delegation of authority, document version control and conflict resolution. The LCH should be read in conjunction with the licence.

The LCH has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains the regulatory context, background, and/or history related to the LC. CVC are used by Canadian Nuclear Safety Commission (CNSC) staff to oversee compliance with the LC. Guidance is non-mandatory information, including direction, on how to comply with the LC.

The statement “a person authorized by the Commission” in the LCs or the LCH indicates that the Commission may delegate certain authority to CNSC staff. Unless otherwise specified, the delegation of authority by the Commission to act as a person authorized by the Commission (Delegated Officer) is only applied to incumbents in the following positions:

- Director, Uranium Mines and Mills Division
- Director General, Directorate of Nuclear Cycle and Facilities Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

INTRODUCTION

PART II – FRAMEWORK FOR EACH LICENCE CONDITION

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter “the Commission”).

Preamble

Licence condition G.1 requires activities (defined in Section IV of the Licence) be conducted in accordance with the licensing basis. Further information on the licensing basis is available in CNSC regulatory document, REGDOC-3.5.3 *Regulatory Fundamentals*.

The licensing basis, established by the Commission at the time the licence is issued, sets the boundary conditions for a regulated activity, and establishes the basis for the CNSC’s compliance program for that regulated activity.

Part (i) of licence condition G.1 includes, but is not limited to, the following:

- *Nuclear Safety and Control Act*
- *Uranium Mines and Mills Regulations*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Substances and Radiation Devices Regulations*
- *Metal and Diamond Mining Effluent Regulations*
- Canada/International Atomic Energy Agency (IAEA) Safeguards Agreements

GENERAL

The safety and control measures mentioned under Parts (ii) and (iii) of licence condition G.1 have the potential to affect the health and safety of people, the environment, security or international obligations to which Canada agrees. These measures may be found in high-level programmatic documents but might also be found in lower-level supporting documentation. Safety and control measures can also be found in licensing basis publications such as CNSC regulatory documents, CSA Group standards or licensee documentation submitted in support of a licence.

The CNSC licence authorizes Cameco Corporation (Cameco) to conduct the following undertakings at the McArthur River Operation, for which the CNSC provides regulatory oversight:

- operate and modify an underground uranium mine, including an associated underground ore-treatment system, to a maximum output of 9.6 million kilograms of uranium per year
- transfer, by use of a surface load-out system, the treated uranium ore to another facility authorized by the CNSC to accept the nuclear substance
- prepare hazardous non-nuclear materials for use in the mining and treatment of the uranium
- implement and maintain a program for the appropriate treatment of all wastes arising from any part of the facility, including those containing nuclear substances
- possess, transfer, use, store, import and dispose of nuclear substances and radiation devices required for use in the facility or as part of the operation of the facility.

An environmental assessment carried out in 1995 (e-Doc 4140075) and addendum in 1996 (e-Doc 557708) evaluated the environmental effects from the operation of the mine at an annual production rate up to 7.2 million kilograms of uranium per year. In April 2015, CNSC staff confirmed that annual production rates of 9.6 million kilograms of uranium was within the licensing basis (e-Doc 4699846).

In 2009, the *Ecological Risk Assessment of the Effects of Discharge from Treated Water from a Rapid Inflow Event at the McArthur River Operation* (e-Doc 3398615) was published in response to the 2003 uncontrolled inflow event.

Ore at the McArthur River Operation is processed into slurry, packaged into a CNSC approved IP-II type container and currently hauled to Cameco's Key Lake uranium mill for further processing. As a result, no tailings are stored at the McArthur River Operation mine site.

On October 23, 2019, an application by Cameco to change the definition of "low grade" ore from 2 percent to 3 percent uranium by mass, CNSC staff confirmed this change is within the licensing basis (e-Doc 6021834). "Low grade" ore is transferred by road conveyance to the Key Lake Operation in IP-I packages.

GENERAL

Compliance Verification Criteria

Licensing Basis Documents

Licensing basis documents are listed in Appendix B and C in addition to tables under the most relevant LC. All “shall” or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any “should” or informative statements in licensing basis publications are also considered CVC, this is provided under the most relevant LC.

In the event of any inconsistency between two elements of the licensing basis, the licensee shall consult CNSC staff to determine the approach to resolve the issue.

For operational activities that are not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state that is compliant with the licensing basis, taking into account the risk significance of the situation. Reporting requirements are outlined in REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills* and discussed under LC 3.2 of this LCH.

Changes to documentation or activities that result in operational activities not being in accordance with the licensing basis must be approved by the Commission prior to implementation.

Guidance

When the licensee becomes aware that a proposed change or activity might not be in accordance with the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Guidance for notifications to the CNSC related to licensee changes are discussed under LC G.2.

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

Preamble

During the course of licensed activities it is expected that the licensee may make changes to implement improvements or to address changes in operational needs. While making these changes, it is imperative the licensee remains within the bounds of the licensing basis.

Appendix B provides a list of licensee documents that require notification of change. CNSC staff track the current version of these licensee documents separate from the LCH (e-Doc 5885939).

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Changes to the design, operating conditions, policies, programs and methods that have the potential to be outside of the licensing basis require prior written notification to the CNSC. CNSC staff will confirm the change remains within the licensing basis and notify the licensee prior to implementation of the change by the licensee. The licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected. Regular communication between the CNSC and the licensee should ensure that there is adequate time for CNSC staff to review and evaluate information provided in prior written notifications in advance of any of these proposed changes being implemented. It remains the responsibility of the licensee to ensure that the McArthur River Operation continues to operate within the bounds of the licensing basis.

Prior written notification shall include:

- a description of the change
- the rationale for the change
- expected duration (if not a permanent change)
- an explanation from the licensee supporting the conclusion that the change remains in accordance with the licensing basis.

Ongoing regular communication shall be maintained between the CNSC and licensee.

Guidance

A list of criteria to determine if a change would be in accordance with the licensing basis is provided in Appendix A of CNSC process document *Overview of: Assessing licensee changes to documents or operations* (e-Doc 4055483).

GENERAL

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

Preamble

The licensee is responsible for all costs of decommissioning at the facility. All such costs are included in the licensee’s decommissioning cost estimates and are covered by the licensee’s financial guarantee for decommissioning. The licensee’s decommissioning costs estimate is provided in the facility’s preliminary decommissioning plan. The facility’s current financial guarantee is covered by specific financial instruments as listed below.

The latest revision of the preliminary decommissioning plan (PDP) and estimation of the cost of decommissioning were finalized in Cameco’s *Preliminary Decommissioning Plan and Cost Estimate*, January 2018 (e-Doc 5934774).

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Decommissioning of facilities containing nuclear substances	N294-19
CNSC	Decommissioning	REGDOC-2.11.2
CNSC	Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities	REGDOC-3.3.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XXXX	Yes
Cameco	Preliminary Decommissioning Plan	5934774	Yes
Cameco	Preliminary Decommissioning Cost Estimate	5445509	Yes
Cameco	Letter of Credit P100095 for CAD\$ 16,867,312 Letter of Credit SBGT744174 for CAD\$ 12,520,593	6940160	Yes
Orano	Bond BDTO-860117-020 for CAD\$ 12,712,095	6940160	Yes

GENERAL

The financial guarantee for decommissioning the McArthur River Operation shall be reviewed and revised by the licensee every five years, or when requested by the Commission. A review should also be conducted following a revision of the Preliminary Decommissioning Plan or Preliminary Decommissioning Cost Estimate that significantly impacts the financial guarantee.

Cameco submitted to the CNSC an updated McArthur River PDP in December 2022. It is undergoing review against the current version of the CSA Group standard.

The licensee shall submit a written report to the Commission confirming that the financial instruments continue to meet the acceptance criteria of section 3 of REGDOC 3.3.1. Any change to the type of financial instrument requires prior notification to the CNSC. The licensee shall submit this report by the end of March of each year, or at any time as the Commission may request.

Guidance

Guidance Publications

There is no guidance provided for this licence condition.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

Preamble

The public information and disclosure program ensures that information related to the health and safety of persons and the environment and other issues associated with the lifecycle of the nuclear facility is effectively communicated to the public. In addition, the program shall include a commitment to and protocol for ongoing timely communications regarding emissions, effluent releases, unplanned events and other incidents and activities related to the licensed facility that may be of interest to the public.

Compliance Verification Criteria

Licensing B Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Public Information and Disclosure*	REGDOC-3.2.1

* Cameco to post summaries of Environmental Risk Assessments on their website, rather than the entire document, in accordance with Cameco's June 4, 2020 letter to the CNSC (L. Mooney to H. Tadros, e-Doc 6318384).

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Public Information Program	6698901	Yes

Guidance

Source	Document Title	Document Number
CNSC	Indigenous Engagement, Version 1.2	REGDOC-3.2.2

GENERAL

1. MANAGEMENT SYSTEM

Licence Condition 1.1

The licensee shall implement and maintain a management system.

Preamble

The “management system” safety and control area covers the framework which establishes the processes and programs required to ensure an organization achieves its safety objectives, continuously monitors its performance against these objectives and fosters a healthy safety culture.

The management system must satisfy the requirements set out in the NSCA, regulations made pursuant to the NSCA, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides the evidence that the licensing basis remains valid.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management system requirements for Nuclear Facilities (except sections identified under other licence conditions)	N286-12
CNSC	Safety Culture	REGDOC-2.1.2

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Quality Management Program	6698900	Yes

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Management System	REGDOC-2.1.1

MANAGEMENT SYSTEM

2. HUMAN PERFORMANCE MANAGEMENT

Licence Condition 2.1

The licensee shall implement and maintain a training program.

Preamble

The “human performance management” safety and control area covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee workers are in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely perform their duties.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	xx	Yes
Cameco	Training and Development Program	6952189	Yes

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Personnel Training, Version 2	REGDOC-2.2.2

Guidance Publications

Source	Document Title	Document Number
CNSC	Human Factors	REGDOC-2.2.1

HUMAN PERFORMANCE MANAGEMENT

3. OPERATING PERFORMANCE

Licence Condition 3.1

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

Preamble

The “operating performance” safety and control area includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management system requirements for nuclear facilities	N286-12

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	xx	Yes
Cameco	Environmental Code of Practice (Appendix B of the Environmental Protection Program – Code of Practice)	6960908	Yes
Cameco	Radiation Code of Practice (Appendix C of Radiation Protection Program – Code of Practice)	6858949	Yes
Cameco	Quality management Program	6698900	Yes
Cameco	Waste Management Program	6740987	Yes
Cameco	Mine Operations Program	6810953	Yes
Cameco	Ore Processing Program	6810949	Yes

Guidance

There is no guidance provided for this licence condition.

OPERATING PERFORMANCE

Licence Condition 3.2

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

Preamble

This LC requires the licensee to implement and maintain a process for reporting information to the CNSC. This includes monitoring results, changes to facilities or approved activities, performance assessments and the occurrence of unusual events. Sections 29 and 30 of the *General Nuclear Safety and Control Regulations*, section 38 of the *Nuclear Substance Radiation Devices Regulations* and section 16 of the *Radiation Protection Regulations* provides further insight into reportable events.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*	REGDOC-3.1.2

* Modified reporting requirements for false alarms and Emergency Response Team (ERT) responses, where ERT activation is not directly related to the licensed activity, are described in a October 4, 2021 letter from CNSC to Cameco (P. Fundarek to K. Nagy, e-Doc 6653493).

The licensee shall report effluent concentrations that reach or exceed the discharge limits in the *Metal and Diamond Mining Effluent Regulations* in addition to requirements outlined in REGDOC-3.1.2.

The licensee shall submit to the CNSC within 90 days after the end of each quarter of a calendar year, the results of the:

- radiation monitoring program
- environmental monitoring program.

Results from the above monitoring programs are also to include quality assurance and quality control information. More frequent reporting may be requested on a case-by-case basis.

The licensee shall issue worker radiation dose records within 90 days after the end of each quarter of a calendar year, to:

- the worker
- the CNSC
- the National Dose Registry (NDR).

The licensee shall submit to the CNSC an annual compliance report by March 31 of each year, covering the operation for the 12-month period from January 1 to December 31 of the previous year.

OPERATING PERFORMANCE

Guidance

Guidance Publications

Source	Document Title	CNSC e-Access Document Number
CNSC/SK	CNSC – Saskatchewan Harmonized Annual Reporting Requirements, August 2010	3678482

OPERATING PERFORMANCE

Licence Condition 3.3

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

Preamble

Licensees must ensure they receive CNSC authorization before the possession, use, storage, transfer, or disposal of nuclear substances and radiation devices, except as specified in the tables for this section. It is the responsibility of the licensee to ensure that they have CNSC authorization for the import or export of any nuclear substances and radiation devices.

The possession limits for unsealed nuclear substances does not apply to natural uranium and its decay products which originate in the mining or ore-processing streams.

It is also important to note that there is no possession limit on the number of sealed nuclear sources or radiation devices.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Licence Application Guide Nuclear Substances and Devices, version 2 (excluding section 2)	REGDOC-1.6.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Radiation Protection Program (Appendix B- Authorized Nuclear Substances and Nuclear Devices List))	6858949	Yes

The authorized possession limits for unsealed nuclear substances are:

Nuclear Substance	Maximum Total Quantity in Possession
Radium-226	355 kBq
Uranium - Natural	100 Bq

OPERATING PERFORMANCE

The maximum authorized quantity of nuclear substances per sealed source is:

Nuclear Substance	Maximum Quantity per Sealed Source
Americium-241	1.00 KBq
Radium-226	20 kBq
Cesium-137	18.5 GBq
Uranium – Natural	30 MBq
Uranium – Depleted	30 MBq
Cobalt-60	100 kBq
Thallium-204	1 MBq
Polonium-210	370 MBq

The authorized make and model of radiation devices and the maximum quantity of nuclear substance per each device are:

Radiation Device Make and Model	Nuclear Substance	Maximum Quantity per Radiation Device
Ronan Engineering SA-1	Cesium-137	18.5 GBq
Tracero	Cesium-137	7.4 GBq
Tracero	Cobalt-60	370 MBq

Note: Includes provision for replacement sources for these radiation devices.

