Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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CMD: 21-H9

Date signed/Signé le : 13 AUGUST 2021

A Licence Renewal

Cameco Corporation

Application to Renew Licence for the Cameco Blind River Refinery

Commission Public Hearing

Scheduled for:

November 24 to 25, 2021

Submitted by:

CNSC Staff

Un renouvellement de permis

Cameco Corporation

Demande de renouvellement de permis pour la raffinerie de Blind River de Cameco

Audience publique de la Commission

Prévue pour :

Les 24 et 25 novembre 2021

Soumise par :

Le personnel de la CCSN

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Summary

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

- Request to renew Cameco's Class IB fuel facility operating licence FFOL-3632.00/2022 to operate the Blind River Refinery for a period of 10 years
- Request to maintain the current authorization to increase the annual production capacity to 24,000 tonnes of uranium as uranium trioxide, subject to conditions
- Request to accept a proposed revised financial guarantee of $57.5 million, through a letter of credit in the amount of $57.5 million

CNSC staff recommend the Commission take the following actions:

- Renew the nuclear fuel facility licence to authorize Cameco to operate its Blind River Refinery until February 28, 2032
- Approve Cameco's request to maintain the current authorization to increase the annual production capacity to 24,000 tonnes of uranium as uranium trioxide, subject to conditions
- Accept the proposed revised financial guarantee of $57.5 million, through a letter of credit in the amount of $57.5 million
- Authorize the delegation of authority as set out in this CMD

Résumé

Le présent document à l'intention des commissaires (CMD) présente de l'information sur un ensemble de questions d'ordre réglementaire concernant Cameco Corporation (Cameco) :

- Demande de Cameco concernant le renouvellement de son permis d'exploitation d'une installation de combustible de catégorie IB (FFOL-3632.00/2022) afin d'exploiter la raffinerie de Blind River pendant une période de 10 ans.
- Demande visant à maintenir l'autorisation actuelle d'augmenter la capacité de production annuelle à 24 000 tonnes d'uranium sous forme de trioxyde d'uranium, sous réserve de certaines conditions.
- Demande d'acceptation d'une garantie financière révisée proposée de 57,5 millions de dollars, au moyen d'une lettre de crédit du même montant.

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

- Renouveler le permis d'installation de combustible nucléaire pour autoriser Cameco à exploiter sa raffinerie de Blind River jusqu'au 28 février 2032.
- Approuver la demande de Cameco visant à maintenir l'autorisation actuelle d'augmenter la capacité de production annuelle à 24 000 tonnes d'uranium sous forme de trioxyde d'uranium, sous réserve de certaines conditions.
- Accepter la garantie financière révisée proposée de 57,5 millions de dollars, au moyen d'une lettre de crédit du même montant.
- Autoriser la délégation de pouvoirs prévue dans le présent CMD.

The following items are attached:

- Proposed licence FFL-3632.00/2032
- Draft licence conditions handbook
- Current licence FFOL-3632.00/2022

Les pièces suivantes sont jointes :

- Permis proposé FFL-3632.00/2032
- Ébauche du manuel des conditions de permis
- Permis actuel FFOL-3632.00/2022

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Signed/signé le

13 August 2021

Kavita Murthy

Director General

Directorate of Nuclear Cycle and Facilities Regulation

Directrice générale de la

Direction de 1a réglementation du cycle et des installations nucléaires

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EXECUTIVE SUMMARY

Cameco Corporation (Cameco) is the operator of the Blind River Refinery (BRR). The BRR is designated as a Class IB nuclear facility under the *Class I Nuclear Facilities Regulations*. Cameco's operating licence for this facility has a 10-year term that began on March 1, 2012, and will expire on February 28, 2022. The facility, which has been in operation since 1983, refines uranium concentrates (commonly referred to as yellowcake) received from uranium mines worldwide to produce uranium trioxide (UO_3), an intermediate product of the fuel cycle. The primary recipient of the product is the Port Hope Conversion Facility in Port Hope, Ontario, which is also operated by Cameco under a Canadian Nuclear Safety Commission (CNSC) licence.

The purpose of this Commission Member Document (CMD) is to provide the results of CNSC staff's assessment of Cameco's application, including conclusions and recommendations, to inform the Commission decision on Cameco's request to renew its operating licence.

Pursuant to section 24 of the *Nuclear Safety and Control Act* (NSCA), the Commission issued the operating licence to Cameco Corporation in March 2012. Since 2012, CNSC staff have presented the licensee's compliance performance to the Commission in annual Regulatory Oversight Reports for Uranium and Nuclear Substance Processing Facilities.

In September 2020, Cameco applied to the CNSC for the renewal of its operating licence. In its application, Cameco requested a 10-year licence to continue operating the BRR. Also, Cameco requested approval to retain the authorization granted in 2012 by the Commission for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, pending completion of conditions. Note that although authorized, Cameco did not proceed with the production increase during the current licence period.

Cameco holds a financial guarantee of C$48.0 million for decommissioning of the BRR, which the Commission accepted in November 2017. In October 2020, as part of this licence renewal application, Cameco submitted a revised financial guarantee of C$57.5 million.

This CMD has two parts. Part 1 of this CMD presents CNSC staff's assessment, conclusions and recommendations in respect of Cameco's licence application. CNSC staff have evaluated the licensee's compliance with the requirements of the NSCA and its regulations. CNSC staff's assessment of the licensee's regulatory performance concludes: that the environmental and radiological risks remain low; that effluent quality and radiation doses are effectively controlled and kept well below regulatory limits; and that Cameco's performance in the conventional health and safety SCA demonstrates that hazards and risks are managed and that activities are conducted safely.

Furthermore, CNSC staff present the following:

1. CNSC staff's assessment determined that the application complies with the regulatory requirements.
2. CNSC staff concluded that the licensee's performance during the licensing term was satisfactory and met regulatory requirements.
3. Cameco is proposing a revised financial guarantee of C$57.5 million in the form of a letter of credit, which is adequate for the decommissioning of the BRR. The financial guarantee instrument meets the acceptance criteria.

CNSC staff recommend that the Commission take the following actions:

1. Conclude, pursuant to paragraph 24(4)(a) and (b) of the NSCA, that Cameco:
    i. is qualified to carry on the activities authorized by the licence.
    ii. will 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.
2. Approve the issuance of a 10-year nuclear fuel facility licence effective March 1, 2022 to February 28, 3032 for the BRR facility.
3. Approve Cameco's request to maintain the current authorization for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, subject to the following facility-specific licence condition:

    > The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iv) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity.

4. Accept the proposed revised financial guarantee of C$57.5 million, through one financial instrument, a letter of credit for C$57.5 million, and direct Cameco to provide the original instrument within 90 days of the issuance of a decision on this matter.
5. Delegate authority as set out in section 4.10 of this CMD.

Part 2 of this CMD provides licensing-related documentation pertaining to this hearing, including a licence change table, the proposed licence and the current licence. A draft licence conditions handbook is also included for information purposes only.

Referenced documents in this CMD are available to the public upon request.

PART 1

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

Part 1 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 other matters of regulatory interest
5. Addenda material that complements items 1 through 4.

Part 2 provides information pertaining to the current and proposed licences.

1. OVERVIEW

1.1 Background

Cameco Corporation (Cameco) based in Saskatoon, Saskatchewan owns and operates a Class IB nuclear facility in Blind River, Ontario under a nuclear fuel facility operating licence, FFOL-3632.00/2022.

The Blind River Refinery (BRR) facility refines uranium concentrates (commonly referred to as yellowcake) received from uranium mines worldwide to produce uranium trioxide (UO_3), an intermediate product of the fuel cycle. The primary recipient of the product is Cameco's Port Hope Conversion Facility (PHCF) in Port Hope, Ontario.

BRR Location and Layout

The BRR facility is located at 328 Eldorado Road approximately 5 km to the west of the Town of Blind River and south of the Mississauga First Nation community. The BRR facility is situated on a portion of the lands owned by Cameco in the Town of Blind River, District of Algoma.

The BRR facility is a processing plant that refines uranium concentrates to produce UO_3. The UO_3 refinery, plant services and administration are located in a central building. There are also several smaller auxiliary buildings at the site, which support refinery operations. Some of these buildings provide a specific function, such as the cooling towers, effluent pump house, solvent make-up building and sewage treatment plant, and others are used primarily for storage of chemical compounds or materials. There are also 3 separate buildings that can be used to store uranium-bearing products. A number of outside storage areas are used for storing chemicals and uranium-bearing materials.

Figure 1: Aerial overview of the BRR facility and surrounding area

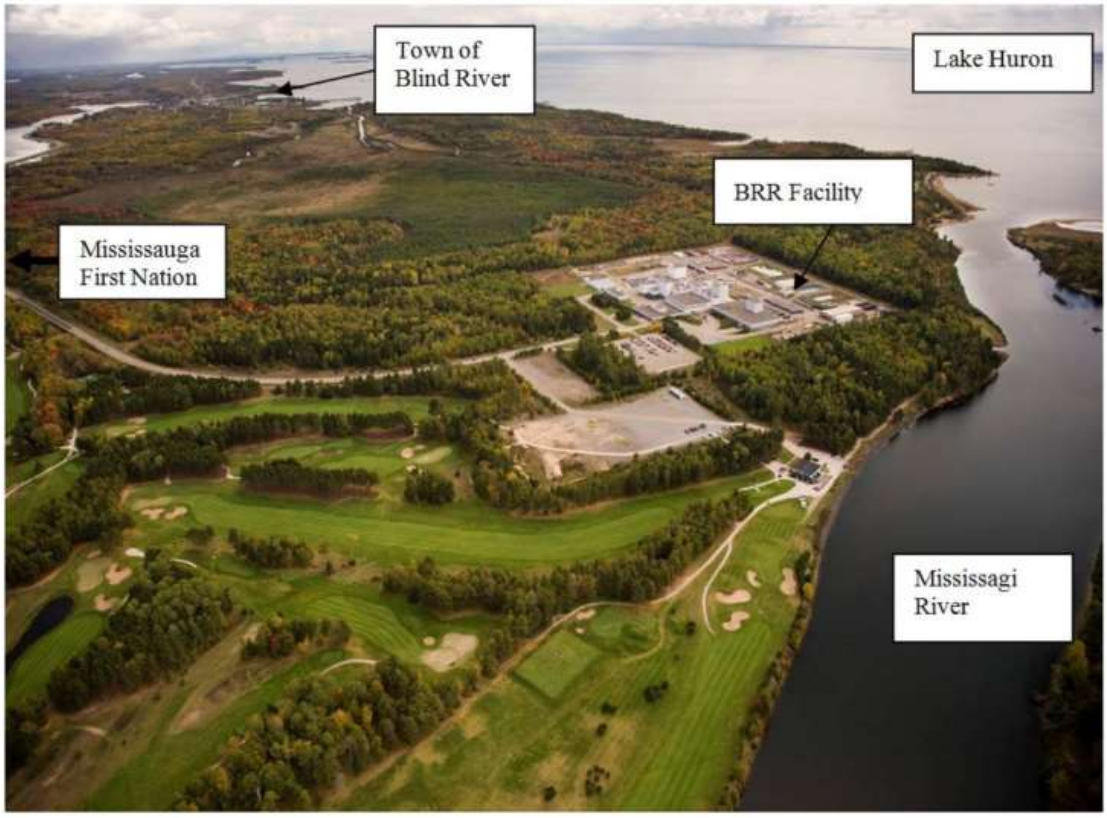

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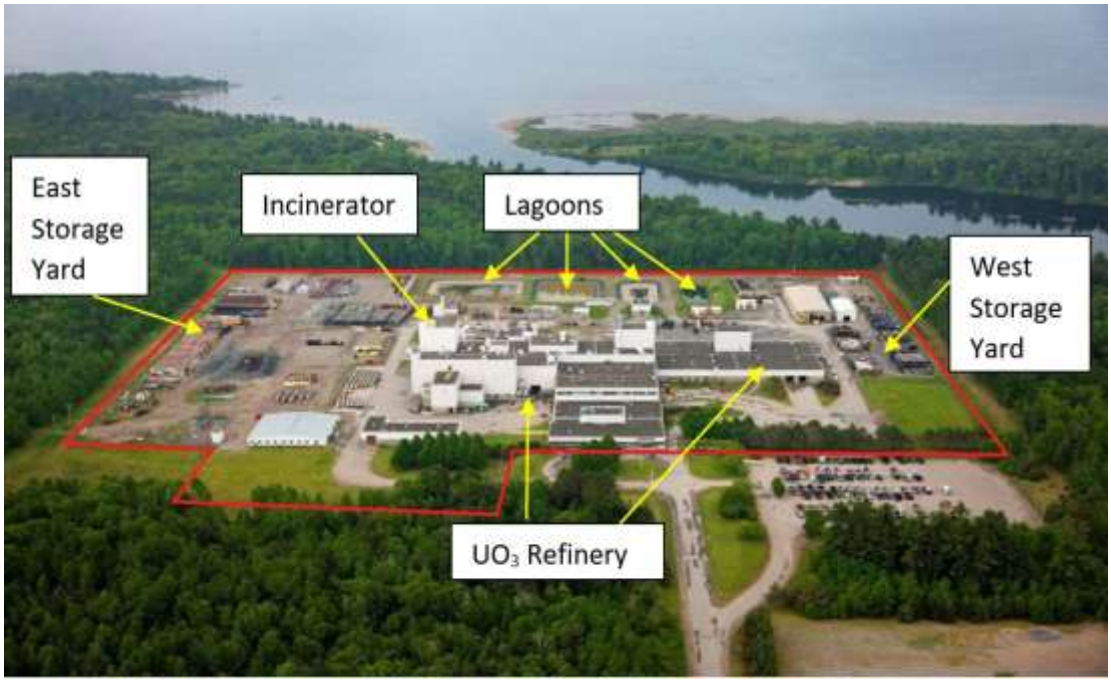
Figure 2: Aerial view of the BRR facility, located in Blind River, ON



BRR Operations

The BRR facility has been in operation since 1983 and licensed to produce up to 18,000 tonnes of uranium as UO_3 during any calendar year. Following public hearings the Commission, in 2012, authorized BRR to increase the annual production rate to 24,000 tonnes of uranium as UO_3, pending completion of conditions. BRR has not undertaken the work related to this over the current licensing period.

The BRR facility processes natural uranium concentrates into natural UO_3. BRR receives uranium concentrates from uranium mines worldwide. BRR also receives and processes small quantities of scrap natural uranium bearing materials such as uranium dioxide and natural uranium metal. All concentrates and scrap uranium products are received in steel drums.