The management of nuclear substances and radiation devices will be evaluated against:

- 3.3.1 A radioisotope safety poster approved by the Commission or a person authorized by the Commission, which corresponds to the classification of the area, room or enclosure, is posted in a readily visible location in areas, rooms or enclosures where these listed nuclear substances are handled.
- 3.3.2 When in storage, radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee; the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 mSv/h and measures are in place to ensure that the dose limits in the *Radiation Protection Regulations* are not exceeded as a result of the substances or devices in storage.

Guidance

There is no guidance provided for this licence condition.

OPERATING PERFORMANCE

4. SAFETY ANALYSIS

Licence Condition 4.1

The licensee shall implement and maintain a safety analysis program.

Preamble

The “safety analysis” safety and control area includes the systematic evaluation of the potential hazards associated with the proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Mining Operations Program	6810953	Yes
Cameco	Waste Management Program	6740987	Yes
Cameco	Safety and Health Management Program	6794112	Yes

The safety analysis program will be evaluated against the following principles:

- 4.1.1 A process has been implemented and maintained to identify, assess, and eliminate or control health and safety and environmental risks associated with existing and new processes or changes to work procedures, equipment, organizational structure, staffing, products, services and suppliers.
- 4.1.2 Risks to health, safety and the environment have been identified, assessed, eliminated or controlled for existing and new processes or for changes to work procedures, equipment, organizational structure, staffing, products, services and suppliers.
- 4.1.3 Appropriate methodologies are used to identify potential hazards and consider the effectiveness of preventative measures and strategies in reducing the effects of such hazards.
- 4.1.4 Modeling is regularly updated using measured values to replace important assumptions and to increase the certainty of predicted long-term behaviour of contaminants.

Job hazard assessments conducted when planning non-routine and complex work activities.

Guidance

There is no guidance provided for this licence condition.

SAFETY ANALYSIS

5. PHYSICAL DESIGN

Licence Condition 5.1

The licensee shall implement and maintain a design program.

Preamble

The “physical design” safety and control area relates to activities that impact the ability of structures, systems and components to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The design basis is the range of conditions and events taken into account in the design of structures, systems and components of a facility according to established criteria, such that the facility can withstand them without exceeding authorized limits for the planned operation of safety systems.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Design of Uranium Mines and Mills: Ventilation Systems*	REGDOC-2.5.4
CSA Group	Management system requirements for nuclear facilities	N286-12

* Applicable when applying for a CNSC licence to prepare a site for and construct, operate or decommissioning a uranium mine or mill.

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Ore Processing Program	6810949	Yes
Cameco	Mining Operations Program	6810953	Yes

Guidance

Source	Document Title	Document Number
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1

PHYSICAL DESIGN

6. FITNESS FOR SERVICE

Licence Condition 6.1

The licensee shall implement and maintain a fitness for service program.

Preamble

The “fitness for service” safety and control area covers activities that impact the physical condition of structures, systems and components to ensure that they remain effective over time. This area includes programs that ensure equipment is available to perform its intended design function when called upon to do so.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management system requirements for Nuclear Facilities	N286-12

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Maintenance Program	6833490	Yes

The fitness for service program will also be assessed against:

- 6.1.1 Systems, equipment and devices are maintained in good working order such that they can perform their design function.
- 6.1.2 Instruments, controls and associated indicators are maintained operational and in calibration. Method and interval of calibrations are defined, and records of calibrations are kept.
- 6.1.3 Preventative and corrective maintenance processes and systems have been implemented and are maintained.
- 6.1.4 Regular inspection and testing of critical infrastructure and equipment are carried out.
- 6.1.5 A process has been implemented to identify, plan and schedule maintenance activities.

FITNESS FOR SERVICE

- 6.1.6 Maintenance, testing, surveillance and inspection backlogs are monitored and minimized.
- 6.1.7 Methods are used to show the current acceptance and operating status, and to prevent the use of systems, equipment or devices that are inaccurate, uncalibrated or not in working order.
- 6.1.8 When deviations beyond accuracy limits are found or suspected, their consequence on past results, and on present performance is evaluated.
- 6.1.9 A process exists to verify that changes to calibration, testing and maintenance requirements due to system and equipment modifications and replacements are implemented.

Guidance

There is no guidance provided for this licence condition.

7. RADIATION PROTECTION

Licence Condition 7.1

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

Preamble

The “radiation protection” safety and control area covers the implementation of a radiation protection program in accordance with the *Radiation Protection Regulations*. This program must ensure that contamination and radiation doses received are monitored, controlled, kept as low as reasonably achievable (ALARA), and social and economic factors are being taken into account.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Radiation Protection Program	6858949	Yes
Cameco	Mining Facility Licensing Manual	XX	Yes

The radiation protection (RP) program will be assessed against the following principles:

- 7.1.1 Radiological conditions are monitored and sources of internal and external radiation exposures are controlled. Access and work in radiological areas are controlled so that collective and individual radiation exposures are kept as low as reasonably achievable in accordance with the ALARA principle.
- 7.1.2 RP instrumentation and equipment are calibrated, maintained and used so that radiation levels are accurately determined. Uncalibrated equipment is removed from use.
- 7.1.3 The personal dosimetry program ensures that external and internal radiation doses to individuals are accurately determined and recorded.
- 7.1.4 Appropriate contamination control measures are implemented to control and minimize the contamination of areas, equipment and personnel.
- 7.1.5 Effective decontamination control measures are implemented to control and prevent the contamination of areas, equipment and personnel.

RADIATION PROTECTION

Action levels (AL) are designed to alert licensees before regulatory dose limits are reached. By definition, if an AL referred to in a licence is reached, a loss of control of some part of the associated RP program may have occurred and specific action is required, as defined in the *Radiation Protection Regulations*, the licence and the applicable code of practice.

Action Level	Dose (mSv)
Weekly Action Level	1
Quarterly Action Level	5

The weekly AL is assessed against official dosimetry results or engineering monitoring data. The quarterly AL is assessed against official dosimetry results. The licensee is expected to review and, if necessary, revise the ALs specified above at least once every five years in order to validate their effectiveness. The results of such reviews should be provided to the CNSC.

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Radiation Protection	REGDOC-2.7.1
CNSC	Dosimetry, Volume I: Ascertaining Occupational Dose	REGDOC-2.7.2
CNSC	Measuring Airborne Radon Progeny at Uranium Mines and Mills	G-4
CNSC	Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills	G-218

8. CONVENTIONAL HEALTH AND SAFETY

Licence Condition 8.1

The licensee shall implement and maintain a conventional health and safety program.

Preamble

The “conventional health and safety” safety and control area covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

The regulation of non-radiological health and safety at uranium mines and mills is governed by the *Canada Labour Code Part II*, which is administered by Employment and Social Development Canada (ESDC). However, the *Saskatchewan Uranium Mines and Mills Exclusion Regulations* (SOR/2001-115) defer the regulation of occupational health and safety in Saskatchewan uranium mines and mills to the province of Saskatchewan in accordance with the requirements of *The Mines Regulations, 2018 Part II Revised Regulations of Saskatchewan*.

The CNSC also has regulatory responsibilities for the oversight of the protection of the health and safety of workers. The CNSC harmonizes the oversight of conventional health and safety with the Saskatchewan Ministry of Labour Relations and Workplace Safety.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Safety and Health Management Program	6794112	Yes

The conventional health and safety program will be assessed against the following principles:

- 8.1.1 Housekeeping standards have been identified and are enforced to ensure that work areas are kept clean and organized.
- 8.1.2 Facilities, processes and procedures have been implemented to ensure the safe management of hazardous materials.
- 8.1.3 Employees and contractors actively participate in the management of conventional health and safety.
- 8.1.4 Management verifies that employees and contractors actively participate in the management of health and safety in their workplace.
- 8.1.5 A process has been established and maintained to monitor, measure and record conventional health and safety performance and the effectiveness of the occupational health and safety program on a regular basis.

CONVENTIONAL HEALTH AND SAFETY

- 8.1.6 Routine inspections are performed by workers, supervisors, senior staff and/or safety professionals to identify any potential safety issues.
- 8.1.7 Processes and procedures are established and maintained to investigate accidents and incidents, to identify root causes, to implement corrective actions and to verify that corrective actions have been completed and will effectively prevent recurrence.
- 8.1.8 Procedures have been implemented and maintained for reporting work-related injuries, illnesses, fatalities and conventional health and safety incidents including near misses.
- 8.1.9 The causes of injuries are investigated, corrective actions implemented, and the effectiveness of corrective actions verified.
- 8.1.10 A preventative and corrective action procedure has been established and maintained to address non-conformances and inadequately controlled risks.

Guidance

Source	Document Title	Document Number
CNSC	Conventional Health and Safety	REGDOC-2.8.1

9. ENVIRONMENTAL PROTECTION

Licence Condition 9.1

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

Preamble

The “environmental protection” safety and control area covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, version 1.2	REGDOC-2.9.1
CSA Group	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.4-10
CSA Group	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.5-11
CSA Group	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	N288.6-12
CSA Group	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.7-15
CSA Group	Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities	N288.8-17

ENVIRONMENTAL PROTECTION

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Environmental Protection Program	6960908	Yes
Cameco	McArthur River Operation Environmental Risk Assessment (December 2020)	6787282	Yes
Cameco	McArthur River Operation Environmental Risk Assessment, 2015	4895700	Yes
Cameco	McArthur River Operation Environmental Performance Report 2010 to 2014	4895691	Yes

To ensure the applicable environmental protection measures have been established, implemented and maintained, the environmental protection program will also be assessed against:

- 9.1.1 Action levels specified in the environmental code of practice. When the licensee becomes aware that an action level has been triggered, the licensee shall notify the Commission within 24 hours and take specific action as defined in the *Uranium Mines and Mills Regulations* and the environmental code of practice.
- 9.1.2 The authorized release limits as specified below. When the licensee becomes aware that an authorized release limit has been reached or exceeded, the licensee shall immediately notify the Commission, investigate and take corrective action to ensure that the releases are maintained below the authorized release limits.

The authorized liquid effluent release limits are:

Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic (mg/L)	0.30	0.45	0.60
Copper (mg/L)	0.30	0.45	0.60
Lead (mg/L)	0.10	0.15	0.20
Nickel (mg/L)	0.50	0.75	1.00
Zinc (mg/L)	0.50	0.75	1.00
Un-ionized ammonia (mg/L)	0.50	N/A	1.00
Total Suspended Solids (mg/L)	15.00	22.50	30.00
Radium-226 (Bq/L)	0.37	0.74	1.11

Acid balance (as H ₃ O ⁺) reported as pH	In a range of 6.0 to 9.5
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Acutely Lethal Effluent	0%
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ENVIRONMENTAL PROTECTION

Notes:

- 1) Authorized release limits have been harmonized, where available, with those required under the *Metal and Diamond Mining Effluent Regulations* (MDMER).
- 2) Definition of Units: mg/L = milligrams per litre
Bq/L = becquerels per litre
- 3) All concentrations and activities are total values.
- 4) The above limits shall apply to all effluent discharged from the minewater treatment plant and from Shaft #3.
- 5) “Monthly mean concentration” means the average value of the concentrations measured in all composite or grab samples collected from the final discharge point during each month when liquid effluent is released.
- 6) “Composite sample” means:
 - a) a quantity of effluent consisting of not less than three equal volumes or three volumes proportionate to flow that have been collected at approximately equal time intervals over a period of not less than seven hours and not more than 24 hours; or
 - b) a quantity of effluent collected continuously at a constant rate or at a rate proportionate to the rate of flow of the effluent over a sampling period of not less than seven hours and not more than 24 hours.
- 7) “Grab sample” means a quantity of undiluted effluent collected at any given time.
- 8) “*Acutely lethal*” (Source MDMER), in respect of an effluent, means that the effluent at 100 percent concentration kills
 - a) more than 50 percent of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1;
 - b) more than 50 percent of the threespine stickleback subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.2; or
 - c) more than 50 percent of the *Daphnia magna* subjected to it for a period of 48 hours, when tested in accordance with the acute lethality test set out in section 14.3. (*létaleté aiguë*)

Guidance

Guidance Publications

Source	Document Title	Document Number
CSA Group	Environmental management systems – Requirements with Guidance for use	ISO 14001:2015

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

Licence Condition 10.1

The licensee shall implement and maintain an emergency preparedness program.

Preamble

The “emergency management and fire protection” safety and control area covers emergency plans and emergency preparedness programs which exist for emergencies and for non-routine conditions. It also includes any results of exercise participation.

Licenses are required to continually maintain and enhance their emergency management programs.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Nuclear Emergency Preparedness and Response, Version 2*	REGDOC-2.10.1

* Off-site reporting timelines accepted by CNSC staff for Saskatchewan uranium mine and mill sites are described in January 30, 2020 letter from Cameco to the CNSC (L. Mooney to H. Tadros, e-Doc 6109667).

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Emergency Preparedness and Response Program	6726678	Yes

The emergency management and fire protection program will be assessed against the following principles:

- 10.1.1 Potential emergency situations are identified.
- 10.1.2 Pre-incident plans for response to emergencies are developed and are maintained.
- 10.1.3 Resources, including facilities and equipment required to respond to emergencies are identified and maintained.
- 10.1.4 Emergency communication protocols are established and understood.
- 10.1.5 Organization and responsibilities are identified.

EMERGENCY MANAGEMENT AND FIRE PROTECTION

- 10.1.6 Workers are trained to fulfill duties and responsibilities with respect to emergency management and fire plans and procedures.
- 10.1.7 Procedures are implemented and maintained to prevent, prepare for, and respond to emergencies.
- 10.1.8 Response plans are periodically tested.

Guidance

There is no guidance provided for this licence condition.

Licence Condition 10.2

The licensee shall implement and maintain a fire protection program.

Preamble

Licenses are required to implement and maintain a fire protection program (a set of planned, coordinated, controlled and documented activities) to ensure that the licensed activities do not result in an unreasonable risk to the health and safety of persons and to the environment due to fire and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
NRC	National Building Code of Canada (2015)*	N/A
NRC	National Fire Code of Canada (2015)*	N/A
CSA Group	Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances**	N393-13

* Subject to exclusions and/or amendments, as contained in Saskatchewan's [Codes Adoption 2015](#).

** To be implemented by Cameco by December 31, 2023 and to be used as guidance until the implementation date.

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Fire Protection Program	6952197	Yes

Guidance

Guidance Publications

There is no guidance provided for this licence condition.

11. WASTE MANAGEMENT

Licence Condition 11.1

The licensee shall implement and maintain a waste management program.

Preamble

The “waste management” safety and control area covers internal waste-related programs that form part of the facility’s operations up to the point where the waste is removed from the facility to a separate waste management facility.

Waste management facilities at the McArthur River Operation include:

- storage areas for mineralized and potentially acid-generating waste rock
- clean waste rock and overburden piles
- water treatment plant – mine water collection, contaminated surface drainage,
- contaminated water handling and storage and discharges
- hazardous substance or waste dangerous goods storage facilities
- site run-off containment systems and ponds
- contaminated industrial waste storage
- storage and recycling facilities for hazardous wastes
- landfill for uncontaminated industrial and domestic waste
- domestic sewage treatment.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Waste Management, Volume I: Management of Radioactive Waste	REGDOC-2.11.1
CNSC	Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*	REGDOC-2.11.1

* Applicable to new uranium mine or mill projects and/or to new waste management facilities at existing uranium mines and mills.

Guidance

Source	Document Title	Document Number
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WASTE MANAGEMENT

Source	Document Title	Document Number
CNSC	Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste, Version 2	REGDOC-2.11.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Waste Management Program	6740987	Yes

The waste management program will be assessed against the following principles:

- 11.1.1 A radioactive waste management program is implemented to control and minimize the volume of radioactive waste.
- 11.1.2 The volume of waste is minimized by applying the “reduce, reuse, recycle and recover” principle.
- 11.1.3 Work is carried out in a manner that minimizes waste and prevents pollution.
- 11.1.4 Waste is stored or disposed of in the appropriate manner.
- 11.1.5 Wastes are managed in a manner that does not compromise reclamation or decommissioning plans.
- 11.1.6 The effectiveness of waste management practices is monitored, measured and recorded on a regular basis.
- 11.1.7 Routine inspections are performed to identify any potential waste management issues and to verify the condition of containment structures and waste management facilities.
- 11.1.8 The safety of embankments/dams is inspected and evaluated.
- 11.1.9 Records are kept of the quantities and types of waste generated and the method of disposal or management.
- 11.1.10 Wastes are managed to control the present and future releases of contaminants to the environment.
- 11.1.11 Surface water is managed to prevent or minimize the volume that is contaminated.

Guidance

Guidance Publications

Source	Document Title	Document Number
Canadian Dam Association	Canadian Dam Association, Canadian Dam Safety Guidelines	N/A

WASTE MANAGEMENT

Licence Condition 11.2

The licensee shall maintain a decommissioning plan.

Preamble

This LC requires that the licensee maintain a preliminary decommissioning plan (PDP).

A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible, and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for establishing and maintaining a financial arrangement (financial guarantee) that will assure adequate funding of the decommissioning plan.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-09
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-19
CNSC	Decommissioning	REDOC-2.11.2
CNSC	<u>Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities</u>	REGDOC-3.3.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Preliminary Decommissioning Plan and Cost Estimate	5445509	Yes
Cameco	Preliminary Decommissioning Cost Estimate	5445509	Yes

The PDP is to be revised at a minimum of every five years or when required by the Commission; however, is to be kept current to reflect any changes in the site or nuclear facility. The McArthur River Operation PDP was last revised and submitted to the CNSC in 2018. Cameco submitted a revised PDP to the CNSC in December 2022 and is undergoing review against the current version of the CSA Group standard.

Guidance

There is no guidance provided for this licence condition.

WASTE MANAGEMENT

12. SECURITY

Licence Condition 12.1

The licensee shall implement and maintain a security program.

Preamble

The “security” safety and control area covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.

Compliance Verification Criteria

Licence Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual (section 6.9)	XX	Yes
Cameco	Security Program	6831749	Yes

The security program will be assessed against the following principles:

- 12.1.1 The security program addresses the risks identified in an industrial security threat and risk assessment.
- 12.1.2 Measures are implemented and maintained to prevent the loss of nuclear substances or prevent acts of sabotage at the facility.
- 12.1.3 Measures are taken to prevent unauthorized access to the mining facility and to areas within the facility where nuclear substances are stored.
- 12.1.4 The industrial security threat and risk assessment is periodically reviewed and updated.

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	REGDOC-2.12.3

SECURITY

13. SAFEGUARDS AND NON-PROLIFERATION

Licence Condition 13.1

The licensee shall implement and maintain a safeguards program.

Preamble

The “safeguards and non-proliferation” safety and control area covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons*.

Compliance Verification Criteria

Source	Document Title	Document Number
CNSC	Accounting and Nuclear Material Accountancy	REGDOC-2.13.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Security Program	6831749	Yes
Cameco	Mining Facility Licencing Manual	XX	Yes

The safeguards and non-proliferation program will be assessed against CNSC’s REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*, and the following principles:

- 13.1.1 Reasonable services and assistance are provided to the IAEA to enable the IAEA to carry out its duties and functions.
- 13.1.2 Prompt access to all locations at the facility is granted to the IAEA at all reasonable times where such access is required for the purposes of carrying on an activity pursuant to a safeguards agreement. Health and safety services and escorts are provided as required in order to facilitate activities.
- 13.1.3 Records that must be kept or any reports that are required to be made under a safeguards agreement are disclosed to the CNSC and the IAEA.
- 13.1.4 Reasonable assistance is provided to the IAEA to enable sampling and removal or shipment of samples.
- 13.1.5 Reasonable assistance is provided to the IAEA to enable measurements, tests and removal or shipment of equipment.

SAFEGUARDS AND NON-PROLIFERATION

- 13.1.6 Measures are implemented to prevent damage to, or the theft, loss or sabotage of samples collected pursuant to a safeguards agreement or the illegal use, possession or removal of such samples.
- 13.1.7 Reports and information, that is required to facilitate Canada's compliance with any applicable safeguards agreement, is provided to the Commission.

Guidance

There is no guidance provided for this licence condition.

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14. PACKAGING AND TRANSPORT

Licence Condition 14.1

The licensee shall implement and maintain a packaging and transport program.

Preamble

The “packaging and transport” safety and control area covers the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility.

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of Transport Canada’s *Transportation of Dangerous Goods Regulations* and the CNSC’s *Packaging and the Transport of Nuclear Substances Regulations, 2015*.

The *Packaging and Transport of Nuclear Substances Regulations, 2015* and the *Transportation of Dangerous Goods Regulations* provides specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria

Licence Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	XX	Yes
Cameco	Transportation Program	6769908	Yes

The licensee shall implement and maintain a packaging and transport program that will ensure compliance with the requirements set out in the *Transportation of Dangerous Goods Regulations* and in the *Packaging and Transport of Nuclear Substances Regulations, 2015*.

Guidance

There is no guidance provided for this licence condition.

15. FACILITY SPECIFIC

There are no facility-specific licence conditions.

FACILITY SPECIFIC

APPENDIX A CHANGE CONTROL PROCESS

A.1 Change Control Process

A change control process is applied to the LCH to ensure that:

- preparation and use of the LCH are properly controlled
- all referenced documents are correctly identified and maintained
- procedures for modifying the LCH are followed.

A request to change this LCH can be initiated by either CNSC staff or the licensee. The licensee will be consulted on any changes to the LCH that are proposed by CNSC staff.

CNSC staff will take the following steps to update the LCH:

1. the CNSC receives or initiates written notification of proposed change
2. initiate a change request using the Change Request Form
3. complete a technical review of the proposed change, if required
4. consult the licensee and in case of disagreement on the proposed change, the dispute resolution process outlined in section A.3 will apply
5. obtain consent and signature from a Delegated Officer
6. update the LCH in accordance with the Change Request Form and send the updated document to the parties identified on the distribution list (section A.5).

Change Request Form

1. GENERAL INFORMATION				
File Plan #		e-Doc #(s) for Change Request Form		
Licensee	Licence Number	LCH #, Rev/Version	Request Date	
Licensing Officer				
2. CHANGE(S) TO THE LCH				
#	Description and Purpose	Proposed Change	References	
1	<initiator, nature, reason for change, e.g. administrative, change to a licensee doc, etc.>	<identify modifications, such as by track changes, highlighting, etc.>	<LC, page, section #, etc.>	
2				
3. ASSESSMENT (text and/or e-Doc #s)				
#	Division/Org	Comment	Disposition	
1	<division>			
	<division>			
	<licensee>			
	<division>			
2	etc.			
4. CONSENT TO MODIFY				
#	Agreed	Comment		
1				
2				
Name		Title	Signature	Date
5. LCH DOCUMENTATION AND DISTRIBUTION				
New LCH Number		LCH Effective Date	e-Doc # (include version number)	
CNSC Outgoing Notification			e-Doc #	Date Sent

APPENDIX A

A.2 Review Criteria for Proposed Changes to Licensing Basis Documents

The licensee must provide the CNSC with written notification of a proposed significant change to key licensee documents before the licensee implements the change. The notification must be accompanied by sufficient information to demonstrate that the change is within the intent of the licensing basis. Written notification of minor or administrative changes may be made in batches after the changes have been implemented.

The following criteria will be used by CNSC staff to determine if the proposed change is acceptable:

1. The submission includes the appropriate level and quality of information with regards to:
 - a) The description of the proposed change including:
 - a summary of the change, including the purpose or need for the change
 - a preliminary finding of whether this proposal or notification is required under the NSCA, a regulation made under the Act or the licence, or has implications under the *Impact Assessment Act*, or whether a licence amendment or other licensing action would likely be required
 - where applicable, the alternatives evaluated and the reasons for selection of the chosen option
 - any changes to the inventories of nuclear substances on site related to the proposed change
 - the construction, commissioning and operating schedule for the proposed change including hold points or progress reports for regulatory review and approval (as appropriate)
 - expected impacts, if any, on the proposed decommissioning or closure plans
 - results of any risk analysis or hazard operability studies performed, and a summary of the identified hazards and the mitigation measures identified to control potential hazards
 - b) The description of the design control, operating specifications and criteria including:
 - the design basis and criteria, and performance specifications
 - the design drawings such as the general arrangement, process and instrumentation diagrams, and process flow sheets
 - the quality management program for the various key stages of the change (e.g., design, construction, commissioning, etc.)

- c) The assessment of both the short and long term impacts with the mitigation measures in place on:
 - worker’s health and safety, including potential radiological and non-radiological exposures
 - the environment
 - security
 - Canada’s international obligations
 - d) The planned administrative controls including:
 - changes to the organization, roles and responsibilities
 - changes to applicable programs and procedures
 - a description of the proposed monitoring, inspection and test plans, including locations and frequency proposed to evaluate both positive and negative results
 - e) Changes to contingency plans including “full-stop measures”
 - f) Evidence that the licensee’s internal reviews and approvals have been completed, including meeting the requirements of the licensee’s change management procedure and consultation with the onsite occupational health and environmental committees, where applicable
 - g) Identification of the documents and training programs that may require revision when the proposed change is implemented.
2. The effects of the proposed change or action remain within the licensing basis.
 3. Following the implementation of the change the licensee will remain in compliance with the requirements set out in the applicable acts, regulations, and LCs.

A.3 Dispute Resolution

In case of a dispute between the licensee and CNSC staff regarding changes to the LCH, both parties will meet to discuss the dispute and reach a decision on the path forward. The decision, including its rationale will be documented. If any party is not satisfied with the decision, the resolution process will proceed up to the Director, Director General or Executive Vice-President and Chief Regulatory Operations Officer level. If any party is still not satisfied with the decision, the issue will be brought to the attention of the Commission at a Commission meeting. The decision made by the Commission will be final.

A.4 Records Management

In order to track changes to the LCH, the document change request and accompanying documentation will be archived in records and referenced in the revision history of the LCH. Electronic communication related to the change, such as comments from reviewers will be stored in the CNSC information management system.

APPENDIX A

A.5 Distribution

A copy of the updated version of the LCH will be distributed to the following parties:

- Uranium Mines and Mills Division, CNSC
- Cameco Corporation

A.6 Reporting to the Commission

CNSC staff will report on the changes made to the LCH during the previous year in their annual report to the Commission.