In the refining process, nitric acid is added to uranium concentrate to produce a uranyl nitrate solution. Impurities are removed from the uranyl nitrate solution using a solvent extraction process. The purified uranyl nitrate is then heated and concentrated, producing a nuclear-grade uranyl nitrate hexahydrate (UNH) liquid. This UNH is then thermally decomposed to form UO_3 powder. The UO_3 powder is stored in two ways:

- specially designed bulk containers called tote bins, which contain approximately 9.5 tonnes of material each; these tote bins are transported to Cameco's PHCF
- steel drums for shipments to other customers.

The facility recovers oxides of nitrogen generated in various processes in a nitric acid recovery circuit for re-use. In addition, the solvent containing tributyl phosphate is recovered and recycled. The other 2 recyclable products of the refining process are the formation of regeneration product produced in the solvent treatment circuit and a calcined product produced in the denitrated raffinate circuit. Both of these products contain recoverable uranium and are shipped to a licensed uranium milling facility to recover uranium. Cameco also transports equipment and materials between licensed Cameco sites in order to reduce, re-use, recover and recycle items to the extent practicable.

The BRR facility is licensed to process natural uranium concentrates into natural UO_3. The risks associated with the licensed activities are mainly due to conventional industrial hazards and radiological hazards from natural uranium. The risk of nuclear criticality does not exist when handling or processing natural uranium concentrates and UO_3. CNSC staff have conducted, and will continue to conduct ongoing regulatory oversight and compliance verification activities for the current licence period. In accordance with its licence, Cameco submits annual compliance reports retailing regulatory performance each year. CNSC staff reported on BRR's satisfactory compliance performance in December 2020 at the Commission meeting on the *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities: 2019* [1].

1.2 Highlights

Cameco's Licence Application Requests

In September 2020, Cameco submitted an application [2] for the renewal of the Class IB Nuclear Fuel Facility Operating Licence FFOL-3632.0/2022 for the BRR for a term of 10 years with no changes to the authorized activities or approved production rates. CNSC staff assessed all aspects of Cameco's licence renewal application for the renewal of FFOL-3632.0/2022 for a 10-year period. Cameco is requesting the following:

- to operate the BRR facility for the production of UO_3 from uranium ore concentrates
- to possess, transfer, use, process, import, package, transport, manage, store and dispose of the nuclear substances that are required for, associated with, or arise from the production of UO_3
- to possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the production of UO_3
- to maintain the current authorization for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, subject to the following conditions:
    a) the proposed modifications of the facility as specified in Cameco's letter dated June 28, 2011[1] [3], are completed and commissioned
    b) a final commissioning report of the proposed modifications specified in Cameco's letter dated June 28, 2011 [3], is submitted to the Commission or a person authorized by the Commission for review and acceptance
    c) the final commissioning report specified in (b) above is accepted in writing by the Commission or a person authorized by the Commission.
- to update its financial guarantee to C$57.5 million through a letter of credit.

CNSC staff note that the request related to the annual production rate was considered by the Commission in 2008 [4, 5] and again in 2011 [6] and approval was granted by the Commission following a 2 part public hearing on November 3, 2011 and January 19, 2012 [7].

CNSC Staff Assessment of Cameco's Licence Application Requests

CNSC staff assessed Cameco's renewal application with the requested authorization to operate the BRR facility for the production of UO_3 from uranium ore concentrates and determined that the application complies with regulatory requirements. This assessment determined whether Cameco is qualified and capable of performing the activities to be authorized by the Commission.

[1] Note: In a letter submitted on March 17, 2021 [8] in support of their current licence renewal application Cameco reaffirmed that these proposed modifications of the facility as specified in Cameco's earlier letter dated June 28, 2011 [3] still remain valid.

Technical Assessment

CNSC staff have reviewed Cameco's licence renewal application and concluded that it contains sufficient information to demonstrate that programs are in place, to meet CNSC's regulatory requirements. CNSC staff assessment is documented in sections 2, 3, 4 and Appendix C of this CMD.

Facility Specific Licence Conditions

CNSC staff's technical assessment identified that, in order to operate at the increased annual production capacity BRR must complete modifications to the facility (see section 1.2 Highlights, Annual Production Capacity). To ensure that requirements are met and that CNSC staff maintain adequate regulatory oversight of these changes, the following facility-specific licence condition is proposed for the Commission's consideration and decision:

- Licence condition 15.1: The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iv) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity.

Section 4.10 of this CMD lists the delegation of authority associated with licence condition 15.1.

The draft LCH in Part 2 of this CMD, details the criteria by which the final commissioning report in proposed licence condition 15.1 will be assessed.

Requested Licence Period

In Cameco's application to renew the CNSC-issued licence, a 10-year licence term was requested. CNSC's regulatory framework includes a standardized licence and licence conditions handbook (LCH), which provides for effective regulatory oversight of this facility. This includes aspects such as the periodic review every 5 years of the safety analysis report and the environmental risk assessment, and continuous improvement through updates to BRR programs to comply with updated regulatory requirements. Cameco is required by its licence to report on its compliance performance annually through its Annual Compliance Monitoring and Operational Performance Report including changes to its operations. CNSC staff verify compliance through desktop reviews, inspections and event reviews. In addition, CNSC staff report compliance performance of BRR to the Commission in public meetings, through the *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities* that ensures adequate oversight of the licensee. Therefore, CNSC staff recommended that the Commission grant a licence to Cameco's BRR for a period of 10 years as put forward in this CMD.

Annual Production Capacity

As part of the September 2020 licence renewal application [2], Cameco requested no change to its existing production rates including to maintain the current authorization for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, pending the approved modifications to the facility and fulfillment of certain other conditions

As part of the documents submitted in support of the licence application, Cameco submitted an updated safety analysis report, taking into account the proposed modification. Cameco also provided an updated response to recommendations in a third party evaluation report on necessary BRR modifications in relation to the requested production increase [8]. CNSC staff evaluated these reports and found them to be acceptable in terms of providing assurance that the existing facility after the installation and commissioning of the proposed additional equipment can safely operate at the proposed production rate of 24,000 tonnes of uranium as UO_3 per year.

Cameco's original application for the proposed production capacity increase was evaluated as part of the licence renewal hearing process in 2008 [4]. That request was subjected to the requirements of the *Canadian Environmental Assessment Act* (CEAA). As a Responsible Authority under CEAA, the Commission, in its "Record of Proceedings, Including Reasons for Decision" dated, November 3, 2008, decided that the proposed project, taking into account the identified mitigation measures, is not likely to cause significant adverse environmental effects [5].

As part of the last (2012) BRR licence renewal process [6], the Commission accepted Cameco's application to increase the annual production capacity [7]. Accordingly, during the current licence period, Cameco was authorized to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, subject to completing the following conditions:

(a) the proposed modifications of the facility as specified in Cameco's letter dated June 28, 2011 [3], are completed and commissioned

(b) a final commissioning report on the proposed modifications specified in Cameco's letter dated June 28, 2011 [3], is submitted to the Commission or a person authorized by the Commission for review and acceptance

(c) the final commissioning report specified in (b) above is accepted in writing by the Commission or a person authorized by the Commission.

The above commitments were captured in the LCH associated with the facility.

To date Cameco has not proceeded with the annual production rate increase.

In the current licence renewal application Cameco is requesting to maintain the authorization granted in 2012 by the Commission for a production increase with no changes to the conditions described above. In the proposed draft licence, CNSC staff recommend that a facility-specific licence condition related to the production increase be included. CNSC staff's proposed conditions related to the requested production increase are in section 1.4 Recommendations and in the draft LCH in Part 2 of this CMD.

Based on the above assessment, CNSC staff concluded that Cameco's proposed modification of its BRR facility to increase the production capacity continues to be acceptable and that with the licensee programs in place as detailed in section 3 of this CMD, Cameco complies with regulatory requirements.

Financial Guarantee

As part of the licence renewal, Cameco proposed a new financial guarantee (FG) of C$57.5 million in the form of a letter of credit. CNSC staff concluded that the updated cost estimate is adequate for the decommissioning of the BRR facility and the proposed financial guarantee instrument is acceptable. Cameco currently maintains a FG for decommissioning of the BRR facility in the form of a letter of credit for C$48 million.

1.3 Overall Conclusions

CNSC staff have reviewed Cameco's licence renewal application and supporting documents and CNSC staff's assessment determined that the application complies with the regulatory requirements and concluded that Cameco's performance during the licensing term was satisfactory and met regulatory requirements.

CNSC staff concluded that the proposed financial guarantee of C$57.5 million, through a letter of credit in the amount of C$57.5 million, is a credible cost estimate, and the financial guarantee instrument is acceptable.

1.4 Overall Recommendations

CNSC staff recommend that the Commission:

1. Conclude, pursuant to paragraph 24(4)(a) and (b) of the NSCA, in that Cameco:
   i. is qualified to carry on the activities authorized by the licence
   ii. will 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.
2. Approve the issuance of a 10-year nuclear fuel facility licence effective March 1, 2022, to February 28, 2032, for the BRR facility;

3. Approve Cameco's request to maintain the current authorization for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, subject to the following facility-specific licence condition:

   Licence condition 15.1: The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iv) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity.

4. Accept the proposed financial guarantee of C$57.5 million, through one financial instrument, a letter of credit for C$57.5 million, and direct Cameco to provide the original instrument within 90 days of the issuance of a decision on this matter.

5. Delegate authority as set out in section 4.10 of this CMD.

2. MATTERS FOR CONSIDERATION

2.1 Environmental Review

CNSC staff reviewed Cameco's licence renewal application in the context of the *Impact Assessment Act*. CNSC staff determined that the *Impact Assessment Act* does not apply because the activities proposed in Cameco's application [2] are not captured in its associated *Physical Activities Regulations*.

CNSC staff conduct Environmental Protection Reviews (EPRs) for all licence applications with potential environmental interactions, in accordance with its mandate under the NSCA and associated regulations. For this licence renewal application, CNSC staff conducted an EPR to ensure the protection of the environment and the health of persons. CNSC staff's assessment included a review of Cameco's licence renewal application, supporting documents (e.g., Environmental Risk Assessment [ERA] and annual compliance monitoring reports), and past environmental performance.

More information on CNSC staff's EPR can be found in section 3.9 of this CMD.

CNSC staff have concluded that the environment (terrestrial, aquatic and air) around the BRR is adequately protected; Cameco has and will continue to implement and maintain an effective environmental protection program to adequately protect the environment and the health and safety of persons. Through ongoing licensing, compliance activities and reviews, CNSC staff will continue to verify and ensure that the environment and the health and safety of persons are protected, and will continue to be protected over the proposed licence period

In the past, CNSC staff have produced an EPR report appended to CNSC staff's CMD. However, CNSC staff are piloting a new approach of publishing EPR reports on the Government of Canada's Open Government online portal and separate from CNSC staff's CMD. The licence renewal of the BRR was selected for the pilot project. The purpose of this new approach was to enhance trust with the public and Indigenous groups and give interested parties more time with the environmental and human health information. This approach was presented to the Commission in April 2021 [9], and was followed by a consultation period to gather feedback on this new approach from April 21, 2021, to July 16, 2021. CNSC will incorporate feedback into future reports, where possible. CNSC staff will include feedback specific to the EPR report for BRR in the CNSC presentation for the BRR licence renewal Hearing. Feedback will also be reflected in future BRR EPR report iterations. The EPR report for BRR [10] is available here on the open government portal.

2.2 Relevant Safety and Control Areas (SCAs)

The functional areas of any licensed facility or activity consist of a standard set of safety and control areas (SCAs). Each SCA is comprised of "specific areas" of regulatory interest; however, the specific areas associated with each SCA vary between facility types. See Addendum D, "Safety and Control Area Framework", for further information about SCAs.

In the following table:

1. The risk-ranking column indicates the overall level of risk associated with each SCA at BRR (see Addendum A, "Risk Ranking").
2. The relevance of each SCA to this CMD is indicated.
3. The rating level for each relevant SCA indicates the overall compliance with regulatory requirements for implementation (see Addendum B, "Rating Levels").

Table 1: SCAs relevant to the BRR licence renewal and CNSC staff's overall rating for the licence period, 2012 –20

Functional Area	Safety and Control Area	Risk Ranking	Relevant to this CMD?	Rating Level
Management	Management System	H	Yes	SA
	Human Performance Management	H	Yes	SA
	Operating Performance	H	Yes	SA
Facility and Equipment	Safety Analysis	H	Yes	SA
	Physical Design	H	Yes	SA
	Fitness for Service	H	Yes	SA
Core Control Processes	Radiation Protection	M	Yes	SA
	Conventional Health and Safety	M	Yes	SA
	Environmental Protection	H	Yes	SA
	Emergency Management and Fire Protection	M	Yes	SA
	Waste Management	H	Yes	SA
	Security	M	Yes	SA
	Safeguards and Non-Proliferation	M	Yes	SA
	Packaging and Transport	H	Yes	SA

2.3 Other Matters of Regulatory Interest

Table 2 identifies other matters that are relevant to this CMD.

Table 2: Other matters relevant to this CMD

OTHER MATTERS OF REGULATORY INTEREST	
Area	**Relevant to this CMD?**
Indigenous Consultation	Yes
Other Consultation	Yes
Cost Recovery	Yes
Financial Guarantees	Yes
Improvement Plans and Significant Future Activities	Yes
Licensee's Public Information Program	Yes
Nuclear Liability Insurance	No

The relevant "other matters" of regulatory interest are discussed in section 4.

2.4 Regulatory and Technical Basis

Cameco's BRR is classified as a Class IB facility under the NSCA. For this type of facility, the key regulatory requirements come directly from the NSCA and associated regulations, which include *Class I Nuclear Facilities Regulations* (CINFR), *General Nuclear Safety and Control Regulations* (GNSCR) as well as other regulatory requirements associated with the NSCA.

Further information, regarding the regulatory and technical basis for the matters under consideration in this CMD, is provided in Appendix C of this CMD.

3. GENERAL ASSESSMENT OF SCAS

The specific areas that comprise the SCAs for this facility or activity type are identified in Addendum D, section D.2. If specific areas are listed for an SCA in section 3, then the related details pertaining to them are provided in Addendum E to this document. If specific areas are not listed for a given SCA in section 3, then a decision has been made to encompass them in an overall approach to that SCA.