APPENDIX B LICENSEE DOCUMENTS THAT REQUIRE NOTIFICATION OF CHANGE

Document Title	e-Doc
Mining Facility Licensing Manual	XX
Preliminary Decommissioning Plan and Cost Estimate	5445509
Public Information Program	6638901
Quality Management Program	6698900
Training and Development Program	6952189
Radiation Protection Program	6858949
Mining Operations Program	6810953
Ore Processing Program	6810949
Maintenance Program	6833490
Safety and Health Management Program	6794112
Environmental Protection Program	6960908
Emergency Preparedness and Response Program	6726678
Fire Protection Program Manual	6952197
Security Program	6831749
Waste Management Program	6740987
Transportation Program	6769908
McArthur River Operation Environmental Performance Report 2010 to 2014	4895691
McArthur River Operation Environmental Risk Assessment, 2015	4895700
McArthur River Operation Environmental Risk Assessment, 2020	6787282

APPENDIX B

APPENDIX C LIST OF DOCUMENTS USED AS GUIDANCE OR COMPLIANCE VERIFICATION CRITERIA*

Document	Document Title	Document Number
Canadian Dam Association	Canadian Dam Association, Canadian Dam Safety Guidelines	N/A
CNSC	Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills	G-218
CNSC	Management System	REGDOC-2.1.1
CNSC	Human Factors	REGDOC-2.2.1
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	REGDOC-2.9.1
CNSC	<i>Personnel Training, Version 2</i>	REGDOC-2.2.2
CNSC	Nuclear Emergency Preparedness and Response, Version 2	REGDOC-2.10.1
CNSC	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1
CNSC	Public Information and Disclosure	REGDOC-3.2.1
CNSC	Licence Application Guide Nuclear Substances and Radiation Devices	REGDOC-1.6.1
CNSC	Safety Culture	REGDOC-2.1.2
CNSC	Design of Uranium Mines and Mills: Ventilation Systems	REGDOC-2.5.4
CNSC	Conventional Health and Safety	REGDOC-2.8.1
CNSC	Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings	REGDOC-2.11.1
CNSC	Security of Nuclear Substances: Sealed Sources and Category 1, II and II Nuclear Material, Version 2.1	REGDOC-2.12.3
CNSC	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	REGDOC-3.1.2
CNSC	Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities	REGDOC-3.3.1
CNSC	Regulatory Fundamentals	REGDOC-3.5.3
CNSC/SK	CNSC – Saskatchewan Harmonized Annual Reporting Requirements, August 2010	e-Doc 3678482

APPENDIX C

Document	Document Title	Document Number
CSA Group	Management System Requirements for Nuclear Facilities	N286-12
CSA Group	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.4-10
CSA Group	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.5-11
CSA Group	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	N288.6-12
CSA Group	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.7-15
CSA Group	Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities	N288.8-17
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-09
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-19
CSA Group	Environmental Management Systems – Requirements with Guidance for Use	ISO 14001:2015
NRC	National Building Code of Canada (2015)	N/A
NRC	National Fire Code of Canada (2015)	N/A
CSA Group	Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances	N393-13

* For CNSC documents, the most recent version of a referenced document shall be implemented following review and agreement between Cameco and the Canadian Nuclear Safety Commission.

APPENDIX C

PART 3 – KEY LAKE OPERATION

Part 3 of this CMD provides all relevant information pertaining directly to the Key Lake Operation licence, including:

1. the current licence;
2. any proposed changes to the conditions, licensing period, or formatting of an existing licence;
3. the proposed licence; and
4. the draft licence conditions handbook.

Current Licence

e-Doc 6072253 (PDF)



**URANIUM MILL LICENCE
CAMECO CORPORATION
KEY LAKE OPERATION**

I) LICENCE NUMBER: UML-MILL-KEY.01/2023

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

**Cameco Corporation
2121 – 11th Street West
Saskatoon, Saskatchewan S7M 1J3
Corporate Number 332981-0**

III) LICENCE PERIOD:

This licence is valid from November 1, 2013 to October 31, 2023, unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

- a) prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) for the milling of uranium ore at a site known as the Key Lake Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;
- b) produce a uranium concentrate;
- c) possess, transfer, import, use, store, and dispose of nuclear substances; and
- d) possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).

V) EXPLANATORY NOTES:

- a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and its associated Regulations.
- c) The UML-MILL-KEY.01/2023 Licence Conditions Handbook (LCH) identifies the criteria that will be used by Canadian Nuclear Safety Commission staff to assess the licensee's compliance with the conditions listed in this licence. The LCH also provides information regarding delegation of authority and applicable version control of documents comprising compliance verification criteria.

VI) CONDITIONS:

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter “the Commission”).

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

1. *MANAGEMENT SYSTEM*

1.1 Management System

The licensee shall implement and maintain a management system.

2. *HUMAN PERFORMANCE MANAGEMENT*

2.1 Training Program

The licensee shall implement and maintain a training program.

3. *OPERATING PERFORMANCE*

3.1 Operations Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

3.3 Nuclear Substances and Radiation Devices

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

4. *SAFETY ANALYSIS*

4.1 Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

5. *PHYSICAL DESIGN*

5.1 Design Program

The licensee shall implement and maintain a design program.

6. *FITNESS FOR SERVICE*

6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

7. *RADIATION PROTECTION*

7.1 Radiation Protection Program

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

8. *CONVENTIONAL HEALTH AND SAFETY*

8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

9. *ENVIRONMENTAL PROTECTION*

9.1 Environmental Protection Program

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

10.2 Fire Protection Program

The licensee shall implement and maintain a fire protection program.

11. WASTE MANAGEMENT

11.1 Waste Management Program

The licensee shall implement and maintain a waste management program.

11.2 Decommissioning Plan

The licensee shall maintain a decommissioning plan.

12. SECURITY

12.1 Security Program

The licensee shall implement and maintain a security program.

13. SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

The licensee shall implement and maintain a safeguards program.

14. PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

SIGNED at OTTAWA, this 29th day of July, 2020.

**Velshi,
Rumina**

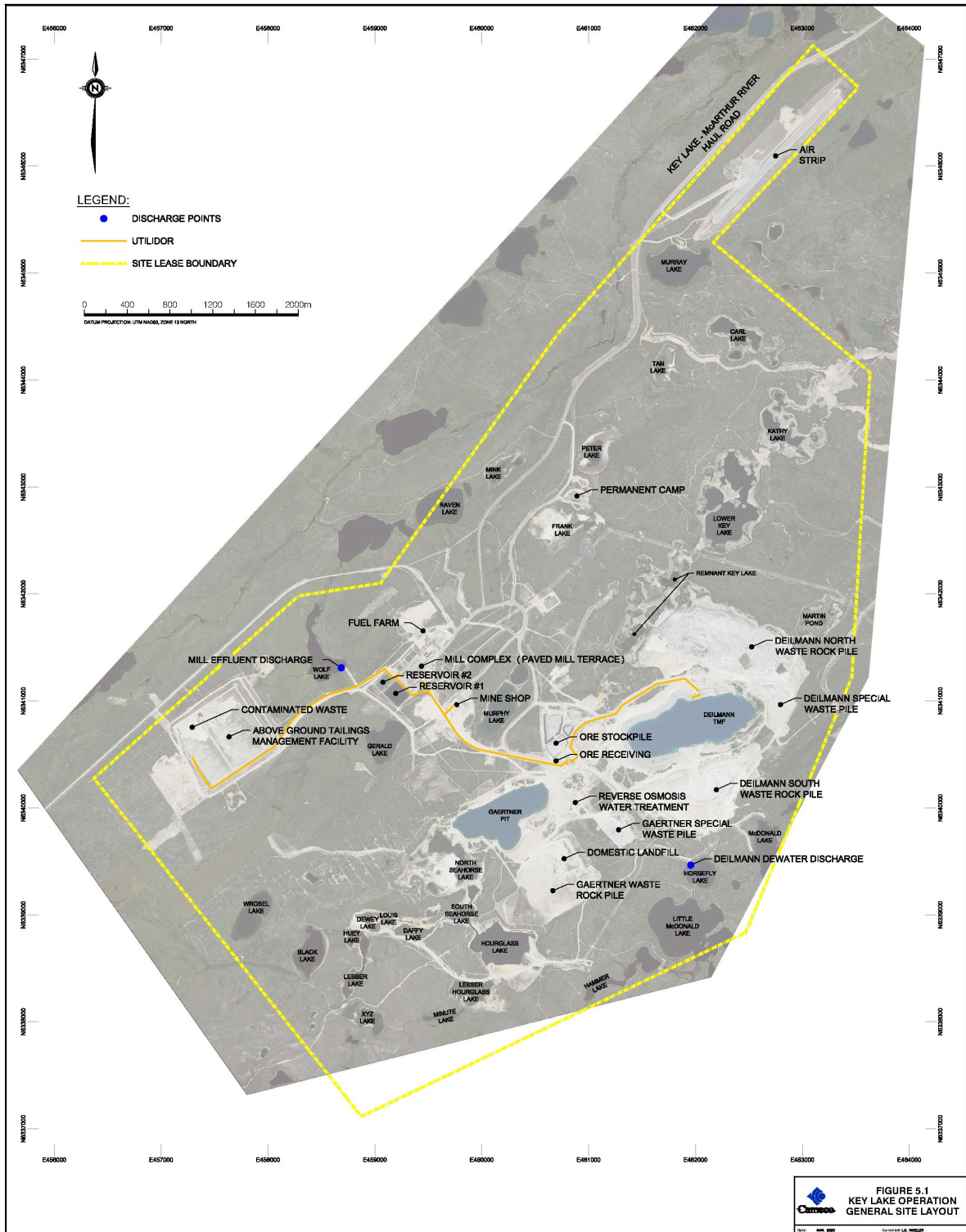
Digitally signed by Velshi, Rumina
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Reason: I am the author of this document
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Rumina Velshi, President
on behalf of the Canadian Nuclear Safety Commission

APPENDIX A

LOCATION OF CAMECO'S OPERATION AT KEY LAKE

The location of the Cameco's operation at Key Lake is shown on Figure 5.1 Key Lake General Site Layout dated March 2020 (e-Doc 6266416).



Proposed Licence Changes

Overview

There are no changes to the licence conditions or format. The licence term recommended is for a 20-year period.

Licence Conditions

There are no changes to the existing licence conditions.

Licence Format

The licence format was updated previously as part of [CMD 20-H101, Cameco Corporation Key Lake Operation Financial Guarantee Review and Licence Modernization Amendments](#). No further changes to the licence format are proposed at this time.

Licence Period

Cameco has requested a renewal of its KLO licence for a 20-year period. As discussed in section 5.5 of this CMD, CNSC staff are recommending that the Commission approve the renewal of the CNSC-issued licence for the KLO for a 20-year period. CNSC staff have concluded that a 20-year licence term is acceptable following an assessment of Cameco's application and supporting documents, and considering Cameco's satisfactory performance history across all SCAs during the previous licence period. Additionally, CNSC staff have also given consideration to the risk profile of the KLO, the ability of CNSC's regulatory framework to support a uranium mill licence for a 20-year period, including the continued ability to provide effective regulatory oversight and appropriate Indigenous and public engagement. Based on these considerations, and recent decisions issued by the Commission, CNSC staff are recommending the Commission approve CNSC staff's proposed 20-year licence term.

Proposed Licence

e-Doc 6872814 (PDF)



DRAFT
URANIUM MILL LICENCE
CAMECO CORPORATION
KEY LAKE OPERATION

I) LICENCE NUMBER: UML-MILL-KEY.00/2043

II) LICENSEE: Pursuant to section 24 of the *Nuclear Safety and Control Act*, this licence is issued to:

Cameco Corporation
2121 – 11th Street West
Saskatoon, Saskatchewan S7M 1J3
Corporate Number 332981-0

III) LICENCE PERIOD:

This licence is valid from November 1, 2023, to October 31, 2043, unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

- a) prepare a site for and construct, operate, modify and decommission a nuclear facility (hereinafter “the facility”) for the milling of uranium ore at a site known as the Key Lake Operation in the province of Saskatchewan as shown on the drawing referenced in appendix A to this licence;
- b) produce a uranium concentrate;
- c) possess, transfer, import, use, store, and dispose of nuclear substances; and
- d) possess, transfer, import, use prescribed equipment that is required for or associated with laboratory studies, field studies, fixed gauge usage and borehole logging devices in relation to (a) and (b).

V) EXPLANATORY NOTES:

- a) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.
- b) Unless otherwise provided for in this licence, words and expressions used in this licence have the same meaning as in the *Nuclear Safety and Control Act* and its associated Regulations.
- c) The UML-MILL-KEY.00/2043 Licence Conditions Handbook (LCH) identifies the criteria that will be used by Canadian Nuclear Safety Commission staff to assess the licensee's compliance with the conditions listed in this licence. The LCH also provides information regarding delegation of authority and applicable version control of documents comprising compliance verification criteria.

VI) CONDITIONS:

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter "the Commission").

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

1. *MANAGEMENT SYSTEM*

1.1 Management System

The licensee shall implement and maintain a management system.

2. *HUMAN PERFORMANCE MANAGEMENT*

2.1 Training Program

The licensee shall implement and maintain a training program.

3. *OPERATING PERFORMANCE*

3.1 Operations Program

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

3.2 Reporting Requirements

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

3.3 Nuclear Substances and Radiation Devices

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

4. *SAFETY ANALYSIS*

4.1 Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

5. *PHYSICAL DESIGN*

5.1 Design Program

The licensee shall implement and maintain a design program.

6. *FITNESS FOR SERVICE*

6.1 Fitness for Service Program

The licensee shall implement and maintain a fitness for service program.

7. *RADIATION PROTECTION*

7.1 Radiation Protection Program

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

8. *CONVENTIONAL HEALTH AND SAFETY*

8.1 Conventional Health and Safety Program

The licensee shall implement and maintain a conventional health and safety program.

9. *ENVIRONMENTAL PROTECTION*

9.1 Environmental Protection Program

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

10.1 Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

10.2 Fire Protection Program

The licensee shall implement and maintain a fire protection program.

11. WASTE MANAGEMENT

11.1 Waste Management Program

The licensee shall implement and maintain a waste management program.

11.2 Decommissioning Plan

The licensee shall maintain a decommissioning plan.

12. SECURITY

12.1 Security Program

The licensee shall implement and maintain a security program.