3.1 Management System

The management system SCA covers the framework that 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 specific areas that comprise this SCA at the BRR facility include:

- management system and organization
- performance assessment, improvement and management review
- change management
- records management
- safety culture

3.1.1 Trends

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

TRENDS FOR MANAGEMENT SYSTEM								
Overall Compliance Ratings								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
BRR has a management system which meets the requirements of Canadian Standards Association (CSA) standard N286-12, *Management System Requirements for Nuclear Facilities* (CSA N286-12). CNSC staff monitor implementation of the management system at BRR through compliance verification activities, which include desktop reviews and inspections. The management system SCA at BRR met applicable CNSC requirements, and received a "satisfactory" rating during all years of the licence period.								

3.1.2 Discussion

BRR is required to implement and maintain a management system in compliance with CSA N286-12. In 2017, as part of the project to align the management system for the facility with the requirements of CSA N286-12, BRR developed a Management Systems Program Manual (MSPM). The MSPM integrates the management system requirements of the CSA N286-12 standard.

The MSPM applies to the entire life cycle of the BRR. The BRR MSPM also applies to supplier(s) contracted to perform the life-cycle activities of design, supply chain, construction, commissioning, operation, and decommissioning, as appropriate, as they relate to BRR. In March of 2018, CNSC staff completed the assessment of the BRR MSPM and identified to Cameco that the MSPM meets the requirements of the CSA N286-12 standard. CNSC staff will continue to review the documented and implemented management system during the next compliance cycle.

CNSC staff conducted 2 planned compliance inspections in 2015 and 2018. All enforcement actions associated with these inspections are closed to the CNSC's satisfaction. CNSC staff concluded that BRR's management system is acceptable and compliant with regulatory requirements.

3.1.3 Summary

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

3.1.3.1 Past Performance

Management System and Organization

CNSC staff determined that BRR has a management system that meets regulatory requirements. CNSC staff regularly assess the compliance of BRR documents and programs through desktop reviews and planned compliance verification inspections.

Onsite verification activities conducted in 2015 and 2018 included: areas of supply chain (purchase orders, purchase requests, quality requirements of purchased items, supplier qualifications, selection process of contractors); maintenance including equipment labelling practices; calibration; change as part of design control; warehouse (item preservation and segregating of non-conforming items); storage of records; annual management review; internal audits; management self-assessments and the document control process. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

CNSC staff's compliance verification conducted during the current licence period identified no issues concerning the licensee's organizational structure and individual responsibilities of positions with oversight on licensed activities.

Performance Assessment, Improvements and Management Review

BRR's management team conducts periodic management reviews, to analyze the previous year's performance when compared with its plans, assess compliance with standards, assess the effectiveness of BRR's management system and consider any trends. CNSC staff assessed these management reviews as part of compliance verification activities and found them acceptable.

BRR also conducts internal assessments to confirm conformance and effectiveness of its licensed programs and associated documentation. BRR completes internal assessments on a 3-year frequency and tracks resulting actions in a database that it maintains.

Over the current licence period, CNSC staff performed inspections on BRR's internal assessment program and confirmed that the program met requirements.

Change Management and Records Management

BRR's design and change control procedures ensures that changes to physical processes as well as changes to documented processes and practices are identified, justified, reviewed and approved before implementation.

CNSC staff verified that these procedures cover any changes to facility layout, equipment, processes including updating of procedures, and provide a documented approach to the assessment of risk and hazards related to any change.

BRR's records management process 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 BRR removes outdated or expired documents in a timely manner.

Over the current licence period, BRR's design and change control programs and records management program met CNSC requirements.

Safety Culture

The management system program at BRR is the framework that currently guides the processes and programs required to ensure safety objectives are achieved, performance is monitored and a healthy safety culture is maintained.

Cameco conducts safety culture assessments approximately every 5 years at all sites within the Fuel Services Division (FSD). The most recent safety culture assessments were completed in 2013 and 2018 at BRR. BRR confirmed that the refinery has a strong commitment to safety and that there is a high degree of trust and confidence in site leadership. BRR recognized that the focus of the actions arising from the safety culture assessments at the refinery was to reinforce ongoing management activities.

3.1.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA, through regulatory oversight activities, with focus on compliance with the CSA N286-12 standard.

CNSC published REGDOC-2.1.2, *Safety Culture* with requirements and guidance applicable to all Class I nuclear facilities. CNSC staff will monitor BRR's implementation of the REGDOC over the next proposed licensing period.

3.1.3.3 Proposed Improvements

To continue to improve its management system, BRR has committed to the implementation of REGDOC-2.1.2, *Safety Culture* by June 2022. CNSC staff will monitor the implementation over the next licence period.

3.1.4 Conclusion

CNSC staff concluded that BRR continues to maintain and implement a documented management system in accordance with CNSC regulatory requirements.

Based on CNSC staff assessments of Cameco's licence renewal application, supporting documents and performance, CNSC staff concluded that BRR has implemented appropriated measures and programs to meet CNSC expectations. CNSC staff will continue to monitor the BRR's progress in this area through the conduct of regular compliance verification activities.

3.1.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 1.1 requires the licensee to implement and maintain a management system. Compliance verification criteria for this licence condition are included in the draft LCH in part 2 of this CMD.

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 these personnel have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.

The specific areas that comprise this SCA at the BRR facility include:

- personnel training
- human performance program
- work organization and job design

Historically, the regulatory focus for BRR in this SCA covered the specific area of personnel training only. However, as part of this licence renewal, CNSC staff completed a technical assessment covering other specific areas in the human performance management SCA such as a human performance program and work organization and job design in addition to the specific area of 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 MANAGMENT								
Overall Compliance Ratings								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
CNSC staff consistently rated the human performance management SCA as satisfactory during the current licence period. BRR has an established systematic approach to training (SAT) based training system that continues to be implemented for its training programs.								

3.2.2 Discussion

The regulatory requirements in the human performance management SCA are under paragraphs 12(1)(a) and (b) of the GNSCR and section 6 of the Class 1 Nuclear Facilities Regulations (CINFR). Details of CNSC staff's assessment in this SCA are presented in the following sections.

Personnel Training

REGDOC-2.2.2, *Personnel Training*, sets out requirements and guidance for the analysis, design, development, implementation, evaluation, documentation and management of training at nuclear facilities within Canada, including the essential principles and elements of an effective training system. BRR's AM 300 Training Program Manual describes the SAT training program implemented at BRR which includes the processes, procedures, work instructions, personnel responsibilities, records, etc. to ensure workers are trained and qualified to carry out the licensed activities.

CNSC staff verified that BRR's training system processes and procedures demonstrated compliance with REGDOC-2.2.2. CNSC staff are satisfied with BRR's progress regarding the implementation of its SAT based training system as it continues to comply with the regulatory requirements.

CNSC staff conducted 3 planned compliance inspections in 2014, 2017 and 2020. All enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

Human Performance Program

BRR maintains processes to support human performance in its operations. Cameco indicated that some human performance management tools have been in place, such as corporate requirements for self-check, personal accountability, fitness for duty and safety, Cameco's competency model, ladder of self-responsibility and accountability, and BRR safety charter. BRR will continue to develop and implement human performance management tools.

Work Organization and Job Design

The minimum shift complement is the minimum number of qualified workers who must be present at all times to ensure the safe operation of the nuclear facility and to ensure adequate emergency response capability.

BRR maintains a minimum complement of qualified emergency response team (ERT) members at the refinery to respond to emergency situations. BRR stated that the requirements for the qualification of the ERT members are defined through SAT and the emergency response plan.

3.2.3 Summary

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

3.2.3.1 Past Performance

Personnel Training

Over the licensed period, CNSC staff conducted 3 personnel training focused inspections in 2014, 2017 and 2020. These inspections verified whether BRR's training program, documented training processes and training procedures were in compliance with CNSC regulatory requirements. All personnel training non-compliances identified during these inspections were classified as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction. In the most recent inspection (October 2020), a deficiency related to the timely development of a supervisory training program when there was a training need, was identified. This deficiency was addressed and a corrective action plan was submitted and accepted by CNSC staff.

3.2.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation. As part of on-going oversight and compliance verification activities, CNSC staff will continue to monitor and review any proposed changes to Cameco's training programs and system.

3.2.3.3 Proposed Improvements

The current programs at BRR for this SCA are considered adequate and no improvements within this SCA are proposed.

3.2.4 Conclusion

CNSC staff concluded that BRR meets the requirements of GNSCR paragraphs 12(1)(a) and (b) and CINFR section 6 and has implemented and maintained a satisfactory training program to ensure that workers are trained and qualified to carry out the licensed activities.

3.2.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 2.1 requires the licensee implement and maintain a training program. Compliance verification criteria for this licence condition are included in the draft LCH in Part 2 of this CMD.

3.3 Operating Performance

The operating performance SCA includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.

The specific areas that comprise this SCA at the BRR facility include:

- conduct of licensed activity
- procedures
- reporting and trending

3.3.1 Trends

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

TRENDS FOR OPERATING PERFORMANCE								
Overall Compliance Ratings								
2012	2013	2014	2015	2016	2017	2018	2019	2020
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
The licensee has maintained an operating program in accordance with CNSC requirements over this licence period. BRR continues to be rated SA in this SCA.								

3.3.2 Discussion

Cameco is required through the NSCA and its regulations to ensure policies, programs, methods and procedures are in place for the safe operation and maintenance of its licensed nuclear facilities. The occupational and industrial safety aspects of BRR's operations are regulated under the *Canada Labour Code*, and its associated *Canada Occupational Health and Safety Regulations*. REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*, is also a governing document dealing with reporting.

Verification of the licensee's compliance with the requirements of this SCA are included as part of CNSC's compliance activities ranging from desktop reviews of annual and quarterly reports, reviews of event reports, related corrective actions and inspections. CNSC staff confirmed through these compliance verification activities that BRR has implemented and maintained an effective operating program in order to ensure licensed activities are conducted safely and in compliance with regulatory requirements.

3.3.3 Summary

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

3.3.3.1 Past Performance

Conduct of Licensed Activity

Cameco has operated the BRR in compliance with CNSC regulatory requirements. Since 2012, CNSC staff carried out a number of compliance verification activities on BRR's operations, including onsite inspections, review of management system documents, annual compliance reports and event reports. Non-compliances identified during inspections or desktop reviews were addressed by Cameco in a timely manner and in accordance with corrective action plans that were reviewed and accepted by CNSC staff.

The current annual production limit for the activities carried out at the BRR are documented in the LCH associated with the current operating licence. Cameco has operated the BRR in compliance with CNSC regulatory requirements and remained below its production limit for the current licence period.

As part of the licence renewal, Cameco requested no change to the current production rates. In 2012 the Commission authorized a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3 pending completion of specified plant modifications and reporting to the Commission or a person authorized by the Commission. See section 1.2 of this CMD for additional information.

In accordance with the current LCH, Cameco continues to provide information regarding the operating performance of the BRR in annual and quarterly compliance reports submitted to CNSC staff. CNSC staff evaluated the information provided in these reports to ensure BRR remains in compliance with regulatory requirements.

Procedures

BRR's management system consists of high-level program documents supported by lower level procedures and work instructions. Cameco maintains a comprehensive suite of procedures across all programs at the BRR facility.

CNSC staff review procedural-level documents as part of ongoing compliance verification activities to ensure proper maintenance of procedures to reflect actual practices as well as procedural adherence by BRR personnel.

Based on these reviews, CNSC staff concluded that BRR adequately maintains its procedures and there were no significant changes to operating procedures with the potential to affect the safe operation of the BRR facility.

Reporting and Trending

In February 2018, CNSC staff requested BRR submit an implementation plan for REGDOC-3.1.2, *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*. BRR completed implementation of REGDOC-3.1.2 in December 2018. Prior to the implementation of REGDOC-3.1.2, detailed requirements for reporting unplanned situations or events were included in BRR's LCH and were based on the general reports submitted pursuant to section 29 of the GNSCR. BRR has complied with the requirements for submission of these reports throughout the licence period. Table 3 lists the number of events reported to the CNSC by the licensee over the licence period.

Table 3: Number of reported events by BRR, 2012 –20

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	4	2	7	4	4	4	2	2	4

CNSC staff review all reported events to identify if there are any regulatory concerns and report significant events to the Commission at public meetings of the Commission. Reported events included transportation incidents, radiation protection action level exceedances, and a yard fire. Two events that occurred during the licensing period are discussed below. They are included in the operating performance SCA since they are significant events that impacted multiple SCAs. Other reportable events during the licensing period are discussed later in this report under the appropriate SCAs.

Drum pressurization event 2012

In June 2012, there was a significant event at this facility when a BRR employee unknowingly opened a pressurized drum of uranium concentrate originating from the U.S., which caused a plume of approximately 26 kg of uranium concentrate to enter the surrounding area. This incident caused an increase in the level of uranium in air, which resulted in the employee receiving an intake of uranium concentrate. Urine analysis measurements determined that the employee's concentration of uranium in urine exceeded BRR's action level for routine urine sample submissions, resulting in a dose to the employee of approximately 1.7 mSv.

BRR attributed the cause of the incident to a lack of information regarding pressurized drums containing uranium concentrates from uranium processing mills that use hydrogen peroxide in their refining process. CNSC staff issued a request under subsection 12(2) of the GNSCR regarding BRR's investigation into the incident, including performing a root cause investigation and taking necessary corrective actions. CNSC staff also reported this event through an event initial report (EIR) to the Commission in 2012 [11]; this provided details of the event and of Cameco's proposed corrective actions.

BRR has since made several improvements to its drum handling and processing operations as part of the lessons learned from the 2012 incident. BRR also performed a redesign of the drum auger sampling station that was involved in the June 2012 incident, so that the worker is removed from the hazard during the de-lidding process. CNSC staff have reviewed these corrective actions during compliance inspections and are satisfied with their implementation. There have been no similar incidents since the 2012 event.

All radiation protection action level exceedances that were reported to the CNSC over the current licence period are described in section 3.7, Radiation Protection, and Appendix E.1, Radiation Protection.

Yard Fire 2020

In April 2020, there was a fire in the BRR yard area. The material involved was contaminated combustible material (CCM) awaiting incineration at the BRR incinerator. Cameco estimated that 400 totes, with a total uranium content of approximately 44 kg U, were either burned completely or partially burned in the yard area. The partially burned materials were collected and placed into sea containers for storage onsite until they can be incinerated. There were no injuries to employees or emergency responders at the scene and there was no environmental impact as a result of this event.

The exact cause of the fire was unknown, but was suspected to be related to the segregation of material in a CCM tote. Cameco completed an investigation and established corrective actions. CNSC staff have reviewed these corrective actions through desktop reviews and during a compliance inspection and are satisfied with their implementation. The 2020 yard fire is discussed further in section 3.10 Emergency Management and Fire Protection.

In accordance with REGDOC-3.1.2, BRR continues to provide information on its operating performance by submitting annual compliance reports. CNSC staff reviewed these reports and are satisfied with BRR's performance during this licence period.

3.3.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation. CNSC staff will focus on procedural adherence and maintenance of the operating limits and safety envelope with compliance verification focus on the safe conduct of licensed activities.

3.3.3.3 Proposed Improvements

Improvements to operation, equipment and programs are identified on an ongoing basis and implemented as part of continuous improvement. There are no major changes anticipated in the near future for this SCA.

3.3.4 Conclusion

Based on CNSC staff assessments of Cameco's application, supporting documents and past performance, CNSC staff concluded that Cameco continues to implement and maintain an effective operating program for the BRR facility in accordance with regulatory requirements.

3.3.5 Recommendation

Two licence conditions are included in the proposed licence for this SCA. Licence condition 3.1 requires the licensee to implement and maintain an operating program, which includes a set of operating limits. Licence condition 3.2 requires the licensee to implement and maintain a program for reporting to the Commission or a person authorized by the Commission. Compliance verification criteria for both licence conditions are included in the draft LCH.

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 areas that comprise this SCA at the BRR facility include:

- deterministic safety analysis
- 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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
Cameco's Safety Analysis Reports (SAR) effectively identify facility hazards and Structures, Systems and Components (SSC) relied upon for safety to control or mitigate these hazards. Cameco's Fire Hazard Analysis reports demonstrate compliance with the *National Building Code of Canada* (NBCC) and the *National Fire Code of Canada* (NFCC).								

3.4.2 Discussion

Paragraph 5(f) of the CINFR requires that an application to construct a Class I nuclear facility include a preliminary SAR and paragraph 6(c) requires that an application for a licence to operate include a final SAR. A safety analysis must include an analysis of the postulated sequences and consequences of conditions that could arise from initiating events and associated hazards.

The BRR licence renewal application's supporting documentation included an updated SAR for the BRR facility. The SAR provides a description of the facility and building layouts, processes, operating limits, and scenarios based on hazardous and postulating initiating events. In addition, the SAR provides an assessment of potential consequences and demonstrates the safety through application of the defence in depth concept.

CNSC staff evaluated the information provided in the SAR for BRR and determined that Cameco has adequately assessed the hazards associated with licensed activities and demonstrated an adequate level of protection over a broad range of operating conditions.

CNSC staff concluded based on their review of the submitted application and supporting documents that the radiological and non-radiological risks associated with Cameco's operations at BRR are low. Cameco remains in compliance with regulatory requirements for the safety analysis SCA.

3.4.3 Summary

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

3.4.3.1 Past Performance

As part of the continued improvement of safety analysis, Cameco reviewed the safety analysis and the design of the facility using the Hazards and Operability study technique. Cameco updated several safety assessments to ensure the safety of its operations. These assessments have included updates to assessments for aircraft impacts, flooding risk analysis, earthquake risk analysis, and potential transport related events.

During the current licence period, CNSC staff conducted several desktop reviews of the safety analysis documentation and program. Compliance inspections included verification that the licensee has been adequately maintaining the safety barriers and protective systems as specified in the BRR facility's SAR.

Cameco maintains an acceptable Fire Hazard Analysis (FHA) for the BRR facility. The FHA reports demonstrate compliance with the requirements of the NBCC, the NFCC and CSA standard N393-13, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances*. The fire hazard analysis is discussed in section 3.10 of this CMD.

CNSC staff require, in the BRR LCH, that Cameco review its SAR at a minimum of every 5 years for accuracy and validity. The document was last updated by Cameco and underwent technical assessment by CNSC staff in 2020 [12]. The updated SAR considered the production increase discussed in section 1.2 of this CMD. CNSC staff reviewed the SAR and the necessary BRR modifications in relation to the production increase [8] for any impact on the SAR. The SAR still meets CNSC staff's expectations with respect to the production increase. Cameco has also committed to reviewing the SAR if a production increase went forward. Cameco has achieved a significant level of consistency of the SAR with the requirements and guidance found in relevant national standard (CSA N292.0-14, *General principles for the management of radioactive waste and irradiated fuel*) and international standard (IAEA SSR-4, *Safety of Nuclear Fuel Cycle Facilities*, 2017), which are included in the BRR LCH as compliance verification criteria and guidance, respectively. CNSC staff's assessment of the BRR SAR concluded that it meets regulatory requirements.

3.4.3.2 Regulatory Focus

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

3.4.3.3 Proposed Improvements

No improvements within this SCA are proposed.

3.4.4 Conclusion

BRR has a process in place to identify and evaluate potential safety hazards associated with the operation of the facility. CNSC staff assessed Cameco's documentation and analyses under the safety analysis SCA and found that it meets regulatory requirements.

3.4.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Standardized Licence condition 4.1 requires the licensee to implement and maintain a safety analysis program. Compliance verification criteria for this licence condition are included in the draft LCH.

3.5 Physical Design

The physical design SCA 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.

The specific areas that comprise this SCA at the BRR facility include:

- design governance
- site characterization
- facility design
- structure design
- system design

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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
The licensee has maintained a physical design program in accordance with CNSC requirements over this licence period. BRR continues to be rated SA in this SCA.								

3.5.2 Discussion

BRR is required to implement and maintain a physical design program such that the design of facilities and changes made to its facilities are managed and within the licence basis. The requirements under this SCA are provided by national codes and standards including the NBCC and NFCC for structural design as well as CSA standard B51-14, *Boiler, pressure vessel and pressure piping code* (CSA B51-14) for systems and components including pressure retaining component design. BRR is also required to maintain an authorized inspection agency agreement, which currently is the Technical Standards and Safety Authority (TSSA) for appropriate third party review and certification of its pressure retaining components.

CNSC staff verified BRR's compliance with regulatory requirements and that all operational changes are assessed, managed and documented through implementing and maintaining a change control program and related procedures under its management system. In addition, BRR is required to notify the CNSC of significant changes to its fire protection program and submit an accompanying third party assessment of the potential impact of these changes. Any physical design changes outside of the licence basis would require Commission approval.

CNSC staff confirmed that BRR has implemented and maintained an adequate physical design program with appropriate change control. CNSC staff concluded that BRR's physical design measures meet regulatory requirements and when design changes are made within the licensing basis, the licensee has adequate resources in place to manage them and to ensure safety.

In its application for a licence renewal [2], Cameco requested approval to retain the authorization granted in 2012 by the Commission for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3. A number of modifications will be required for the production increase, which involve the addition of equipment similar in design and function to the equipment already in place at the facility. The additional equipment to be installed mainly consists of 2 new strip columns in the solvent extraction circuit, 3 new de-nitration pots, and associated piping, pumps, valves and process heaters.

Cameco provided an updated response to recommendations in a third party evaluation report on necessary plant modifications in relation to the requested production increase [8]. CNSC staff reviewed Cameco's submission and found that it continues to meet expectations. This submission, in addition to the updated SAR and the existing SCA programs continue to support the safe operation of BRR at the increased production rate of 24,000 tonnes of uranium as UO_3 per year, provided Cameco makes the minor modifications to the facility to address the findings of the third party engineering review.

3.5.3 Summary

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

3.5.3.1 Past Performance

Modifications to the licensed facility including changes or alterations to facility, equipment or process are managed under BRR's design control process to ensure compliance with the licence, their LCH, applicable national codes and CSA standards.

BRR carried out Code Compliance Reviews (CCR), in accordance with applicable requirements. Prior to the implementation of any proposed modification with the potential to impact protection from fire, Cameco submits the proposed modification for third-party review having specific expertise with such reviews for a CCR. CNSC staff review the results of these third party CCRs as part of regular compliance oversight. Throughout the licence term, CNSC staff have reviewed several third party CCRs submitted by BRR and are satisfied that the depth and scope of these reviews ensure safety. BRR continues to implement and maintain its fire protection program in accordance with the current licence and associated compliance verification criteria as outlined in the LCH.

During the current licence period, BRR maintained a pressure boundary program and had in place a formal agreement with the TSSA. The TSSA provides design registration, inspection and other activities and services related to pressure boundary in accordance with the requirements of CSA B51-14 and the agreement. BRR held valid certificates to perform pressure boundary activities in accordance with the requirements in CSA B51-14. Cameco submitted an implementation plan of the latest revision CSA B51-19, *Boiler, pressure vessel, and pressure piping code* at the BRR. BRR conducted a gap analysis between CSA B51-19 and the existing pressure boundary program and practices to address the changes between CSA B51-14 and CSA B51-19. BRR demonstrated that the design basis of pressure retaining systems and components to support facility safe and reliable operation have been maintained. As part of the gap analysis, BRR updated their program to be compliant with CSA B51-19.

CNSC staff conducted 2 planned compliance inspections in 2017 and 2019. The 2017 inspection focused on the pressure boundary program and the 2019 inspection focused on the fitness for service SCA, with elements of physical design. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

Through document reviews and onsite inspections, CNSC staff monitor BRR's implementation of physical design SCA requirements in accordance with CNSC regulatory requirements. Based on the above capabilities and past performance, CNSC staff are satisfied with the licensee's overall performance in this SCA.

3.5.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA through regulatory oversight activities including onsite inspections and desktop reviews of relevant program documentation, and the third party reviews of design modifications to the facilities.

3.5.3.3 Proposed Improvements

No improvements within this SCA are proposed.

3.5.4 Conclusion

Based on CNSC staff assessments of Cameco's application, supporting documents and past performance, CNSC staff concluded that BRR continues to implement and maintain programs for pressure boundary and facility design in accordance with regulatory requirements.

3.5.5 Recommendation

Two standardized licence conditions are included in the proposed licence for this SCA. Licence condition 5.1 requires the licensee to implement and maintain a design program. Licence condition 5.2 requires the licensee to implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency. Compliance verification criteria for both licence conditions are included in the draft LCH.

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 all equipment is available to perform its intended design function when called upon to do so.

The specific areas that comprise this SCA at the BRR facility include:

- equipment fitness for service / equipment performance
- maintenance
- aging management
- periodic inspection and testing

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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
The licensee has maintained a fitness for service program in accordance with CNSC requirements over this licence period. BRR continues to be rated SA in this SCA.								

3.6.2 Discussion

BRR is required to implement and maintain a fitness for service program to cover activities that affect the physical condition of SSC to ensure that they remain effective over time. The requirements under this SCA are provided under paragraph 6(f) the CINFR, the NBCC and the NFCC. Specific aspects of CSA N286-12 are also applicable for this SCA.

BRR's Management System Program Manual and Preventative Maintenance System Program Procedure detail its preventative maintenance, in-service inspection, and periodic inspection and testing requirements for equipment. The site maintenance program ensures that equipment functions as designed over its lifetime so that the safety systems remain available, meet the design intent in the safety report and that equipment failures are minimized. This is accomplished by completion of corrective and preventative maintenance activities along with routine inspection on system components to ensure that they remain in good operating condition.

CNSC staff concluded based on its assessment of BRR's governing documents for the conduct of maintenance, and onsite verification activities, that BRR's fitness for service program meets regulatory requirements.

3.6.3 Summary

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

3.6.3.1 Past Performance

The CNSC requires BRR through its regulations to have processes in place to maintain all equipment as well as SSC. All preventative maintenance work at BRR is initiated and documented through work notification software. For safety significant SSC, preventive maintenance plans are reviewed and updated periodically. The site maintenance program ensures that equipment functions as designed over its lifetime so that safety systems remain available, meet the design intent in the safety report and that equipment failures are minimized. This is accomplished by completion of corrective and preventative maintenance activities along with routine inspections on system components to ensure that they remain in good operating condition.

In addition, BRR has an in-service inspection program that applies to the piping and vessels in the safety significant systems. Technicians performing the inspection are certified in accordance with the Canadian General Standards Board. Inspection methods have been selected based on the historical record of operation and inspection at the BRR and are considered the most appropriate for detecting potential problems and for revealing the type of deterioration most likely to occur as a result of the service conditions to which the equipment is subjected.

Fire protection systems are tested according to an established schedule using the National Building Code and the National Fire Code. Reviews of aspects of the fire protection systems are completed as required by CSA N393-13: *Fire protection for facilities that process, handle or store nuclear substances.*

During the current licence period, CNSC staff verified through compliance activities that BRR continues to implement its fitness for service program through its preventive maintenance programs in-service inspection program, and periodic inspection and testing for fire protection systems. CNSC staff conducted 1 focused inspection in 2019, and 4 onsite general inspections since 2012, which included fitness for service. CNSC staff verified that in-service inspections of safety related structures are carried out by Cameco, safety related equipment is maintained in good working order, and components requiring calibration are tested at the required frequency. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

Cameco has acceptable preventative maintenance and in-service inspection programs in place at its BRR facility. BRR's performance in this SCA is satisfactory.

3.6.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation.

3.6.3.3 Proposed Improvements

The current programs at BRR for this SCA are considered acceptable and no improvements within this SCA are proposed.

3.6.4 Conclusion

Based on CNSC staff assessments of Cameco's application, supporting documents and past performance, CNSC staff concluded that BRR continues to implement and maintain effective fitness for service programs in accordance with regulatory requirements.

3.6.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 6.1 requires the licensee to implement and maintain a fitness for service program. Compliance verification criteria for this licence condition are included in the draft LCH.

3.7 Radiation Protection

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

The specific areas that comprise this SCA at the BRR facility include:

- 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 radiation protection SCA over the current licensing period:

TRENDS FOR RADIATION PROTECTION								
Overall Compliance Ratings								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
Cameco has implemented and maintained an effective radiation protection program at BRR, as required by the *Radiation Protection Regulations*. Over the current licence period, no worker received a radiation dose in excess of regulatory limits as a result of the licensed activities conducted at BRR.								

3.7.2 Discussion

The *Radiation Protection Regulations* require licensees to implement a radiation protection (RP) program. As part of that program, licensees must also keep effective and equivalent doses received by and committed to persons ALARA, taking into account social and economic factors, through the implementation of: management control over work practices, personnel qualification and training, control of occupational and public exposures to radiation, and planning for unusual situations. The *Radiation Protection Regulations* also prescribe dose limits for Nuclear Energy Workers (NEWs) and persons who are not NEWs.

BRR has implemented and continues to maintain a RP program that ensures contamination levels and radiation doses received by individuals are monitored, controlled and maintained ALARA. CNSC staff conducted 4 planned compliance inspections in 2012, 2013, 2016 and 2018. A detailed assessment of specific areas is provided below in section 3.7.3 of this CMD.