13. SAFEGUARDS AND NON-PROLIFERATION

13.1 Safeguards Program

The licensee shall implement and maintain a safeguards program.

14. PACKAGING AND TRANSPORT

14.1 Packaging and Transport Program

The licensee shall implement and maintain a packaging and transport program.

SIGNED at OTTAWA, this XX day of XX, 2023.

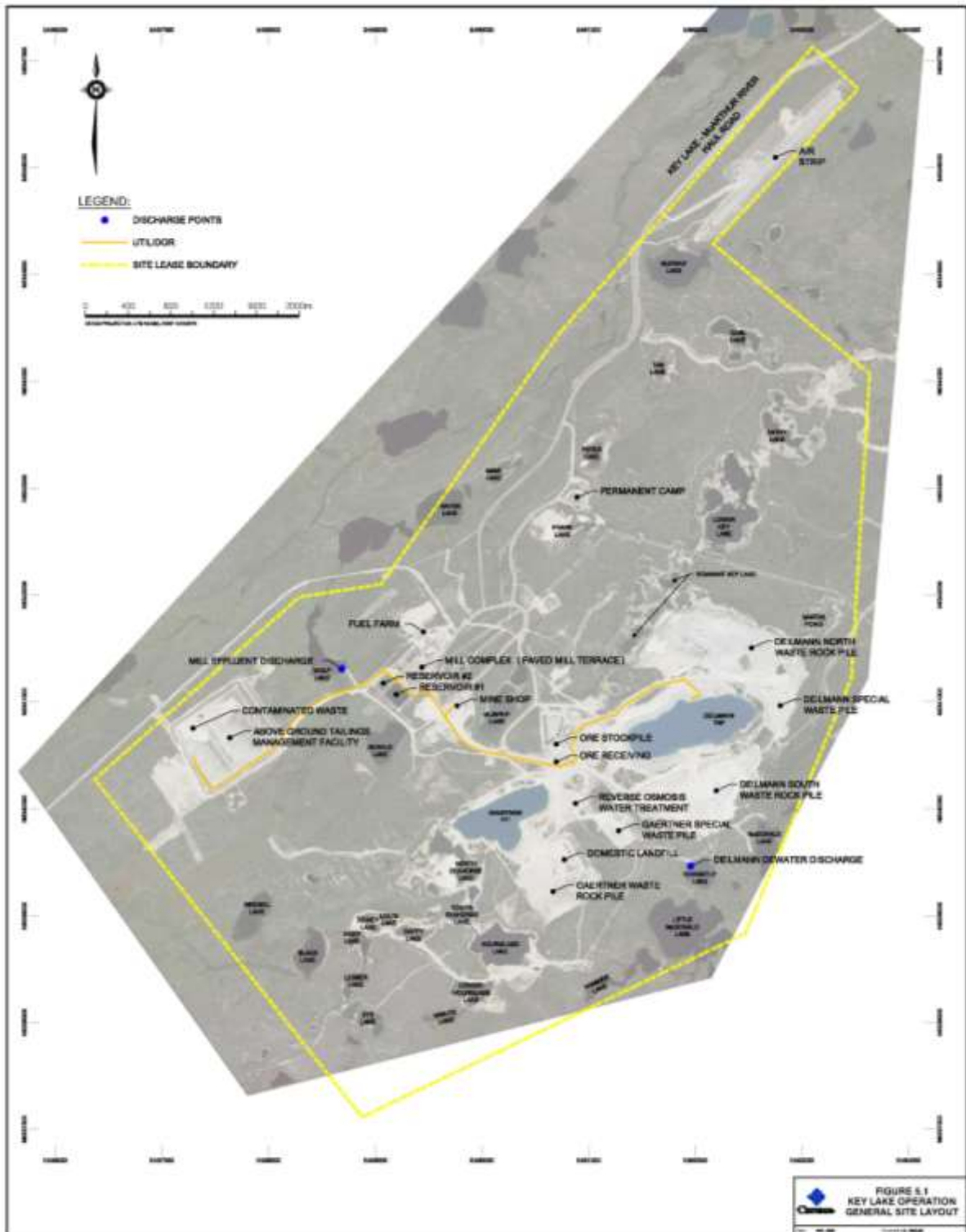
Rumina Velshi, President
on behalf of the Canadian Nuclear Safety Commission

APPENDIX A

LOCATION OF CAMECO'S OPERATION AT KEY LAKE

The location of the Cameco's Key Lake Operation is provided on Figure 5.1, *Key Lake General Site Layout*, March 2020 (e-Doc 6266416).

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Draft Licence Conditions Handbook

e-Doc 6872817 (PDF)



e-Doc 6658569 (Word)

e-Doc 6872817 (PDF)

DRAFT

LICENCE CONDITIONS HANDBOOK

LCH-MILL-KEY.00/2043

**KEY LAKE OPERATION
URANIUM MILL LICENCE**

UML-MILL-KEY.00/2043

Revision 0



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Licence Conditions Handbook
LCH-MILL-KEY.00/2043, Revision 0

Effective: XX, 2023

Key Lake Operation
Uranium Mill Licence
UML-MILL-KEY.00/2043
(Effective: XX, 2023)

SIGNED at OTTAWA this **XXth** day of **XXX 2023**

Patrick Burton, Director
Uranium Mines and Mills Division
Directorate of Nuclear Cycle and Facilities Regulation
CANADIAN NUCLEAR SAFETY COMMISSION

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Revision History:

Effective Date	Revision	Section(s) Changed	Description of the Changes	DCR e-Doc
XXX 2023	0	N/A	Original Document. Updated REGDOC listings, updated to reflect new licence and LCH number from LCH issued as part of previous licence	6658569 (Word) 6872817 (PDF)

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TABLE OF CONTENTS

PART I - INTRODUCTION	1
PART II – FRAMEWORK FOR EACH CONDITION.....	2
G. GENERAL	2
G.1 Licensing Basis for Licensed Activities	2
G.2 Notification of Changes	5
G.3 Financial Guarantee	6
G.4 Public Information and Disclosure	8
1. MANAGEMENT SYSTEM	9
Licence Condition 1.1	9
2. HUMAN PERFORMANCE MANAGEMENT	10
Licence Condition 2.1	10
3. OPERATING PERFORMANCE	11
Licence Condition 3.1	11
Licence Condition 3.2	12
Licence Condition 3.3	14
4. SAFETY ANALYSIS	17
Licence Condition 4.1	17
5. PHYSICAL DESIGN	19
Licence Condition 5.1	19
6. FITNESS FOR SERVICE	20
Licence Condition 6.1	20
7. RADIATION PROTECTION	22
Licence Condition 7.1	22
8. CONVENTIONAL HEALTH AND SAFETY	24
Licence Condition 8.1	24
9. ENVIRONMENTAL PROTECTION.....	26
Licence Condition 9.1	26
10. EMERGENCY MANAGEMENT AND FIRE PROTECTION	29
Licence Condition 10.1	29
Licence Condition 10.2	31
11. WASTE MANAGEMENT	32
Licence Condition 11.1	32
Licence Condition 11.2	35
12. SECURITY	37
Licence Condition 12.1	37

13. SAFEGUARDS AND NON-PROLIFERATION..... 38
 Licence Condition 13.138

14. PACKAGING AND TRANSPORT 40
 Licence Condition 14.140

15. FACILITY SPECIFIC..... 41

APPENDIX A CHANGE CONTROL PROCESS..... 42

APPENDIX B LICENSEE DOCUMENTS THAT REQUIRE NOTIFICATION OF
CHANGE..... 47

APPENDIX C LIST OF DOCUMENTS USED AS GUIDANCE OR COMPLIANCE
VERIFICATION CRITERIA 48

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PART I - INTRODUCTION

The purpose of the licence conditions handbook (LCH) is to identify and clarify the relevant parts of the licensing basis for each licence condition (LC). This will help ensure that the licensee will maintain facility operations in accordance with the licence and the intent of the licensing basis. The LCH also provides information regarding delegation of authority, document version control and conflict resolution. The LCH should be read in conjunction with the licence.

The LCH has three parts under each LC: the Preamble, Compliance Verification Criteria (CVC), and Guidance. The Preamble explains the regulatory context, background, and/or history related to the LC. CVC are used by Canadian Nuclear Safety Commission (CNSC) staff to oversee compliance with the LC. Guidance is non-mandatory information, including direction, on how to comply with the LC.

The statement “a person authorized by the Commission” in the LCs or the LCH indicates that the Commission may delegate certain authority to CNSC staff. Unless otherwise specified, the delegation of authority by the Commission to act as a person authorized by the Commission (Delegated Officer) is only applied to incumbents in the following positions:

- Director, Uranium Mines and Mills Division
- Director General, Directorate of Nuclear Cycle and Facilities Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch.

INTRODUCTION

PART II – FRAMEWORK FOR EACH LICENCE CONDITION

G. GENERAL

G.1 Licensing Basis for Licensed Activities

The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis, defined as:

- (i) the regulatory requirements set out in the applicable laws and regulations;
- (ii) the conditions and safety and control measures described in the facility's or activity's licence and the documents directly referenced in that licence;
- (iii) the safety and control measures described in the licence application and the documents needed to support that licence application;

unless otherwise approved in writing by the Canadian Nuclear Safety Commission (hereinafter “the Commission”).

Preamble

Licence condition G.1 requires activities (defined in Part IV of the licence) be conducted in accordance with the licensing basis. Further information on the licensing basis is available in CNSC regulatory document, REGDOC-3.5.3 *Regulatory Fundamentals*.

The licensing basis, established by the Commission at the time the licence is issued, sets the boundary conditions for a regulated activity, and establishes the basis for the CNSC’s compliance program for that regulated activity.

Part (i) of licence condition G.1 includes, but is not limited to, the following:

- *Nuclear Safety and Control Act (NSCA)*
- *Uranium Mines and Mills Regulations*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Substances and Radiation Devices Regulations*
- *General Nuclear Safety and Control Regulations*
- *Metal and Diamond Mining Effluent Regulations*
- Canada/International Atomic Energy Agency (IAEA) Safeguards Agreements

GENERAL

The safety and control measures mentioned under Parts (ii) and (iii) of licence condition G.1 have the potential to affect the health and safety of people, the environment, security or international obligations to which Canada agrees. These measures may be found in high-level programmatic documents but might also be found in lower-level supporting documentation. Safety and control measures can also be found in licensing basis publications such as CNSC regulatory documents, CSA Group standards or licensee documentation submitted in support of a licence.

The CNSC licence authorizes Cameco Corporation (Cameco) to conduct the following undertakings at the Key Lake Operation, for which the CNSC provides regulatory oversight:

- operation and changes to the mill and associated site infrastructure within the objective of the licensing basis to produce up to a nominal annual production of 9.6 million kilograms of uranium
- receipt, storage and processing of ore slurry and mineralized rock from other authorized facilities
- receipt, storage and processing of recycle products from the Blind River and Port Hope Conversion Facilities
- disposal of tailings in the Deilmann tailings management facility
- operation of the above ground tailings management facility
- operation of the dewatering and water management systems
- operation of the water treatment plants
- storage of clean and special waste rock
- disposal of contaminated wastes
- authorized decommissioning and reclamation
- possession, storage, transfer, importation, use and disposal of nuclear substances and radiation devices.

Environmental assessments carried out since 1979 evaluated the environmental effects from refining ore from the Key Lake and McArthur River Operations, and in 2013, effects from increased tailings capacity and expansion of facilities for increased uranium production. The Key Lake Operation mill processes ore from the McArthur River Operation as well as residual special waste located at the Key Lake Operation. Cameco is required to provide to the CNSC prior notification before processing other ore sources or increasing the annual production rates so that it can be verified that the proposed activities meet CNSC requirements and remain within the licensing basis.

GENERAL

Compliance Verification Criteria

Licensing Basis Documents

Licensing basis documents are listed in Appendix B and C in addition to tables under the most relevant LC. All “shall” or normative statements in licensing basis publications are considered CVC unless stated otherwise. If any “should” or informative statements in licensing basis publications are also considered CVC, this is provided under the most relevant LC.

In the event of any inconsistency between two elements of the licensing basis, the licensee shall consult CNSC staff to determine the approach to resolve the issue.

For operational activities that are not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state that is compliant with the licensing basis, taking into account the risk significance of the situation. Reporting requirements are outlined in CNSC’s REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills* and discussed under LC 3.2 of this LCH.

Changes to documentation or activities that result in operational activities not being in accordance with the licensing basis must be approved by the Commission prior to implementation.

Guidance

When the licensee becomes aware that a proposed change or activity might not be in accordance with the licensing basis, it should first seek direction from CNSC staff regarding the potential acceptability of this change or activity. The licensee should take into account that certain types of proposed changes might require significant lead times before CNSC staff can make recommendations and/or the Commission can properly consider them. Guidance for notifications to the CNSC related to licensee changes are discussed under LC G.2.

G.2 Notification of Changes

The licensee shall give written notification of changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis.

Preamble

During the course of licensed activities, it is expected that the licensee may make changes to implement improvements or to address changes in operational needs. While making these changes, it is imperative the licensee remains within the bounds of the licensing basis.

Appendix B provides a list of licensee documents that require notification of change. CNSC staff track the current version of these licensee documents separate from the LCH (e-Doc 5482913).

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Changes to the design, operating conditions, policies, programs and methods that have the potential to be outside of the licensing basis require prior written notification to the CNSC. CNSC staff will confirm the change remains within the licensing basis and notify the licensee prior to implementation of the change by the licensee. The licensee shall allow sufficient time for the CNSC to review the change proportionate to its complexity and the importance of the safety and control measures being affected. Regular communication between the CNSC and the licensee should ensure that there is adequate time for CNSC staff to review and evaluate information provided in prior written notifications in advance of any these proposed changes being implemented. It remains the responsibility of the licensee to ensure that the Key Lake Operation continues to operate within the bounds of the licensing basis.