Overall, based on the review of Cameco's application, supporting documents and compliance verification activities, CNSC staff concluded that BRR's Radiation Protection Program is acceptable and compliant with regulatory requirements.

3.7.3 Summary

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

3.7.3.1 Past Performance

Application of ALARA

Cameco's commitment to the ALARA principle has been demonstrated through the implementation of the RP program at BRR. Cameco's application of ALARA at BRR includes management commitment and oversight, personnel qualification and training, and facilitation of ongoing dialogue and promotion of a culture of continuous improvement.

Cameco establishes annual radiation safety objectives for BRR. An ALARA Committee has also been established at BRR, consisting of both management and worker representatives. This committee reviews radiation safety related issues and concerns at the site and makes recommendations for reducing worker exposures.

CNSC staff are satisfied with Cameco's efforts in applying the ALARA principle to keep doses to workers ALARA over the current licensing period.

Worker Dose Control

Cameco uses a combination of action levels, staff training and qualification, and dose management tools (work planning and management oversight) to ensure radiation doses to workers are controlled and kept ALARA. Engineered and administrative controls such as shielding, mandatory use of personal protective equipment and designated respirator-use areas are also established to ensure protection of workers at BRR.

Radiological exposures associated with work activities at BRR are due to alpha, beta and gamma radiation emitted by natural uranium. Exposures to workers can result from beta or gamma radiation sources outside the body, or alpha, beta or gamma radiation taken into the body as a result of inhalation, ingestion or absorption through the skin of uranium product. While radiological hazards that may give rise to both external and internal radiation exposures to workers are present at BRR, the control of uranium products that may be taken into the body is particularly important from a worker protection point of view. The primary concerns are chemical damage to the kidney from intakes of fast clearing uranium compounds and radiation doses to the lungs from intakes of insoluble forms of uranium.

Cameco's dosimetry program at BRR includes the use of CNSC licensed techniques for both external and internal dose assignment. The total effective dose assignment for workers are the sum of the external whole body dose as measured by a dosimeter, plus the internal dose determined from the concentration of uranium in urine, and the internal dose determined from uranium in the lung (lung burden). Each of the components of the dosimetry program implemented at BRR are described below.

External Dosimetry

Optically stimulated luminescent dosimeters sensitive to gamma and beta radiation are used to measure external whole body and skin doses. Monitoring of exposures to the hands is performed using ring-type personal dosimeters, issued to area operators and to maintenance employees who work in the raffinate/dried raffinate processing area. Cameco uses a CNSC licensed dosimetry service provider for all external dosimetry.

Internal Dosimetry

Cameco's Fuel Services Division holds a CNSC dosimetry service licence, which authorizes Cameco to provide in-house internal dosimetry services to BRR. Internal dose is assessed and assigned at BRR through 2 programs – urine analysis and lung counting.

The International Commission on Radiological Protection has developed a general classification system for inhaled compounds by their solubility or retention in the human body. The classification scheme divides compounds as type F (fast), type M (medium), and type S (slow). Type F compounds have a retention time of hours, type M compounds have intermediate values (days to weeks), and type S have a retention time of years. At BRR, all 3 types of compounds are present. BRR has assessed the solubility of the uranium concentrates received and the solubility varies from producer to producer. The majority of the concentrates received are either type M or S, although type F concentrates are also received. In-process materials and products (such as UO_3 and calcined product) have also been assessed for solubility and have been classed as type F or type M materials.

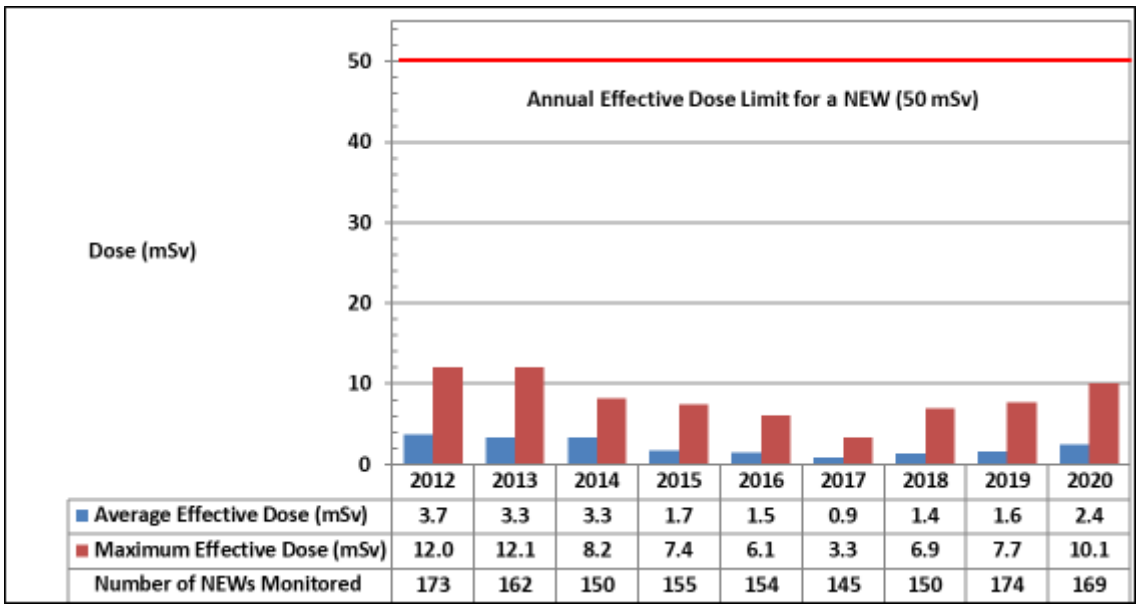
Lung counting is used to estimate the internal dose from type M and type S uranium compounds that have been taken into the body of a worker. In addition, routine urine analysis sampling is used to estimate the internal dose received by workers from intakes of type F uranium compounds. This means a worker's committed effective dose from intakes of uranium is composed of the sum of the dose derived from urine analysis data and their dose from lung counting.

Effective and Equivalent Doses for NEWs at BRR

Workers (including contractors) who have a reasonable probability of receiving an occupational dose greater than 1 mSv in a 1-year dosimetry period are considered as NEWs at BRR.

During the current licence period, Cameco consistently maintained doses to NEWs below the regulatory dose limits. Figure 3 depicts the total effective dose statistics for NEWs at BRR over the current licence period. The maximum annual effective dose received by a NEW during the current licence period was 12.1 mSv, received in 2013, which is approximately 24% of the regulatory effective dose limit of 50 mSv in a 1-year dosimetry period. The trend of total effective doses received by NEWs over the current licence period are reflective of the work activities at BRR, and influenced by factors such as production levels and number of operating days. For example, the 2017 maximum individual effective dose is the lowest maximum individual dose of the historical effective doses received by NEWs at BRR. This decrease was attributable to a decrease in UO_3 production and a corresponding decrease in operating days, compared to previous years.

Figure 3: Total effective dose statistics for NEWs at BRR, 2012 –20



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Average Effective Dose (mSv)	3.7	3.3	3.3	1.7	1.5	0.9	1.4	1.6	2.4
Maximum Effective Dose (mSv)	12.0	12.1	8.2	7.4	6.1	3.3	6.9	7.7	10.1
Number of NEWs Monitored	173	162	150	155	154	145	150	174	169

Table 4 provides the maximum and average doses received by NEWs over the current licence period, for each component contributing to total effective dose (i.e. external dose to the whole body, and internal doses ascertained from lung counting and urine analysis). It is important to note that the same NEW at BRR did not necessarily receive each dose component. Therefore, the sum of all components in a given year does not yield the same value as the maximum effective dose.

Table 4: Radiation dose statistics for each component of effective dose, received by NEWs at BRR, 2012 –20

Year	Annual External (Whole Body) Dose (mSv)		Annual Internal (Urine Analysis) Dose (mSv)		Annual Internal (Lung Counting) Dose (mSv)		Annual Effective Dose (mSv)	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
2012	1.0	8.2	0.3	3.4	2.5	4.3	3.7	12.0
2013	1.0	7.2	0.3	2.8	2.0	4.6	3.3	12.1
2014	0.8	6.7	0.3	2.3	2.3	4.3	3.3	8.2
2015	0.6	3.5	0.3	4.7	0.8	3.2	1.7	7.4
2016	0.5	2.5	0.2	1.6	0.9	2.7	1.5	6.1
2017	0.5	2.4	0.1	1.6	0.3	1.7	0.9	3.3
2018	0.6	3.7	0.2	2.6	0.7	2.4	1.4	6.9
2019	0.9	4.7	0.2	2.8	0.5	2.1	1.6	7.7
2020	1.0	7.1	0.3	2.6	1.2	4.0	2.4	10.1

Similar to the trend of total effective doses received by NEWs over the current licence period, the average and maximum dose trends for each dose component show some variability over the current licence period. These trends are attributed to factors including production levels and operating days at BRR, as well as the individual NEW's work activities.

The maximum internal dose assigned from urine analysis in 2015 does warrant further discussion. The NEW that received the maximum internal dose of 4.7 mSv from urine analysis was one of the workers involved in an event involving the changing out of filter bags in a dust collection bag house, and the majority of this NEW's dose (i.e., 3.7 mSv) is attributable to the intake received during this event. The event was reported to the Commission in CMD 16-M43, *Regulatory Oversight Report for Nuclear Processing, Small Research Reactor and Class IB Accelerator Facilities: 2015* [13]. The baghouse is an air collection device that contains filter bags, which collect and filter the uranium concentrate dust from the dust collection system, allowing clean air to exhaust out the dust collection exhaust vent. Over time, these filter bags must be replaced due to dust loading. As a result of this particular work, 4 of 11 workers involved in performing the baghouse filter replacement received uranium intakes, necessitating dose assessments and the temporary placement of these workers on restricted status. The maximum internal dose assigned to a NEW as a result of this event was 3.7 mSv. Cameco carried out an investigation into the incident that included a root-cause analysis. Cameco identified a number of corrective actions, including mandating the use of powered air-purifying respirators by workers when performing this task, along with other improvements to work practices and procedures. In March 2016, CNSC staff performed an RP-focused inspection at BRR, which included extensive follow-up on the implementation of these

corrective actions. CNSC staff confirmed that Cameco had effectively implemented measures that improved the radiation safety of workers during the conduct of similar work activities.

During the current licence period, there have been 2, 5-year dosimetry periods. For the 5-year dosimetry period from 2011 to 2015, the maximum cumulative effective dose received by a NEW at BRR was 41.4 mSv. For the 5-year dosimetry period from 2016 to 2020, the maximum cumulative effective dose received by a NEW at BRR was 31.7 mSv. These radiation dose results represent approximately 41% and 32% respectively, of the CNSC regulatory dose limit of 100 mSv in a 5-year dosimetry period.

Table 5 provides the equivalent dose to the skin statistics for NEWs at BRR, during the current licence period. The maximum annual equivalent dose to the skin that was received by a NEW at BRR during the current licence period was 41.4 mSv occurring in 2013, representing approximately 8.2% the regulatory equivalent dose limit of 500 mSv per year.

Table 5: Equivalent dose to the skin statistics for NEWs at BRR, 2012 –20

Year	Average skin dose (mSv)	Maximum individual skin dose (mSv)
2012	6.0	39.2
2013	6.8	41.4
2014	5.4	41.2
2015	3.9	28.1
2016	3.3	26.0
2017	3.1	16.2
2018	4.1	28.4
2019	4.8	29.2
2020	5.1	39.1
Regulatory dose limit	**--**	**500 mSv/year**

Table 6 provides the equivalent dose to the extremities statistics for NEWs at BRR, during the current licence period. The maximum annual equivalent dose to the extremities (hands) that was received by a NEW at BRR during the current licence period was 48.2 mSv occurring in 2014, representing approximately 9.6% of the regulatory equivalent dose limit of 500 mSv per year.

Table 6: Equivalent dose to the extremities (hands) statistics for NEWs at BRR, 2012 –20

Year	Average extremity dose (mSv)	Maximum individual extremity dose (mSv)
2012	11.4	47.6
2013	14.1	35.1
2014	5.4	48.2
2015	1.5	15.3
2016	1.2	10.6
2017	1.0	13.6
2018	3.5	14.5
2019	3.9	11.9
2020	3.4	14.5
Regulatory dose limit	**--**	**500 mSv/year**

CNSC staff are satisfied that effective and equivalent doses to NEWs at BRR are being controlled below CNSC regulatory dose limits.

Radiation Protection Program Performance

CNSC Compliance Activities

RP program performance at BRR was assessed during the current licence period through various CNSC staff compliance verification activities, including desktop reviews of quarterly and annual compliance reports. Aspects of the radiation protection SCA have been covered during all CNSC inspection activities. In addition, 4 focused RP inspections at BRR occurred in the years 2012, 2013, 2016 and 2018. CNSC staff's assessment of BRR's RP program performance identified areas of strength and opportunities for improvement. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections have been closed to CNSC staff's satisfaction. Cameco implemented positive enhancements to the RP program and established appropriate corrective actions to address areas requiring improvement.

Radiological Action Levels

For various radiological parameters, Cameco has established action levels well below regulatory dose limits, that when reached, may be indicative of a potential loss of control for that specific parameter. Action levels have been established for external whole body, skin and extremity doses, uranium-in-urine concentrations, and lung count results. Each action level has a defined frequency that corresponds with the associated dosimetry frequency. For example, for NEWs on a monthly dosimetry service for whole body and skin dose, the corresponding action level frequency is monthly. These action levels serve as early warnings of conditions that warrant further investigation and reporting to the CNSC if reached. In addition, Cameco has established lower-tier internal administrative levels, which are set well below the action levels to provide very early warnings of potential concerns.

During the current licence period, Cameco reviewed the radiological action levels for workers in the years 2011, 2012, 2014 and 2019, to ensure that they remain adequately sensitive indicators to detect the emergence of a potential loss of control of BRR's RP program elements. Following these reviews, Cameco implemented revised action levels for monthly whole body and skin doses, lung dose, and urine analysis. The most recent set of action levels, based on the review that occurred in 2019, continue to be acceptable to CNSC staff and these action levels have been incorporated into the proposed LCH for BRR.

Appendix E.1 provides an overview of the 16 action level exceedances that were reported to the CNSC over the current licence period. To note, all of the action level exceedances reported to the CNSC were detailed in CNSC staff's annual regulatory oversight reports for uranium and nuclear substance processing facilities. In all instances, Cameco completed investigations and implemented corrective actions, as necessary and where possible, to the satisfaction of CNSC staff. It is important to note that all workers' radiological doses were well below the corresponding CNSC regulatory dose limits, and there were no risks to their health and safety as a result of these action level exceedances.

As reported in CMD 15-M39, *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2014* [14], CNSC staff's review of the action level exceedances and the common causes resulted in the identification of potential areas for improvement surrounding the proper care, storage and handling of dosimeters at BRR. In 2014, CNSC staff requested that Cameco implement a more proactive approach at BRR to ensure dosimetry handling practices are being controlled, as well as adequate oversight to ensure procedural non-conformances are limited. CNSC staff followed up on the dosimetry management practices at BRR during the RP-focused inspection conducted in March 2016. As part of the corrective actions to improve dosimetry management, Cameco's radiation safety training for operations personnel at BRR was modified to include a greater emphasis on procedural compliance related to dosimeters. Procedural compliance amongst workers was also included during routine daily interactions and informal inspections at BRR. CNSC staff are satisfied with the actions taken by Cameco to address issues with dosimetry management at BRR.

Radiation Protection Program Improvements

During the current licensing period, Cameco revised their RP program documentation for BRR as part of their continual improvement activities and as a result of findings arising from CNSC compliance verification activities. Other areas where Cameco strengthened BRR's RP program included installation of continuous air monitors in production areas which will allow for the timely detection of changing conditions and increases in ambient uranium in air concentrations; and, installation of whole body monitors at the main exit of BRR for contamination monitoring of workers and visitors leaving the facility.

CNSC staff are satisfied with the performance of Cameco's RP program at BRR over the current licence period.

Radiological Hazard Control

Radiation and contamination control programs have been established at BRR to control and minimize radiological hazards and the spread of radioactive contamination. BRR is divided into 3 areas, or zones, for the purposes of contamination control. Zone 3 represents processing areas where there is the highest chance of contamination being present while Zone 1 represents clean areas. Zone 2 is referred to as the buffer zone. Contamination limits are set for each zone, and boundaries between zones are delineated by appropriate signage.

Radiological monitoring programs confirm the effectiveness of contamination control, and include a combination of direct and indirect contamination monitoring of areas (lunchrooms, corridors and offices), floors, footwear, work clothing and personal protective equipment (PPE). Airborne contamination monitoring, conducted in designated areas, provides timely notification of changing conditions related to possible compromises in equipment operation. Air contamination monitoring is augmented by providing containment systems such as dust collectors and fume hoods, ventilated operating areas and the use of a plant wide vacuum system for cleaning up spills when they do occur. All these measures are in place to minimize the potential for intakes of uranium products by workers.

CNSC staff are satisfied that radiological hazards have been adequately controlled at BRR during the current licence period.

3.7.3.2 Regulatory Focus

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

3.7.3.3 Proposed Improvements

There are no proposed improvements for the radiation protection SCA.

3.7.4 Conclusion

CNSC staff assessed Cameco's documentation and analyses at the BRR under the radiation protection SCA and found them 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 BRR in this SCA.

3.7.5 Recommendation

One standardized licence condition is included in the proposed licence for the RP SCA. Licence condition 7.1 requires the licensee to implement and maintain an RP program, which includes a set of action levels. As part of this licence condition, the licensee is required to notify the Commission within 7 days of becoming aware that an action level has been exceeded. Compliance verification criteria for this licence condition are provided in the draft LCH.

3.8 Conventional Health and Safety

The conventional health and safety SCA relates to the implementation of a program to manage workplace safety hazards and to protect workers.

The specific areas that comprise this SCA at the BRR facility include:

- performance
- practice
- 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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	FS	FS	FS	FS	FS	FS	SA	SA
Comments								
The licensee has maintained a conventional health and safety program that meets the requirements of the NSCA and is in accordance with CNSC requirements over this licence period. BRR was rated “Fully Satisfactory (FS)” in this SCA from 2013 until 2018. The “Fully Satisfactory (FS)” rating was not used after the 2018 reporting year. Starting in 2019, facility performance assessment ratings were simplified and the FS and “Satisfactory (SA)” ratings were replaced by the SA rating. Thus, the lack of FS in subsequent years does not indicate a reduction in licensee performance.								

3.8.2 Discussion

BRR is obligated under the NSCA and its associated regulations to have policies, programs, methods and procedures in place for the safe operation and maintenance of its facilities. In addition to the NSCA and its associated regulations, BRR’s activities must comply with the *Canada Labour Code*, and the associated *Canada Occupational Health and Safety Regulations*. BRR’s occupational health and safety program applies to all work performed by BRR employees and contractors.

CNSC inspectors annually verify Cameco's conventional health and safety program at BRR, to observe workers' compliance with requirements related to workplace safety, proper use of PPE, use of signage and barriers along with the general housekeeping of the facility. All general inspections by CNSC staff during the current licence period included walkdowns of the facilities.

Based on the above, CNSC staff concluded that BRR's conventional health and safety SCA met all applicable regulatory requirements and CNSC expectations.

3.8.3 Summary

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

3.8.3.1 Past Performance

Performance

Conventional health and safety programs at uranium and nuclear substance processing facilities fall under the dual regulatory oversight of the CNSC and Employment and Social Development Canada. Cameco submits hazardous-occurrence investigation reports to both regulators, in accordance with their respective reporting requirements. CNSC staff monitor compliance with regulatory reporting requirements through various means including desktop reviews and inspections.

Licensees are required to report to the CNSC as set out under paragraph 29 (1) (h) of the GNSCR. These reports include serious illnesses or injuries incurred or possibly incurred as a result of a licensed activity.

BRR uses several key performance indicators to assess performance of the licensed facility. Some of the indicators include first aid, medical consultations, near misses, number of workplace inspections and safety issues reported.

The key performance indicators typically reported to the Commission for conventional health and safety are the number of lost-time injuries (LTI) that occur per year, LTI severity and LTI frequency. A LTI is defined as an injury that takes place at work, and results in the worker being unable to return to work and carry on their duties for a period of time. The LTI frequency and LTI severity are both based on 100 full time workers (100 FTE = 200,000 hours worked). LTI statistics for the BRR are outlined in table 7. BRR has not had a LTI in 14 years.

Table 7: – Lost-time injury statistics, BRR, 2012 –20

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Lost-time injuries[1]	0	0	0	0	0	0	0	0	0
Severity rate[2]	0	0	0	0	0	0	0	0	0
Frequency rate[3]	0	0	0	0	0	0	0	0	0

[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] The accident severity rate measures the total number of days lost to injury for every 200,000 person-hours worked at the site. Severity = [(# of days lost in last 12 months) / (# of hours worked in last 12 months)] x 200,000.
[3] The accident frequency rate measures the number of LTIs for every 200,000 person-hours worked at the site. Frequency = [(# of injuries in last 12 months) / (# of hours worked in last 12 months)] x 200,000.

Practices

Licensees are responsible for developing and implementing conventional health and safety programs for the protection of their workers. These programs must comply with Part II of the *Canada Labour Code*.

BRR continues to maintain the site Facility Health and Safety Committee (FHSC), which fulfills the requirement for both a policy health and safety committee, and a workplace health and safety committee.

Due to the activities conducted at BRR, there are radiological hazards associated with the various forms of uranium present at the refinery and chemical hazards due to bulk chemicals used in the process. BRR has established tools for identifying and controlling hazards in the work place. These tools include proper labelling, work instructions, procedures, job hazard analysis (JHA), safety clearances and hazard specific clearances. In addition, personal protective equipment (PPE) is provided as necessary based on the work instruction, JHA or clearances for the job.

CNSC inspectors routinely verify Cameco's conventional health and safety program at BRR, to observe workers' compliance with requirements related to workplace safety, proper use of PPE, use of signage and barriers along with the general housekeeping of the facility. Since 2012, all general inspections by CNSC staff included walkdowns of the BRR facility. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

CNSC staff are satisfied with BRR's past performance in the conventional health and safety SCA and that BRR continues to meet regulatory expectations.

Awareness

Licensees are responsible for ensuring that workers have the knowledge to identify workplace hazards and take the necessary precautions to protect against these hazards. This is accomplished through training and ongoing internal communications with workers.

During routine onsite inspections, CNSC staff verified that workers are trained to identify hazards at the BRR. CNSC staff confirmed that BRR has effectively implemented their conventional health and safety programs to keep workers safe.

CNSC staff confirmed that BRR has health and safety management system programs that promote conventional health and safety through the provision of information, training, instructions and supervision.

CNSC staff observed Cameco's use of bulletin boards within the BRR facility to promote safety awareness for posting weekly FHSC inspections, hazard alerts, use of experience and minutes of FHSC meetings. CNSC staff review the minutes of BRR's FHSC, which meets monthly as required by the *Canada Labour Code*.

The BRR Health and Safety Management System Program Manual clearly outlines the roles and responsibilities of Cameco's management and employees. Management is responsible to review and approve safety rules and procedures and establish health and safety performance goals. Employees are responsible for adhering to established site safety procedures, wearing proper protection equipment, and participating in BRR's safety activities.

BRR delivers safety-related training courses to its employees and contractors. All site personnel have general awareness training related to the potential health and safety hazards and exposures that exist at the site and the various means of minimizing risk from the hazards. Health and safety related training is also a component of BRR safety meetings. Additional job specific training is also provided in areas such as hot work, lock out / tag out and the use of a Workplace Hazardous Materials Information System. CNSC staff are satisfied with BRR's promotion of health and safety awareness.

CNSC staff are satisfied that BRR's implementation of its conventional health and safety program during the current licence period is acceptable and CNSC staff concluded that BRR's overall performance for this SCA is satisfactory and that Cameco is qualified to carry on its activities, as requested in the licence application for this SCA.

3.8.3.2 Regulatory Focus

CNSC staff continue to monitor BRR's performance in this SCA through regulatory oversight activities including inspections and desktop reviews of relevant program documentation.

3.8.3.3 Proposed Improvements

No improvements to this SCA are proposed.

3.8.4 Conclusion

Based on CNSC staff assessments of Cameco's application, supporting documents and past performance, CNSC staff concluded that BRR continues to implement and maintain an effective conventional health and safety program in accordance with regulatory requirements and CNSC expectations.

3.8.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 8.1 requires the licensee to implement and maintain a conventional health and safety program. Compliance verification criteria for this licence condition are included in the draft LCH.

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 BRR facility include:

- effluent and emissions control (releases)
- environmental management system (EMS)
- assessment and monitoring
- protection of the public
- environmental risk assessment (ERA)

3.9.1 Trends

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

TRENDS FOR ENVIRONMENTAL PROTECTION								
Overall Compliance Ratings								
2012	2013	2014	2015	2016	2017	2018	2019	2020
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
BRR has developed, implemented and maintained an effective environmental protection program that protects the environment and the public in accordance with CNSC regulatory requirements. During the current licence period, releases to the environment were well below the release limits specified in the CNSC licence. CNSC staff monitor BRR's implementation of the environmental protection program through compliance verification activities. Cameco updated the BRR's Environmental Risk Assessment (ERA) in 2020. The ERA concluded that human health and ecological risks attributable to the BRR facility's operations are negligible.								

3.9.2 Discussion

As per the NSCA, licensees are required to make adequate provisions for the protection of the environment. Licensees achieve this by developing and maintaining an environmental protection program to control releases of nuclear and hazardous substances and to assess the effects of these releases on the environment. The design and implementation of the environmental protection program at the BRR facility is in accordance with REGDOC 2.9.1, 2013 *Environmental Protection: Policies, Programs and Procedures*.

BRR has implemented the requirements contained in:

- CSA N288.1-14, *Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities*
- CSA N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.6-12, *Environmental risk assessments at Class I nuclear facilities, and uranium mines and mills*
- CSA N288.8-17, *Establishing and implementing action levels for releases to the environment from nuclear facilities*

BRR is required to abide by all provincial and federal requirements for the handling of nuclear and other hazardous substances. Cameco controls releases of hazardous substances from the BRR facility to the environment in accordance with CNSC regulatory requirements as well as requirements prescribed in the Environmental Compliance Approvals issued by the Ontario Ministry of the Environment, Conservation and Parks (MECP).

During the current licence period, CNSC staff verified BRR's performance with respect to environmental protection through inspections and desktop reviews. In total, CNSC staff conducted 5 focused environmental protection inspections in 2012, 2013, 2015, 2018 and 2020. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

From these inspections, CNSC staff concluded that Cameco's implementation of the environmental protection program at the BRR facility meets CNSC's regulatory requirements and expectations.

In 2008, CNSC staff prepared a screening report [4] in accordance with the requirements of the former *Canadian Environmental Assessment Act* of Cameco's proposal for a production increase. CNSC staff re-assessed Cameco's request for the continued authorization for a production increase, which was discussed in section 1.2, from an environmental protection perspective. The production increase will not result in any changes in processing or production activities and there will be no changes to the equipment design, types of materials received or to

chemicals involved in the refining process. However, increasing production will result in an increase in the quantities of materials received and processed. Increasing production will also result in a proportional increase in the quantities of waste and effluent currently generated but there will be no change in airborne emission and liquid effluent contaminants. CNSC staff concluded that the decision from the 2008 screening report that the production increase would likely not cause significant adverse environmental effects remains valid. Thus, the existing environmental protection program will remain sufficient to monitor releases from BRR and that the revised release limits and action levels remain appropriate and protective of the health and safety of the public and the environment.

Environmental Protection Review (EPR) reports

The BRR EPR report [10] is available here on the Government of Canada's Open Government portal. The EPR reports are discussed further in section 2.1 Environmental Review.

3.9.3 Summary

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

3.9.3.1 Past Performance

Effluent and Emissions Control (releases)

The BRR facility monitors and controls its airborne emissions and liquid effluent to the environment, by implementing BRR's Environmental Protection Program. BRR's effluent and emissions monitoring program is based on CSA N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills* and includes monitoring of radiological and hazardous substances.

Atmospheric Emissions

Cameco has valid Environmental Compliance Approvals issued by the MECP for air emissions that requires the BRR facility to maintain emission summaries and dispersion modelling reports to demonstrate compliance.

The majority of stack emissions from the BRR facility discharge through the absorber stack, the Dust Collection and Exhaust Ventilation (DCEV) stack, and the incinerator stack, which Cameco routinely monitors. Cameco uses a variety of pollution control equipment including baghouses, scrubbers and activated carbon beds at the BRR facility to control and reduce emissions to air.

Table 8 provides air emissions from the BRR facility, which are compared to the current licence release limits. In addition to licensed release limits, the BRR facility established action levels and internal control levels, to prevent action level exceedances. Exceedances of licensed release limits and action levels are reported to the CNSC, documented, investigated and appropriate corrective action are taken where warranted. No action levels for atmospheric emissions were exceeded at any time during the licence period.