Prior written notification shall include:

- a description of the change
- the rationale for the change
- expected duration (if not a permanent change)
- an explanation from the licensee supporting the conclusion that the change remains in accordance with the licensing basis.

Ongoing regular communication shall be maintained between the CNSC and licensee.

Guidance

A list of criteria to determine if a change would be in accordance with the licensing basis is provided in Appendix A of CNSC process document *Overview of: Assessing licensee changes to documents or operations* (e-Doc 4055483).

GENERAL

G.3 Financial Guarantee

The licensee shall maintain a financial guarantee for decommissioning that is acceptable to the Commission.

Preamble

The licensee is responsible for all costs of decommissioning at the facility. All such costs are included in the licensee’s decommissioning cost estimates and are covered by the licensee’s financial guarantee for decommissioning. The licensee’s decommissioning cost estimate is provided in the facility’s preliminary decommissioning plan. The facility’s current financial guarantee is covered by specific financial instruments as listed below.

The latest revision of the preliminary decommissioning plan (PDP) and estimation of the cost of decommissioning were finalized in Cameco’s *Preliminary Decommissioning Plan & Preliminary Cost Estimate*, October 2019.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-19
CNSC	Decommissioning	REDOC-2.11.2
CNSC	<u>Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities</u>	REGDOC-3.3.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Preliminary Decommissioning Plan	5609680	Yes
Cameco	Preliminary Decommissioning Cost Estimate	5609682	Yes
Cameco	Letter of Credit SBT743523 for CAD \$50,065,422.00 Letter of Credit P391941C04092 for CAD \$20,116,665.50 Letter of Credit 8CRBIZVCK for CAD \$81,336,059.50	5609682	Yes
Cameco	Letter of Credit P223062C00489 for CAD \$33,899,771.00	6415794	Yes
Orano	Bond Number BDTO-860152-020 for CAD\$37,082,082.00	6415796	Yes

GENERAL

The financial guarantee for decommissioning the Key Lake Operation shall be reviewed and revised by the licensee every five years, when required by the Commission, or following a revision of the preliminary decommissioning plan that significantly impacts the financial guarantee. Cameco's next submission of the Key Lake PDP to the CNSC was submitted in December 2022 and is undergoing review against the current version of the CSA Group standard.

The licensee shall submit a written report to the Commission confirming that the financial instruments continue to meet the acceptance criteria of section 3 of REGDOC 3.3.1. Any change to the type of financial instrument requires prior notification to the CNSC. The licensee shall submit this report by the end of March of each year, or at any time as the Commission may request.

Guidance

There is no guidance provided for this licence condition.

G.4 Public Information and Disclosure

The licensee shall implement and maintain a public information and disclosure program.

Preamble

The public information and disclosure program ensures that information related to the health and safety of persons and the environment and other issues associated with the lifecycle of the nuclear facility is effectively communicated to the public. In addition, the program shall include a commitment to and protocol for ongoing, timely communications regarding emissions, effluent releases, unplanned events and other incidents and activities related to the licensed facility that may be of interest to the public.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Public Information and Disclosure*	REGDOC-3.2.1

* Cameco to post summaries of Environmental Risk Assessments on their website, rather than the entire document, in accordance with Cameco's June 4, 2020 letter to the CNSC (L. Mooney to H. Tadros, e-Doc 6318384) and Cameco's June 12, 2020 email (K. Nagy to R. Snider, e-Doc 6316951).

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Public Information Program	6594911	Yes

Guidance

Source	Document Title	Document Number
CNSC	Indigenous Engagement, Version 1.2	REGDOC-3.2.2

GENERAL

1. MANAGEMENT SYSTEM

Licence Condition 1.1

The licensee shall implement and maintain a management system.

Preamble

The “management system” safety and control area covers the framework which establishes the processes and programs required to ensure an organization achieves its safety objectives, continuously monitors its performance against these objectives and fosters a healthy safety culture.

The management system must satisfy the requirements set out in the NSCA, regulations made pursuant to the NSCA, the licence and the measures necessary to ensure that safety is of paramount consideration in implementation of the management system. An adequately established and implemented management system provides the evidence that the licensing basis remains valid.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management System Requirements for Nuclear Facilities (except sections identified under other license conditions)	N286-12
CNSC	Safety Culture	REGDOC-2.1.2

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Quality Management Program	6594904	Yes

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Management System	REGDOC-2.1.1

HUMAN PERFORMANCE MANAGEMENT

2. HUMAN PERFORMANCE MANAGEMENT

Licence Condition 2.1

The licensee shall implement and maintain a training program.

Preamble

The “human performance management” safety and control area covers activities that enable effective human performance through the development and implementation of processes that ensure a sufficient number of licensee workers are in all relevant job areas and have the necessary knowledge, skills, procedures and tools in place to safely perform their duties.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Training and Development Program	6768138	Yes

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Personnel Training, Version 2	REGDOC-2.2.2

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Human Factors	REGDOC-2.2.1

HUMAN PERFORMANCE MANAGEMENT

3. OPERATING PERFORMANCE

Licence Condition 3.1

The licensee shall implement and maintain an operating program, which includes a set of operating limits.

Preamble

The “operating performance” safety and control area includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management System Requirements for Nuclear Facilities	N286-12

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Environmental Code of Practice (Appendix A of the Environmental Protection Program – Code of Practice)	6615434	Yes
Cameco	Radiation Code of Practice (Appendix 4 of Radiation Protection Program – Code of Practice)	6615433	Yes
Cameco	Quality Management Program	6594904	Yes
Cameco	Waste Management Program	6672126	Yes
Cameco	Facilities Program	6615436	Yes

Guidance

There is no guidance provided for this licence condition.

OPERATING PERFORMANCE

Licence Condition 3.2

The licensee shall implement and maintain a program for reporting to the Commission or a person authorized by the Commission.

Preamble

This LC requires the licensee to implement and maintain a process for reporting information to the CNSC. This includes monitoring results, changes to facilities or approved activities, performance assessments and the occurrence of unusual events. Sections 29 and 30 of the *General Nuclear Safety and Control Regulations*, section 38 of the *Nuclear Substances and Radiation Devices Regulations* and section 16 of the *Radiation Protection Regulations* provides further insight into events that are reportable.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*	REGDOC-3.1.2

* Modified reporting requirements for false alarms and Emergency Response Team (ERT) responses, where ERT activation is not directly related to the licensed activity, are described in a October 4, 2021 letter from CNSC to Cameco (P. Fundarek to K. Nagy, e-Doc 6653493).

The licensee shall report effluent concentrations that reach or exceed the discharge limits in the *Metal and Diamond Mining Effluent Regulations* in addition to requirements outlined in CNSC's REGDOC-3.1.2.

The licensee shall submit to the CNSC within 90 days after the end of each quarter of a calendar year, the results of the:

- radiation monitoring program
- environmental monitoring program

Results from the above monitoring programs are also to include quality assurance and quality control information. More frequent reporting may be requested on a case-by-case basis.

The licensee shall issue worker radiation dose records within 90 days after the end of each quarter of a calendar year, to:

- the worker
- the CNSC
- the National Dose Registry (NDR)

The licensee shall submit to the CNSC an annual compliance report by March 31 of each year, covering the operation for the 12-month period from January 1 to December 31 of the previous year.

OPERATING PERFORMANCE

Guidance

Guidance Publications

Source	Document Title	CNSC e-Access Document Number
CNSC/SK	CNSC – Saskatchewan Harmonized Annual Reporting Requirements, August 2010	3678482

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OPERATING PERFORMANCE

Licence Condition 3.3

The licensee shall implement and maintain a program for nuclear substances and radiation devices.

Preamble

Licensees must ensure they receive CNSC authorization before the possession, use, storage, transfer, or disposal of nuclear substances and radiation devices, except as specified in the tables for this section. It is the responsibility of the licensee to ensure that they have CNSC authorization for the import or export of any nuclear substances and radiation devices.

The possession limits for unsealed nuclear substances does not apply to natural uranium and its decay products which originate in the mining or ore-processing streams.

It is also important to note that there is no possession limit on the number of sealed nuclear sources or radiation devices.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Licence Application Guide: Nuclear Substances and Radiation Devices, version 2 (excluding section 2)	REGDOC-1.6.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Radiation Protection Program (Appendix 3 – Authorized Nuclear Substance List)	6615433	Yes

OPERATING PERFORMANCE

The authorized possession limits for unsealed nuclear substances are:

Nuclear Substance	Maximum Total Quantity in Possession
Americium-241	1 MBq
Barium-133	10 MBq
Lead-210	400 kBq
Polonium-208	10 kBq
Polonium-210	400 kBq
Radium-226	1 MBq
Thorium-228	5 MBq
Thorium-234	40 MBq

The maximum authorized quantity of nuclear substances per sealed source is:

Nuclear Substance	Maximum Quantity per Sealed Source
Americium-241	200 kBq
Bismuth-210	1 kBq
Cesium-137	18.5 GBq
Radium-226	20 kBq
Strontium-90	10 kBq
Technetium-99	1 kBq
Thorium-230	1 kBq
Thorium-232	1 kBq
Uranium-238	1 kBq

The authorized make and model of radiation devices and the maximum quantity of nuclear substance per each device are:

Radiation Device Make and Model	Nuclear Substance	Maximum Quantity per Radiation Device
Ronan Engineering - SA-1	Cesium-137	18.5 GBq
Ronan Engineering - SA-8	Cesium-137	18.5 GBq
Ronan Engineering - SA-1R	Cesium-137	18.5 GBq
Ronan Engineering - SA-8R	Cesium-137	7.4 GBq

Note: Includes provision for replacement sources for these radiation devices.

OPERATING PERFORMANCE

The management of nuclear substances and radiation devices will be evaluated against:

- 3.3.1 A radioisotope safety poster approved by the Commission or a person authorized by the Commission, which corresponds to the classification of the area, room or enclosure, is posted in a readily visible location in areas, rooms or enclosures where these listed nuclear substances are handled.
- 3.3.2 When in storage, radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee; the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 mSv/h and measures are in place to ensure that the dose limits in the *Radiation Protection Regulations* are not exceeded as a result of the substances or devices in storage.

Guidance

There is no guidance provided for this licence condition.

4. SAFETY ANALYSIS

Licence Condition 4.1

The licensee shall implement and maintain a safety analysis program.

Preamble

The “safety analysis” safety and control area includes the systematic evaluation of the potential hazards associated with the proposed activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

Compliance Verification Criteria

Licence Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Environmental Protection Program	6615434	Yes
Cameco	Waste Management Program	6672126	Yes
Cameco	Occupational Health and Safety Program	6698883	Yes

The safety analysis program will be evaluated against the following principles:

- 4.1.1 A process has been implemented and maintained to identify, assess, and eliminate or control health and safety and environmental risks associated with existing and new processes or changes to work procedures, equipment, organizational structure, staffing, products, services and suppliers.
- 4.1.2 Risks to health, safety and the environment have been identified, assessed, eliminated or controlled for existing and new processes or for changes to work procedures, equipment, organizational structure, staffing, products, services and suppliers.
- 4.1.3 Appropriate methodologies are used to identify potential hazards and consider the effectiveness of preventative measures and strategies in reducing the effects of such hazards.
- 4.1.4 Modeling is regularly updated using measured values to replace important assumptions and to increase the certainty of predicted long-term behaviour of contaminants.

Job hazard assessments are conducted when planning non-routine and complex work activities.

SAFETY ANALYSIS

Guidance

There is no guidance provided for this licence condition.

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5. PHYSICAL DESIGN

Licence Condition 5.1

The licensee shall implement and maintain a design program.

Preamble

The “physical design” safety and control area relates to activities that impact the ability of structures, systems and components to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

The design basis is the range of conditions and events taken into account in the design of structures, systems and components of a facility according to established criteria, such that the facility can withstand them without exceeding authorized limits for the planned operation of safety systems.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Design of Uranium Mines and Mills: Ventilation Systems*	REGDOC-2.5.4
CSA Group	Management System Requirements for Nuclear Facilities	N286-12

* Applicable when applying for a CNSC licence to prepare a site for and construct, operate or decommission a uranium mine or mill.

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Facilities Program	6615436	Yes
Cameco	Quality Management Program	6594904	Yes

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1

PHYSICAL DESIGN

6. FITNESS FOR SERVICE

Licence Condition 6.1

The licensee shall implement and maintain a fitness for service program.

Preamble

The “fitness for service” safety and control area covers activities that impact the physical condition of structures, systems and components to ensure that they remain effective over time. This area includes programs that ensure equipment is available to perform its intended design function when called upon to do so.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Management System Requirements for Nuclear Facilities	N286-12

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Maintenance Program	6672097	Yes

The fitness for service program will also be assessed against:

- 6.1.1 Systems, equipment, and devices are maintained in good working order such that they can perform their design function.
- 6.1.2 Instruments, controls and associated indicators are maintained operational and in calibration. Method and interval of calibrations are defined, and records of calibrations are kept.
- 6.1.3 Preventative and corrective maintenance processes and systems have been implemented and are maintained.
- 6.1.4 Regular inspection and testing of critical infrastructure and equipment are carried out.
- 6.1.5 A process has been implemented to identify, plan and schedule maintenance activities.
- 6.1.6 Maintenance, testing, surveillance and inspection backlogs are monitored and minimized.

FITNESS FOR SERVICE

- 6.1.7 Methods are used to show the current acceptance and operating status, and to prevent the use of systems, equipment or devices that are inaccurate, uncalibrated or not in working order.
- 6.1.8 When deviations beyond accuracy limits are found or suspected, their consequence on past results, and on present performance is evaluated.
- 6.1.9 A process exists to verify that changes to calibration, testing and maintenance requirements due to system and equipment modifications and replacements are implemented.