During the current licensing period, concentrations of uranium, oxides of nitrogen (NOx), and particulate have been consistently several orders of magnitude below licenced release limits.

Table 8: Average air emissions monitoring results and licence limits for the BRR facility, 2012 –20

Source	DCEV	Absorber		Incinerator	All Stacks
Parameter	Uranium (g/hr)	Uranium (g/hr)	NOx (kg/hr)	Uranium (g/hr)	Particulate (g/hr)
Value	Weekly Average	Weekly Average		Daily Average	Weekly Average
2012	0.06	0.01	3.3	<0.01	24
2013	0.04	<0.01	3.4	<0.01	14
2014	0.05	<0.01	2.0	<0.01	9
2015	0.05	0.01	2.5	<0.01	6
2016	0.05	0.01	1.6	<0.01	6
2017	0.04	0.01	1.8	<0.01	8
2018	0.05	0.01	2.3	<0.01	10
2019	0.05	0.01	3.3	<0.01	12
2020	0.06	0.01	3.2	<0.01	10
Current licence limit[1]	**100**	**100**	**56**	**10**	**11,000**

[1] Cameco has revised these licence limits as part of this licence renewal. Please see the release limits subsection on page 51 for more information.

Liquid Effluent Discharges

Cameco collects and transfers (to 1 of 3 process lagoons) the liquid effluent from the operations at the BRR facility, as well as treated effluent from the onsite sewage treatment plant. The BRR facility has a storm water lagoon that collects surface water run-off from the site. Water from the storm water lagoon then transfers to 1 of the 3 process lagoons, where it mixes with process effluent prior to discharge. BRR takes a sample from the lagoon and analyzes it for uranium, nitrate, radium-226, and pH. Once BRR confirms the results meet the discharge release criteria, they discharge the treated effluent on a batch basis to Lake Huron through a diffuser.

Table 9 provides liquid effluent from the BRR facility and compares it against the current licensed release limits. There are also action levels and internal control levels for liquid effluent releases. During the current licensing period, concentrations of uranium, nitrate and radium-226 have been consistently several orders of magnitude below licensed release limits. No action levels for liquid effluents were exceeded at any time during the licence period.

CNSC staff concluded that BRR is acting appropriately to control the contaminants of potential concern in airborne emissions and liquid effluent.

Table 9: Concentrations in liquid effluent for the BRR facility, 2012 –20

Parameter	Uranium (mg/L)	Nitrate (mg/L)	Radium-226 (Bq/L)	pH	
Value	**Average**	**Average**	**Average**	**Daily Min.**	**Daily Max.**
2012	0.01	28	0.01	7.2	8.2
2013	0.01	26	0.01	7.1	8.4
2014	0.02	17	0.01	7.1	8.4
2015	0.02	13	0.01	7.2	8.4
2016	0.01	11	0.01	7.3	8.6
2017	0.01	14	0.01	7.3	8.2
2018	0.01	20	0.01	7.3	8.5
2019	0.01	21	0.01	7.2	8.4
2020	0.01	19	0.01	7.0	8.4
Current licence limits[3]	**2[1]**	**1000[1]**	**1[1]**	**6.0 ≤ 9.5[2]**	

[1] Limit based on the monthly average of weekly composite samples
[2] Limit based on daily discharge sample limit
[3] Cameco has revised these licensed release limits as part of this licence renewal. Please see the release limits subsection on page 51 for more information.

The CNSC is making radionuclide loading data more readily accessible to the public as part of its commitment to Open Government and its mandate to disseminate this information to the public. As part of this commitment, table 10 shows the total annual loadings to the environment from the BRR facility for airborne and waterborne releases. The loadings give an indication of how much is actually released to the environment.

Table 10: Loadings to the environment from the BRR facility, 2012 –20

Parameter	Uranium (kg)	Uranium (kg)	Radium-226 (MBq)
Medium	Air	Water	Water
2012	3.6	2.4	1.7
2013	4.1	3.6	1.9
2014	1.5	4.0	1.8
2015	1.3	2.6	1.1
2016	1.0	1.2	0.9
2017	0.8	1.9	1.0
2018	1.2	1.9	1.1
2019	2.0	2.7	2.1
2020	4.8	2.8	1.4

Release limits

At the request of CNSC staff for this licence renewal, Cameco established Exposure Based Release Limits (EBRLs) at its air and liquid release points at the BRR facility. The EBRLs ensure that releases stay below certain levels to meet human health or environmental quality criteria.

For releases to water, Cameco calculated EBRLs by deriving the release limit based on the Canadian Council of Ministers of the Environment (CCME) - *Protection of Aquatic Life Guidelines* and a dilution factor determined from plume modelling of Lake Huron.

For releases to air, Cameco harmonized with the provincial air quality standards under Ontario Regulation 419/05 *Air Pollution - Local Air Quality* and calculated EBRLs by deriving release limits that apply at the stack, based on meeting the applicable air quality standards at the Point-of-Impingement (PoI).

CNSC staff assessed and accepted these revised release limits shown in table 11 as they are protective of the health and safety of the public and the environment.

BRR has also established action levels that are lower than the facilities' release limits. These action levels provide an early indication of a potential loss of control of the environmental protection program. Hence, BRR can take corrective actions to ensure that they do not exceed the release limits.

Table 11: New exposure based release limits for the BRR facility

Source	Parameter	Release Limits			
		Current	Averaging Period	Revised	Averaging Period
Water – Final Discharge Point	Uranium	2.0 mg/L	Monthly average of weekly composite samples	1.7 mg/L	Weekly composite
	Nitrate (as Nitrogen)	1000 mg/L		N/A[1]	N/A[1]
	Radium-226	1.0 Bq/L		N/A[1]	N/A[1]
	Acid Balance (as H_3O^+)	pH ≥ 6.0 pH ≤ 9.5	Daily	N/A[1]	N/A[1]
Air - Absorber Stack	Uranium	0.10 kg/h	Weekly	0.021 kg/h	Annual
	Oxides of Nitrogen (NO_x + HNO_3) as NO_2	56.0 kg/h	Weekly	19 kg/h	Daily
Air - Dust Collection and Exhaust Ventilation (DCEV) Stack	Uranium	0.10 kg/h	Weekly	0.093 kg/h	Annual
Air - Incinerator Stack	Uranium	0.01 kg/h	Daily	0.029 kg/h[2]	Annual
Air - Combined for above three Stacks	Particulate	11 kg/h	Weekly	15 kg/h[2]	Daily

[1] N/A = not applicable. The screening assessment determined that these parameters did not require an exposure based release limit because they are were well below existing protective water quality guidelines, and therefore did not warrant limits, but only monitoring

[2] Updated methodology for calculating the release limit resulted in an increase in the limit. The limit remains safe as it ensures the provincial air quality standards are met at the PoI.

Environmental Management System (EMS)

BRR has developed and is maintaining an EMS that provides a framework for integrated activities for the protection of the environment at the BRR facility. Cameco describes the EMS for the BRR facility in the FSD EMS. It includes activities such as establishing annual environmental objectives and targets. CNSC staff through compliance verification activities review these objectives and targets.

CNSC staff, as part of their compliance verification activities, review documents relating to environmental protection and follow up with Cameco staff at the BRR facility on any outstanding issues. The results of these compliance verification activities demonstrate that Cameco conducts an annual management review in accordance with CNSC requirements and BRR addresses the identified issues properly. CNSC staff are satisfied that BRR is conducting effective reviews and addressing identified issues properly.

Assessment and Monitoring

The BRR facility conducts environmental monitoring under its implementation of the environmental protection program. The environmental monitoring program is based on CSA N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*.

Ambient Air Monitoring

The BRR facility has a comprehensive ambient air monitoring program that consists of high volume air samplers (Hi-Vols) that collect uranium and particulates in ambient air. The purpose of the ambient air monitoring program is to confirm the effectiveness of the emission abatement systems and to monitor the impact of the facility on the environment. Cameco has Hi-Vols at 5 locations around the BRR facility and in the nearby community.

As shown in table 12, during the current licensing period, the results from these monitoring locations show that uranium in ambient air has consistently remained very low throughout the current licence period. The uranium in ambient air results are well below the MECP's standard for uranium in ambient air of 0.03 $\mu g/m^3$, based on an annual average.

Table 12: Average uranium-in-air concentrations at Hi-Vol stations, 2012 –20

Parameter	Uranium (µg/m^3)				
Location	**Golf Course**	**SE Yard**	**East Yard**	**Hydro Yard**	**Town of Blind River**
2012	0.0004	0.0013	0.0042	0.0001	0.0001
2013	0.0002	0.0009	0.0017	0.0001	0.0001
2014	0.0002	0.0006	0.0020	0.0001	0.0001
2015	0.0002	0.0007	0.0031	0.0001	0.0001
2016	0.0001	0.0007	0.0039	0.0001	0.0001
2017	0.0002	0.0005	0.0017	0.0002	0.0002
2018	0.0002	0.0008	0.0022	0.0002	0.0002
2019	0.0004	0.0008	0.0040	0.0002	0.0002
2020	0.0003	0.0010	0.0029	0.0002	0.0002

Soil Monitoring

Due to deposition of airborne uranium on soil in the vicinity of the BRR facility, the soil monitoring program currently consists of 9 monitoring locations where BRR collects soil samples at the 0 to 5 cm depth each year. Table 13 shows the average uranium in soil results. The 2020 soil monitoring data are in the background range for Ontario (up to 2.5 µg/g) and below the respective concentrations detected in previous years. This means that uranium soil concentrations did not increase in the area surrounding the facility. The uranium soil concentrations, measured in 2012 –20 were well below 23 µg/g, which is the most restrictive soil quality guideline set by the CCME for residential and parkland land use. Overall, the soil monitoring data demonstrate that the current BRR operations do not contribute to accumulation of uranium in surrounding soil, and that no adverse effects to relevant human and environmental receptors are expected.

Table 13: Average uranium in soil results, 2012 –20

Parameter	Uranium (µg/g)	
Location	**Sampling sites within 1000 m**	**Sampling sites outside 1000 m**
Depth	**0 – 5 cm**	**0 – 5 cm**
2012	3.3	0.7
2013	4.3	0.4
2014	2.7	0.6
2015	3.8	1.4
2016	1.5	0.5
2017	1.6	0.6
2018	2.0	0.7
2019	2.1	1.0
2020	1.4	0.7
Guideline	23[1]	

[1] Reference: Canadian Council of Ministers of the Environment, *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*, 1999.

Groundwater Monitoring

Groundwater in the area of the BRR facility moves in a southwesterly direction towards the Mississagi River. BRR has a groundwater monitoring network around the facility with 35 monitoring wells 14 wells located inside the perimeter fence and 21 outside the fence line. BRR samples groundwater 1 to 3 times a year depending on the location of the well relative to the refinery.

Table 14 shows the average uranium concentrations from all of the groundwater monitoring wells in the past 5 years. The results were below the Provincial Full Depth Generic Site Condition Standard in a Potable Groundwater Condition value of 20 µg/L uranium, with only 1 exception in 2018 when Cameco detected a maximum uranium concentration of 27 µg/L in 1 of the monitoring wells. Note that the monitoring wells are not used for drinking water.

BRR committed to implementing CSA N288.7-15, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills* by August 2021.

Table 14: Average uranium in groundwater results, 2012 –20

Parameter	Uranium (µg/L)
Value	**Average**
2012	0.3
2013	0.5
2014	0.6
2015	1.7
2016	1.3
2017	1.2
2018	2.3
2019	2
2020	1.4
Guideline	20[1]

[1]Reference: Ontario Ministry of the Environment, *Soil, ground water and sediment standards for use under Part XV.1 of the Environmental Protection Act, 2011*.

CNSC Independent Environmental Monitoring Program

The CNSC implemented its Independent Environmental Monitoring Program (IEMP) to verify that the public, Indigenous groups and the environment around nuclear facilities are safe. It is separate from, but complementary to, the CNSC's ongoing compliance verification program. The IEMP involves taking samples from public areas around the facility and measuring and analyzing the amount of radiological (nuclear) and hazardous substances in those samples.

CNSC staff conducted the IEMP in the Blind River area in 2013, 2014, 2017, 2018 and 2020. The results are available on the CNSC's IEMP Web page. The IEMP results indicate that the public and the environment surrounding the BRR facility are protected.

The CNSC collaborates with Indigenous groups to ensure that the sampling plan reflects Indigenous traditional land use, values and knowledge. For example, CNSC staff met with the Mississauga First Nation (MFN), Métis Nation of Ontario Region 4, and the Sagamok First Nation to discuss the 2018 IEMP sampling campaign. CNSC staff incorporated input from the MFN into the 2018 IEMP sampling plans for the BRR facility, including suggested sampling types and locations around the community.

Protection of the Public

BRR is required to demonstrate that it made adequate provision for protecting the health and safety of the public from exposures to radiological and non-radiological substances released from the BRR facility. BRR uses the effluent and environmental monitoring programs currently implemented to verify that releases of hazardous substances do not result in concentrations that may adversely affect public health.

The CNSC receives reports of discharges to the environment through the reporting requirements outlined in the BRR licence and licence conditions handbook. CNSC staff's review and evaluation of hazardous discharges from the BRR facility to the environment during the 2012 –20 licensing period indicates that negligible risks to the public occurred during this period.

Based on their review of these programs at the BRR facility, CNSC staff concluded that Cameco continues to protect the public from facility emissions.

Estimated dose to public

The derived release limit (DRL) for a given radionuclide is defined as the release rate that would cause an individual of the most highly exposed group to receive and be committed to a dose equal to the regulatory annual dose limit due to release of the radionuclide to air or surface water during normal operation of a nuclear facility over the period of a calendar year. The DRL calculation is used to determine dose to the public. The most recent BRR DRL report is *Derived Release Limits for Cameco's Blind River Facility,* 2018 [15].

Cameco calculates the maximum dose to the public from the BRR facility from air emissions, liquid effluent releases and gamma radiation. The CNSC's requirement for following the ALARA principle, taking into account social and economic factors, means that Cameco must monitor their facilities and keep doses to the public below the annual public dose limit of 1 mSv/year prescribed in the *Radiation Protection Regulations*.

The BRR facility also has environmental dosimeters along each of the 4 perimeter fence lines. These dosimeters measure the gamma levels at the fence line to represent a potential exposure to a member of the public. The results are orders of magnitude below the regulatory annual public dose limit of 1 mSv/year.