Guidance

There is no guidance provided for this licence condition.

7. RADIATION PROTECTION

Licence Condition 7.1

The licensee shall implement and maintain a radiation protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

Preamble

The “radiation protection” safety and control area covers the implementation of a radiation protection program in accordance with the *Radiation Protection Regulations*. This program must ensure that contamination and radiation doses received are monitored, controlled, kept as low as reasonably achievable (ALARA), with social and economic factors being taken into account.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Radiation Protection Program	6615433	Yes

The radiation protection (RP) program will be assessed against the following principles:

- 7.1.1 Radiological conditions are monitored and sources of internal and external radiation exposures are controlled. Access and work in radiological areas are controlled so that collective and individual radiation exposures are kept in accordance with the ALARA principle.
- 7.1.2 RP instrumentation and equipment are calibrated, maintained and used so that radiation levels are accurately determined. Uncalibrated equipment is removed from use.
- 7.1.3 The personal dosimetry program ensures that external and internal radiation doses to individuals are accurately determined and recorded.
- 7.1.4 Appropriate contamination control measures are implemented to control and minimize the contamination of areas, equipment and personnel.
- 7.1.5 Effective decontamination control measures are implemented to control and prevent the contamination of areas, equipment and personnel.

RADIATION PROTECTION

Action levels (AL) are designed to alert licensees before regulatory dose limits are reached. By definition, if an AL referred to in a licence is reached, a loss of control of some part of the associated RP program may have occurred and specific action is required, as defined in the *Radiation Protection Regulations*, the licence and the applicable code of practice.

Action Level	Dose (mSv)
Weekly Action Level	1
Quarterly Action Level	5

The weekly AL is assessed against official dosimetry results or engineering monitoring data. The quarterly AL is assessed against official dosimetry results. The licensee is expected to review and, if necessary, revise the ALs specified above at least once every five years in order to validate their effectiveness. The results of such reviews should be provided to the CNSC.

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Radiation Protection	REGDOC-2.7.1
CNSC	Dosimetry, Volume I: Ascertaining Occupational Dose	REGDOC-2.7.2
CNSC	Measuring Airborne Radon Progeny at Uranium Mines and Mills	G-4
CNSC	Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills	G-218

8. CONVENTIONAL HEALTH AND SAFETY

Licence Condition 8.1

The licensee shall implement and maintain a conventional health and safety program.

Preamble

The “conventional health and safety” safety and control area covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.

The regulation of non-radiological health and safety at uranium mines and mills is governed by the *Canada Labour Code Part II*, which is administered by Employment and Social Development Canada (ESDC). However, the *Saskatchewan Uranium Mines and Mills Exclusion Regulations* (SOR/2001-115) defer the regulation of occupational health and safety in Saskatchewan uranium mines and mills to the province of Saskatchewan in accordance with the requirements of *The Mines Regulations, 2018 Part II Revised Regulations of Saskatchewan*.

The CNSC also has regulatory responsibilities for the oversight of the protection of the health and safety of workers. The CNSC harmonizes the oversight of conventional health and safety with the Saskatchewan Ministry of Labour Relations and Workplace Safety.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Notification Requirements
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Occupational Health and Safety Program	6698883	Yes

The conventional health and safety program will be assessed against the following principles:

- 8.1.1 Housekeeping standards have been identified and are enforced to ensure that work areas are kept clean and organized.
- 8.1.2 Facilities, processes and procedures have been implemented to ensure the safe management of hazardous materials.
- 8.1.3 Employees and contractors actively participate in the management of conventional health and safety.
- 8.1.4 Management verifies that employees and contractors actively participate in the management of health and safety in their workplace.
- 8.1.5 A process has been established and maintained to monitor, measure and record conventional health and safety performance and the effectiveness of the occupational health and safety program on a regular basis.

CONVENTIONAL HEALTH AND SAFETY

- 8.1.6 Routine inspections are performed by workers, supervisors, senior staff and/or safety professionals to identify any potential safety issues.
- 8.1.7 Processes and procedures are established and maintained to investigate accidents and incidents, to identify root causes, to implement corrective actions and to verify that corrective actions have been completed and will effectively prevent recurrence.
- 8.1.8 Procedures have been implemented and maintained for reporting work-related injuries, illnesses, fatalities and conventional health and safety incidents including near misses.
- 8.1.9 The causes of injuries are investigated, corrective actions implemented, and the effectiveness of corrective actions verified.
- 8.1.10 A preventative and corrective action procedure has been established and maintained to address non-conformances and inadequately controlled risks.

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Conventional Health and Safety	REGDOC-2.8.1

9. ENVIRONMENTAL PROTECTION

Licence Condition 9.1

The licensee shall implement and maintain an environmental protection program, which includes a set of action levels. When the licensee becomes aware that an action level has been reached, the licensee shall notify the Commission within 24 hours.

Preamble

The “environmental protection” safety and control area covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the result of licensed activities.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, version 1.2	REGDOC-2.9.1
CSA Group	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.4-10
CSA Group	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.5-11
CSA Group	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	N288.6-12
CSA Group	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.7-15
CSA Group	Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities	N288.8-17

ENVIRONMENTAL PROTECTION

Licence Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Environmental Protection Program	6615434	Yes
Cameco	Waste Management Program	6672126	Yes
Cameco	Key Lake Operation Environmental Risk Assessment (December 2020)	6448936	Yes

To ensure the applicable environmental protection measures have been established, implemented and maintained, the environmental protection program will also be assessed against:

- 9.1.1 Action levels specified in the environmental code of practice. When the licensee becomes aware that an action level has been triggered, the licensee shall notify the Commission within 24 hours and take specific action as defined in the *Uranium Mines and Mills Regulations* and the environmental code of practice.
- 9.1.2 The authorized release limits as specified below. When the licensee becomes aware that an authorized release limit has been reached or exceeded, the licensee shall immediately notify the Commission, investigate and take corrective action to ensure that the releases are maintained below the authorized release limits.

The authorized liquid effluent release limits are:

Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic (mg/L)	0.30	0.45	0.60
Copper (mg/L)	0.30	0.45	0.60
Lead (mg/L)	0.10	0.15	0.20
Nickel (mg/L)	0.50	0.75	1.00
Zinc (mg/L)	0.50	0.75	1.00
Un-ionized ammonia (mg/L)	0.50	N/A	1.00
Total Suspended Solids (mg/L)	15.00	22.50	30.00
Radium-226 (Bq/L)	0.37	0.74	1.11

Acid balance (as H ₃ O ⁺) reported as pH	In a range of 6.0 to 9.5
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Acutely Lethal Effluent	0%
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ENVIRONMENTAL PROTECTION

Notes:

- 1) Authorized release limits have been harmonized, where available, with those required under the *Metal and Diamond Mining Effluent Regulations* (MDMER).
- 2) Definition of Units: mg/L = milligrams per litre
Bq/L = becquerels per litre
- 3) All concentrations and activities are total values.
- 4) “Monthly mean concentration” means the average value of the concentrations measured in all composite or grab samples collected from the final discharge point during each month when liquid effluent is released.
- 5) “Composite sample” means:
 - a) a quantity of effluent consisting of not less than three equal volumes or three volumes proportionate to flow that have been collected at approximately equal time intervals over a period of not less than seven hours and not more than 24 hours; or
 - b) a quantity of effluent collected continuously at a constant rate or at a rate proportionate to the rate of flow of the effluent over a sampling period of not less than seven hours and not more than 24 hours.
- 6) “Grab sample” means a quantity of undiluted effluent collected at any given time.
- 7) “*Acutely lethal*” (Source MDMER), in respect of an effluent, means that the effluent at 100 percent concentration kills
 - a) more than 50 percent of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1;
 - b) more than 50 percent of the threespine stickleback subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.2; or
 - c) more than 50 percent of the *Daphnia magna* subjected to it for a period of 48 hours, when tested in accordance with the acute lethality test set out in section 14.3. (*léthalité aiguë*)

Guidance

Guidance Publications

Source	Document Title	Document Number
CSA Group	Environmental Management Systems – Requirements with Guidance for Use	ISO 14001:2015

10. EMERGENCY MANAGEMENT AND FIRE PROTECTION

Licence Condition 10.1

The licensee shall implement and maintain an emergency preparedness program.

Preamble

The “emergency management and fire protection” safety and control area covers emergency plans and emergency preparedness programs which exist for emergencies and for non-routine conditions. It also includes any results of exercise participation.

Licensees are required to continually maintain and enhance their emergency management programs.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Nuclear Emergency Preparedness and Response, Version 2*	REGDOC-2.10.1

* Off-site reporting timelines accepted by CNSC staff for Saskatchewan uranium mine and mill sites are described in January 30, 2020 letter from Cameco to the CNSC (L. Mooney to H. Tadros, e-Doc 6109667).

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Emergency Preparedness and Response Program	6672125	Yes

The emergency management and fire protection program will be assessed against the following principles:

- 10.1.1 Potential emergency situations are identified.
- 10.1.2 Pre-incident plans for response to emergencies are developed and are maintained.
- 10.1.3 Resources, including facilities and equipment required to respond to emergencies are identified and maintained.
- 10.1.4 Emergency communication protocols are established and understood.
- 10.1.5 Organization and responsibilities are identified.
- 10.1.6 Workers are trained to fulfill duties and responsibilities with respect to emergency management and fire plans and procedures.

EMERGENCY MANAGEMENT AND FIRE PROTECTION

- 10.1.7 Procedures are implemented and maintained to prevent, prepare for, and respond to emergencies.
- 10.1.8 Response plans are periodically tested.

Guidance

There is no guidance provided for this licence condition.

DRAFT

Licence Condition 10.2

The licensee shall implement and maintain a fire protection program.

Preamble

Licenses are required to implement and maintain a fire protection program (a set of planned, coordinated, controlled and documented activities) to ensure that the licensed activities do not result in an unreasonable risk to the health and safety of persons and to the environment due to fire and to ensure that the licensee is able to efficiently and effectively respond to emergency fire situations.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
NRC	National Building Code of Canada (2015)*	N/A
NRC	National Fire Code of Canada (2015)*	N/A
CSA Group	Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances*	N393-13

* Subject to exclusions and/or amendments, as contained in Saskatchewan's [Codes Adoption 2015](#).

** To be implemented by Cameco by December 31, 2023 and to be used as guidance until the implementation date.

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Fire Protection Program	6768141	Yes

Guidance

Guidance Publications

There is no guidance provided for this licence condition.

11. WASTE MANAGEMENT

Licence Condition 11.1

The licensee shall implement and maintain a waste management program.

Preamble

The “waste management” safety and control area covers internal waste-related programs that form part of the facility’s operations up to the point where the waste is removed from the facility to a separate waste management facility.

Waste management facilities at the Key Lake Operation include:

- Deilmann special waste pad
- Gaertner special waste pad
- Gaertner, Deilmann North, and Deilmann South waste rock piles
- ore/cobble ore and mineralized waste pads
- Gaertner Pond
- water treatment plants - dewatering collection, reverse osmosis treatment and discharge, contaminated water handling and storage, mill effluent treatment and discharge
- tailings preparation circuit and Deilmann tailings management facility
- above ground tailings management facility with contaminated waste disposal
- hazardous substance or waste dangerous goods storage facilities
- site run-off containment systems and ponds
- contaminated industrial waste storage
- storage and recycling facilities for hazardous wastes
- landfill for uncontaminated industrial and domestic waste
- domestic sewage treatment

WASTE MANAGEMENT

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CNSC	Waste Management, Volume I: Management of Radioactive Waste	REGDOC-2.11.1
CNSC	Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings*	REGDOC-2.11.1

* Applicable to new uranium mine or mill projects and/or to new waste management facilities at existing uranium mines and mills.

Guidance

Source	Document Title	Document Number
CNSC	Waste Management, Volume III: Safety Case for the Disposal of Radioactive Waste, Version 2	REGDOC-2.11.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Waste Management Program	6672126	Yes

The waste management program will be assessed against the following principles:

- 11.1.1 A radioactive waste management program is implemented to control and minimize the volume of radioactive waste.
- 11.1.2 The volume of waste is minimized by applying the “reduce, reuse, recycle and recover” principle.
- 11.1.3 Work is carried out in a manner that minimizes waste and prevents pollution.
- 11.1.4 Waste is stored or disposed of in the appropriate manner.
- 11.1.5 Wastes are managed in a manner that does not compromise reclamation or decommissioning plans.
- 11.1.6 The effectiveness of waste management practices is monitored, measured and recorded on a regular basis.
- 11.1.7 Routine inspections are performed to identify any potential waste management issues and to verify the condition of containment structures and waste management facilities.
- 11.1.8 The safety of embankments/dams is inspected and evaluated.
- 11.1.9 Records are kept of the quantities and types of waste generated and the method of disposal or management.

WASTE MANAGEMENT

- 11.1.10 Wastes are managed to control the present and future releases of contaminants to the environment.
- 11.1.11 Surface water is managed to prevent or minimize the volume that is contaminated.

Guidance

Guidance Publications

Source	Document Title	Document Number
Canadian Dam Association	Canadian Dam Association, Canadian Dam Safety Guidelines	N/A

DRAFT

Licence Condition 11.2

The licensee shall maintain a decommissioning plan.

Preamble

This LC requires that the licensee maintain a preliminary decommissioning plan (PDP).

A PDP provides an overview of the proposed decommissioning approach that is sufficiently detailed to assure that the proposed approach is, in the light of existing knowledge, technically and financially feasible, and appropriate in the interests of health, safety, security and the protection of the environment. The PDP defines areas to be decommissioned and the general structure and sequence of the principle work packages. The PDP forms the basis for establishing and maintaining a financial arrangement (financial guarantee) that will assure adequate funding of the decommissioning plan.

Compliance Verification Criteria

Licensing Basis Publications

Source	Document Title	Document Number
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-09
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-19
CNSC	Decommissioning	REDOC-2.11.2
CNSC	<u>Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities</u>	REGDOC-3.3.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Preliminary Decommissioning Plan	5609680	Yes
Cameco	Preliminary Decommissioning Cost Estimate	5609682	Yes

The PDP is to be revised at a minimum every five years or when required by the Commission; however, is to be kept current to reflect any changes in the site or nuclear facility. The Key Lake Operation PDP was last revised and submitted to the CNSC in 2019. Cameco's next submission of the Key Lake PDP to the CNSC was submitted in December 2022 and is undergoing review against the current version of the CSA Group standard.

WASTE MANAGEMENT

Guidance

There is no guidance provided for this licence condition.

DRAFT

12. SECURITY

Licence Condition 12.1

The licensee shall implement and maintain a security program.

Preamble

The “security” safety and control area covers the programs required to implement and support the security requirements stipulated in the regulations, the licence, orders, or expectations for the facility or activity.

Compliance Verification Criteria

Licence Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Security Program	6795130	Yes

The security program will be assessed against the following principles:

- 12.1.1 The security program addresses the risks identified in an industrial security threat and risk assessment.
- 12.1.2 Measures are implemented and maintained to prevent the loss of nuclear substances or prevent acts of sabotage at the facility.
- 12.1.3 Measures are taken to prevent unauthorized access to the mining facility and to areas within the facility where nuclear substances are stored.
- 12.1.4 The industrial security threat and risk assessment is periodically reviewed and updated.

Guidance

Guidance Publications

Source	Document Title	Document Number
CNSC	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	REGDOC-2.12.3

SECURITY

13. SAFEGUARDS AND NON-PROLIFERATION

Licence Condition 13.1

The licensee shall implement and maintain a safeguards program.

Preamble

The “safeguards and non-proliferation” safety and control area covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons*.

Compliance Verification Criteria

Source	Document Title	Document Number
CNSC	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Security Program	4276686	Yes

The safeguards and non-proliferation program will be assessed against CNSC’s REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*, and the following principles:

- 13.1.1 Reasonable services and assistance are provided to the IAEA to enable the IAEA to carry out its duties and functions.
- 13.1.2 Prompt access to all locations at the facility is granted to the IAEA at all reasonable times where such access is required for the purposes of carrying on an activity pursuant to a safeguards agreement. Health and safety services and escorts are provided as required in order to facilitate activities.
- 13.1.3 Records that must be kept or any reports that are required to be made under a safeguards agreement are disclosed to the CNSC and the IAEA.
- 13.1.4 Reasonable assistance is provided to the IAEA to enable sampling and removal or shipment of samples.
- 13.1.5 Reasonable assistance is provided to the IAEA to enable measurements, tests and removal or shipment of equipment.

SAFEGUARDS AND NON-PROLIFERATION

- 13.1.6 Measures are implemented to prevent damage to, or the theft, loss or sabotage of samples collected pursuant to a safeguards agreement or the illegal use, possession or removal of such samples.
- 13.1.7 Reports and information, that is required to facilitate Canada's compliance with any applicable safeguards agreement, is provided to the Commission.

Guidance

There is no guidance provided for this licence condition.

DRAFT

14. PACKAGING AND TRANSPORT

Licence Condition 14.1

The licensee shall implement and maintain a packaging and transport program.

Preamble

The “packaging and transport” safety and control area covers the safe packaging and transport of nuclear substances to and from the licensed facility.

Every person who transports radioactive material, or requires it to be transported, shall act in accordance with the requirements of Transport Canada’s *Transportation of Dangerous Goods Regulations* and the CNSC’s *Packaging and the Transport of Nuclear Substances Regulations, 2015*.

The *Packaging and Transport of Nuclear Substances Regulations, 2015* and the *Transportation of Dangerous Goods Regulations* provides specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Compliance Verification Criteria

Licensee Documents that Require Notification of Change

Source	Document Title	CNSC e-Access Document Number	Prior Notification Required
Cameco	Mining Facility Licensing Manual	6594897	Yes
Cameco	Transportation Program	6594914	Yes

The licensee shall implement and maintain a packaging and transport program that will ensure compliance with the requirements set out in the *Transportation of Dangerous Goods Regulations* and in the *Packaging and Transport of Nuclear Substances Regulations, 2015*.

Guidance

There is no guidance provided for this licence condition.

15. FACILITY SPECIFIC

There are no facility-specific licence conditions.

DRAFT

FACILITY SPECIFIC

APPENDIX A CHANGE CONTROL PROCESS

A.1 Change Control Process

A change control process is applied to the LCH to ensure that:

- preparation and use of the LCH are properly controlled
- all referenced documents are correctly identified and maintained
- procedures for modifying the LCH are followed.

A request to change this LCH can be initiated by either CNSC staff or the licensee. The licensee will be consulted on any changes to the LCH that are proposed by CNSC staff.

CNSC staff will take the following steps to update the LCH:

1. the CNSC receives or initiates written notification of proposed change
2. initiate a change request using the Change Request Form
3. complete a technical review of the proposed change, if required
4. consult the licensee and in case of disagreement on the proposed change, the dispute resolution process outlined in section A.3 will apply
5. obtain consent and signature from a Delegated Officer
6. update the LCH in accordance with the Change Request Form and send the updated document to the parties identified on the distribution list (section A.5).

Change Request Form

1. GENERAL INFORMATION			
File Plan #		e-Doc #(s) for Change Request Form	
Licensee	Licence Number	LCH #, Rev/Version	Request Date
Licensing Officer			
2. CHANGE(S) TO THE LCH			
#	Description and Purpose	Proposed Change	References
1	<initiator, nature, reason for change, e.g. administrative, change to a licensee doc, etc.>	<identify modifications, such as by track changes, highlighting, etc.>	<LC, page, section #, etc.>
2			
3. ASSESSMENT (text and/or e-Doc #s)			
#	Division/Org	Comment	Disposition
1	<division>		
	<division>		
	<licensee>		
	<division>		
2	etc.		
4. CONSENT TO MODIFY			
#	Agreed	Comment	
1			
2			
Name	Title	Signature	Date
5. LCH DOCUMENTATION AND DISTRIBUTION			
New LCH Number	LCH Effective Date	e-Doc # (include version number)	
CNSC Outgoing Notification		e-Doc #	Date Sent

APPENDIX A

A.2 Review Criteria for Proposed Changes to Licensing Basis Documents

The licensee must provide the CNSC with written notification of a proposed significant change to key licensee documents before the licensee implements the change. The notification must be accompanied by sufficient information to demonstrate that the change is within the intent of the licensing basis. Written notification of minor or administrative changes may be made in batches after the changes have been implemented.

The following criteria will be used by CNSC staff to determine if the proposed change is acceptable:

1. The submission includes the appropriate level and quality of information with regards to:
 - a) The description of the proposed change including:
 - a summary of the change, including the purpose or need for the change
 - a preliminary finding of whether this proposal or notification is required under the NSCA, a regulation made under the Act or the licence, or has implications under the *Impact Assessment Act*, or whether a licence amendment or other licensing action would likely be required
 - where applicable, the alternatives evaluated and the reasons for selection of the chosen option
 - any changes to the inventories of nuclear substances on site related to the proposed change
 - the construction, commissioning and operating schedule for the proposed change including hold points or progress reports for regulatory review and approval (as appropriate)
 - expected impacts, if any, on the proposed decommissioning or closure plans
 - results of any risk analysis or hazard operability studies performed, and a summary of the identified hazards and the mitigation measures identified to control potential hazards
 - b) The description of the design control, operating specifications and criteria including:
 - the design basis and criteria, and performance specifications
 - the design drawings such as the general arrangement, process and instrumentation diagrams, and process flow sheets
 - the quality management program for the various key stages of the change (e.g., design, construction, commissioning, etc.)

APPENDIX A

- c) The assessment of both the short and long term impacts with the mitigation measures in place on:
 - worker’s health and safety, including potential radiological and non-radiological exposures
 - the environment
 - security
 - Canada’s international obligations
 - d) The planned administrative controls including:
 - changes to the organization, roles and responsibilities
 - changes to applicable programs and procedures
 - a description of the proposed monitoring, inspection and test plans, including locations and frequency proposed to evaluate both positive and negative results
 - e) Changes to contingency plans including “full-stop measures”
 - f) Evidence that the licensee’s internal reviews and approvals have been completed, including meeting the requirements of the licensee’s change management procedure and consultation with the onsite occupational health and environmental committees, where applicable
 - g) Identification of the documents and training programs that may require revision when the proposed change is implemented
2. The effects of the proposed change or action remain within the licensing basis.
 3. Following the implementation of the change the licensee will remain in compliance with the requirements set out in the applicable acts, regulations, and LCs.

A.3 Dispute Resolution

In case of a dispute between the licensee and CNSC staff regarding changes to the LCH, both parties will meet to discuss the dispute and reach a decision on the path forward. The decision, including its rationale will be documented. If any party is not satisfied with the decision, the resolution process will proceed up to the Director, Director General or Executive Vice-President and Chief Regulatory Operations Officer level. If any party is still not satisfied with the decision, the issue will be brought to the attention of the Commission at a Commission meeting. The decision made by the Commission will be final.

A.4 Records Management

In order to track changes to the LCH, the document change request and accompanying documentation will be archived in records and referenced in the revision history of the LCH. Electronic communication related to the change, such as comments from reviewers will be stored in the CNSC information management system.

APPENDIX A

A.5 Distribution

A copy of the updated version of the LCH will be distributed to the following parties:

- Uranium Mines and Mills Division, CNSC
- Cameco Corporation

A.6 Reporting to the Commission

CNSC staff will report on the changes made to the LCH during the previous year in their annual report to the Commission.

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APPENDIX A

APPENDIX B LICENSEE DOCUMENTS THAT REQUIRE NOTIFICATION OF CHANGE

Document Title	e-Doc
Key Lake Operation Environmental Risk Assessment (December 2020)	6448936
Mining Facility Licensing Manual	6594897
Facilities Program	6615436
Maintenance Program	6672097
Environmental Protection Program	6615434
Waste Management Program	6672126
Radiation Protection Program	6615433
Occupational Health and Safety Program	6698883
Security Program	6795130
Emergency Preparedness and Response Program	6672125
Quality Management Program	6594904
Training and Development Program	6768138
Public Information Program	6594911
Transportation Program	6594914
Fire Protection Program	6768141
Preliminary Decommissioning Plan	5609680
Preliminary Decommissioning Cost Estimate	5609682
Cameco Financial Guarantee Letters of Credit -Letter of Credit SBTG743523 for CAD \$50,065,422.00 -Letter of Credit P391941C04092 for CAD \$20,116,665.50 -Letter of Credit 8CRBIZVCK for CAD \$81,336,059.50	5609682
Cameco Financial Guarantee Letters of Credit - Letter of Credit P223062C00489 for CAD \$33,899,771.00	6415794
Orano Financial Guarantee Bond – Bond Number BDTO-860152-020 for CAD \$37,082,082.00	6415796

APPENDIX B

APPENDIX C LIST OF DOCUMENTS USED AS GUIDANCE OR COMPLIANCE VERIFICATION CRITERIA

Document	Document Title	Document Number
Canadian Dam Association	Canadian Dam Association, Canadian Dam Safety Guidelines	N/A
CNSC	Preparing Codes of Practice to Control Radiation Doses at Uranium Mines and Mills	G-218
CNSC	Management System	REGDOC-2.1.1
CNSC	Human Factors	REGDOC-2.2.1
CNSC	General Design Considerations: Human Factors	REGDOC-2.5.1
CNSC	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	REGDOC-2.9.1
CNSC	<i>Personnel Training, Version 2</i>	REGDOC-2.2.2
CNSC	Nuclear Emergency Preparedness and Response, Version 2	REGDOC-2.10.1
CNSC	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1
CNSC	Public Information and Disclosure	REGDOC-3.2.1
CNSC	Licence Application Guide Nuclear Substances and Radiation Devices	REGDOC-1.6.1
CNSC	Safety Culture	REGDOC-2.1.2
CNSC	Design of Uranium Mines and Mills: Ventilation Systems	REGDOC-2.5.4
CNSC	Conventional Health and Safety	REGDOC-2.8.1
CNSC	Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailings	REGDOC-2.11.1
CNSC	Security of Nuclear Substances: Sealed Sources and Category 1, II and II Nuclear Material, Version 2.1	REGDOC-2.12.3
CNSC	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	REGDOC-3.1.2
CNSC	Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities	REGDOC-3.3.1
CNSC	Regulatory Fundamentals	REGDOC-3.5.3
CNSC/SK	CNSC – Saskatchewan Harmonized Annual Reporting Requirements, August 2010	e-Doc 3678482

APPENDIX C

Document	Document Title	Document Number
CSA Group	Management System Requirements for Nuclear Facilities	N286-12
CSA Group	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.4-10
CSA Group	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.5-11
CSA Group	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	N288.6-12
CSA Group	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	N288.7-15
CSA Group	Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities	N288.8-17
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-09
CSA Group	Decommissioning of Facilities Containing Nuclear Substances	N294-19
CSA Group	Environmental Management Systems – Requirements with Guidance for Use	ISO 14001:2015
NRC	National Building Code of Canada (2015)	N/A
NRC	National Fire Code of Canada (2015)	N/A
CSA Group	Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances	N393-13

Note: For CNSC documents, the most recent version of a referenced document shall be implemented following review and agreement between Cameco and the Canadian Nuclear Safety Commission.

APPENDIX C