Table 15 shows the estimated doses to the public from the BRR facility. The doses continue to be well below the regulatory annual public dose limit of 1 mSv/year. The increase in 2020 is a result of using the new DRL calculations and not to operational changes of the BRR facility.

Table 15: Estimated dose to the public from the BRR facility, 2012 –20

Year	Dose to the Public (mSv/year)
2012	0.012
2013	0.012
2014	0.005
2015	0.005
2016	0.005
2017	0.005
2018	0.005
2019	0.005
2020	0.009

Environmental Risk Assessment

An environmental risk assessment (ERA) of nuclear facilities is a systematic process used by licensees to identify, quantify and characterize the risk posed by contaminants and physical stressors in the environment on human and other biological receptors, including the magnitude and extent of the potential effects associated with a facility. CNSC staff use CSA Standard 288.6-12, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills* to help determine if licensees comply with regulatory requirements regarding protection of the environment and human health.

In November 2016, Cameco submitted an ERA for the BRR facility to the CNSC [16]. CNSC staff reviewed the ERA and confirmed that the ERA complied with CSA standard N288.6-12 and that the ERA conclusions regarding potential risk to human health and the environment at the BRR facility were valid. The 2016 ERA concluded that there were negligible impacts to human health and the environment as a result of the BRR operations. BRR currently has acceptable environmental programs in place to ensure protection of the public and the environment.

In accordance with CSA N288.6-12, licensees must review their ERAs at a minimum of every 5 years or earlier, if there are changes to operations or in scientific knowledge. BRR completed this ERA review after 4 years (in 2020) to support the licence renewal application [17].

The 2020 ERA review provided the following:

- a review of site changes and site characterization
- environmental monitoring data collected since the 2016 ERA
- an updated screening of contaminants of potential concern
- a review of environmental issues and methodology revealed by the 2016 ERA (including the disposition of CNSC staff comments)
- a review of scientific advances
- changes in regulatory requirements that may affect the ERA methodology or parameters

CNSC staff found the 2020 ERA review to be acceptable and concluded that the 2016 ERA conclusions and recommendations are still valid. No new risks have emerged since the 2016 ERA and, therefore, human health and ecological risks attributable to the BRR facility's operations are negligible.

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 BRR's compliance reporting and revisions to relevant program documentation pertaining to this SCA.

3.9.3.3 Proposed Improvements

The BRR facility has made a commitment that they will update their groundwater monitoring program to be in compliant with CSA N288.7-15, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills* by August 2021. This will also bring them in compliance with REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures* (2020).

CNSC staff will review the submission to ensure that it meets regulatory requirements and to ensure effective implementation.

3.9.4 Conclusion

The BRR facility has implemented and maintained an environmental protection program that adequately protects the environment and the public in accordance with regulatory requirements. CNSC staff expect no adverse effects on human health and the environment during the operation of the facility.

3.9.5 Recommendation

Standardized Licence condition 9.1 has been included in the proposed licence for this SCA. This licence condition requires the licensee to implement and maintain an environmental protection program, which includes a set of action levels with a requirement to notify the CNSC within 7 days of any exceedances. Compliance verification criteria for this licence condition are included in the draft LCH.

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 area also includes any results of participation in exercises.

The specific areas that comprise this SCA at the BRR facility include:

- nuclear emergency preparedness and response
- fire emergency preparedness and response

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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
BRR has implemented and maintained a fire protection program in accordance with CNSC regulatory requirements. BRR's emergency preparedness measures meet applicable CNSC regulatory and performance objectives. CNSC staff monitor Cameco's implementation of this program through regular compliance verification activities.								

3.10.2 Discussion

The emergency management and fire protection SCA covers the provisions for a licensee to have in place an emergency preparedness plan and response capability which can mitigate the effects of accidental releases of radiological and hazardous substances into the environment during emergency and non-routine conditions. This SCA also includes implementation of a fire protection program (FPP) to prevent or minimize the risk that fire poses to the environment and the health and safety of persons.

BRR implements an emergency preparedness program, as required by REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response, Version 2*. CNSC staff also confirmed that BRR has a FHA and FPP that complies with the NFCC. BRR maintains a FPP to minimize both the likelihood of occurrence and the severity of consequences due to fire at the facility. This is achieved through appropriate fire protection system design, fire safe operation and fire prevention. BRR's FPP has been established to comply with the requirements of CSA standard N393-13, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances*.

In total, CNSC staff conducted 3 focused emergency response inspections in 2012, 2015 and 2018 and 2 focused fire protection inspections in 2016 and 2019. CNSC staff are satisfied with the corrective actions, which were implemented, and all action items have been closed

BRR continues to effectively implement an emergency preparedness and FPP, which adequately protects workers, the public and the environment from emergency or non-routine conditions.

CNSC staff are satisfied with the emergency preparedness and fire protection measures taken by BRR during the current licensing period with respect to this SCA and concluded that they meet CNSC regulatory requirements.

3.10.3 Summary

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

3.10.3.1 Past Performance

Emergency Preparedness and Response

Cameco submitted an updated emergency response plan, revision 14, dated June 2019, for its BRR facility, which was reviewed and accepted by CNSC staff.

As described in the emergency response plan, Cameco has a mutual aid agreement in place with the Blind River Fire Department to provide emergency mutual aid assistance. Protocols are also in place with the local hospital for the treatment of contaminated casualties. These arrangements are tested routinely during the conduct of joint training, drills and exercises.

BRR continues to improve its emergency preparedness and response program based on changes to regulatory requirements, as well as lessons learned from events, exercises and drills. Specific compliance and verification activities performed during this current licensing period include reviews of BRR's emergency plan and procedure updates, annual compliance reports, event reviews and onsite inspections of major exercises.

There were 2 fire events that occurred at BRR during the current licensing period. The first event occurred on December 3, 2015, which was a minor fire on an electrical panel in the stores area. This fire was promptly extinguished by a staff member, who was also a member of the BRR Emergency Response Team (ERT), using a portable fire extinguisher. The second event occurred on April 24, 2020, which was a large fire in the yard area involving several hundred totes containing CCMs, as detailed in section 3.3 Operating Performance. This required activation of the BRR emergency response organization and a response by the BRR ERT, including offsite support. The BRR ERT effectively worked along with the Blind River Fire Department and Mississauga First Nations Fire Department to extinguish the fire. In accordance with BRR's corrective action process, investigations were completed and a number of corrective actions had been identified and implemented to prevent or mitigate a recurrence of these events.

CNSC staff are satisfied with BRR's responses to the fires and the corrective actions taken.

CNSC staff conducted 3 focused compliance inspections on BRR emergency exercises in 2012, 2015 and 2018. The inspection findings were related to maintaining updated equipment inventory checklists in an emergency vehicle, protocols for establishing an incident command post, ERT response protocols, and adequacy of contamination control and monitoring during an emergency. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.The results of the CNSC inspections confirmed that the BRR emergency response capability is satisfactory for the type and scope of anticipated and postulated emergency situations.

Based on the above assessment, CNSC staff concluded that BRR's implementation of its emergency management program is satisfactory.

Fire Protection

CNSC staff conducted 2 focused fire protection inspections in 2016 and 2019. The inspection findings were related to means of egress, exit signs, fire separations, combustible materials and third party fire audits. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

During its current licence period, Cameco submitted annual third party review reports of inspection, testing and maintenance of fire protection in accordance with CNSC regulatory requirements. These reports indicate BRR is meeting the required codes and standards. While BRR's fire protection measures met applicable CNSC regulatory and performance objectives, BRR has committed to review their FHA as per CNSC staff recommendations.

BRR continues to maintain a satisfactory FPP. CNSC staff concluded that the FPP at BRR meets regulatory requirements and BRR is performing satisfactorily with respect to this SCA. CNSC staff monitor BRR's implementation of this program through compliance verification activities.

3.10.3.2 Regulatory Focus

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

3.10.3.3 Proposed Improvements

There are no proposed improvements for this SCA.

3.10.4 Conclusion

CNSC staff have assessed BRR's documentation and analyses under the emergency management and fire protection SCA and concluded that Cameco has an acceptable emergency management and FPP. CNSC staff therefore concluded that Cameco's overall performance for this SCA is satisfactory and that Cameco is qualified to carry out the authorized activities in this SCA.

3.10.5 Recommendation

Two standardized licence conditions are included in the proposed licence for the emergency management and fire protection SCA. Licence condition 10.1 requires the licensee to implement and maintain an emergency preparedness program and Licence condition 10.2 requires the licensee to implement and maintain a FPP. Compliance verification criteria for these licence conditions are also provided in the draft LCH.

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 licensed site for storage, treatment, or disposal at another licensed location. This area also covers the planning for decommissioning.

The specific areas that comprise this SCA at the BRR facility include:

- waste characterization
- waste minimization
- waste management practices
- 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								
2012	2013	2014	2015	2016	2017	2018	2019	2020
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
The BRR waste management program met applicable CNSC regulatory and performance objectives. CNSC staff monitor BRR's implementation of this program through regular compliance verification activities.								

3.11.2 Discussion

Cameco FSD has a waste management program that meets the requirements of CSA Standard N292.3-14, *Management of low- and intermediate-level radioactive waste*, CSA Standard N292.0-14, *General principles for the management of radioactive waste and irradiated fuel* and for hazardous waste as defined by Ontario Regulation 347 General – *Waste Management*.

In accordance with paragraph 3(k) of the CINFR, Cameco is required to maintain a decommissioning plan throughout the life of the facility. Cameco maintains a Preliminary Decommissioning Plan (PDP) for the BRR as per CSA standard N294-19, *Decommissioning of Facilities Containing Nuclear Substances* and CNSC Regulatory Guide G-219, *Decommissioning Planning for Licensed Activities*.

Cameco regularly assesses its waste management program and PDP to ensure the adequacy and effectiveness of its programs.

CNSC staff conducted 3 planned compliance inspections during the term of the current licence, in 2012, 2015 and 2018. All enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

Based on CNSC staff's assessment of the licence renewal application, supporting documents and Cameco's past performance in this SCA, CNSC staff concluded that Cameco continues to maintain and implement a documented waste management program in accordance with CNSC regulatory requirements, and Cameco has demonstrated satisfactory performance at the BRR facility for this SCA.

3.11.3 Summary

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

3.11.3.1 Past Performance

Waste Characterization, Minimization, and Management Practices

Cameco's application for a licence renewal included a documented waste management program for the BRR facility. The program involves minimizing waste, storing waste and disposing hazardous waste.

The program applies to Cameco's FSD operations at BRR, the PHCF and Cameco Fuel Manufacturing (CFM). The specific aspects of waste management at the BRR facility are addressed in the BRR Waste Management Plan (WMP). The WMP applies to all aspects of waste management at the site, including all of the waste materials generated, received, handled, stored, processed at the refinery, recycled and/or transferred/removed to an appropriate waste management or other facility.

The objectives of BRR WMP are:

- to manage and dispose of wastes in accordance with applicable laws and generally accepted industry practices so as to minimize the potential adverse impact to personnel and to the environment
- to minimize and reduce the quantity of stored onsite waste through recycle, re-use and recovery to the extent possible
- to segregate radioactively contaminated and non-contaminated waste materials
- to maintain an inventory of waste materials produced, received, disposed of and stored, including quantities and location on site
- to store waste materials only when re-use, recycle or recovery is not possible and then to do so with proper management systems and controls in place; until an acceptable method has been identified for their eventual disposal
- to continually evaluate disposal alternatives and new technologies for waste reductions.

During the term of the current licence, CNSC staff conducted 3 inspections at BRR focused on the waste management SCA, in 2012, 2015 and 2018. Enforcement actions from these inspections dealt with how BRR managed legacy waste and labelling of containers. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

CNSC staff assessed the waste management program and associated supporting documentation submitted by Cameco with the licence renewal application for the SCA and found that Cameco FSD's waste management program meets regulatory requirements.

Decommissioning Plans

In October 2020, as part of their licence renewal application, Cameco submitted an updated PDP and cost estimate for decommissioning of the BRR facility.

Decommissioning must be conducted in a manner that ensures that the health, safety, and security of workers, the public, and the environment are protected. Cameco has selected a prompt decommissioning strategy for BRR including dismantling and removing the buildings and equipment from the site and remediating it back to a state similar to its natural state. Cameco's strategy for managing waste from decommissioning is to construct a long-term waste management facility to contain the remaining contaminated soil and building rubble in a properly designed and secure facility occupying a small area on the site. At this time, Cameco does not have a proposed timeframe for permanently shutting down the BRR. While a preliminary potential approach to decommissioning is considered sufficient at this juncture, the acceptance of a final planned approach would be the subject of a future Commission decision.

Should a proposal be submitted to the CNSC for regulatory approval, the requirements in force at that time will define the process that will apply to such a waste management facility.

CNSC requires Cameco to revise its PDP for BRR at a minimum of every 5 years or when required by the Commission. CNSC staff have reviewed the updated PDP for BRR and found that it meets the applicable regulatory requirements and provides an acceptable basis for a decommissioning cost estimate. The associated financial guarantee for decommissioning is discussed in section 4.4 of this CMD.

3.11.3.2 Regulatory Focus

CNSC staff will continue to monitor and evaluate BRR's compliance with regulatory requirements through regulatory oversight activities including inspections and reviews of compliance reports and revisions to relevant program documentation.

3.11.3.3 Proposed Improvements

Both REGDOC-2.11.1, *Waste Management Volume I: Management of Radioactive Waste* and REGDOC-2.11.2, *Decommissioning*, were published in January 2021, and will apply to BRR operations. CNSC staff expect that Cameco will conduct a gap analysis to align the waste management and planning for decommissioning programs for BRR with the regulatory requirements set in the newly published REGDOCs and implement them at BRR.

3.11.4 Conclusion

Based on the assessment of BRR's WMP, CNSC staff concluded BRR has a waste management program that meets the requirements of CSA Standard N292.3-14, *Management of low- and intermediate-level radioactive waste*, and CSA Standard N292.0-14, *General principles for the management of radioactive waste and irradiated fuel*.

Based on the assessment of BRR's revised PDP, CNSC staff concluded that the PDP meets the applicable regulatory requirements of CSA standard N294-19, *Decommissioning of facilities containing nuclear substances*, and CNSC regulatory guide G-219, *Decommissioning Planning for Licensed Activities.*

3.11.5 Recommendation

Two standardized licence conditions are included in the proposed licence for the waste management SCA. Standardized Licence condition 11.1 requires the licensee to implement and maintain a waste management program. Standardized Licence condition 11.2 requires the licensee to maintain a decommissioning plan. Compliance verification criteria for these licence conditions are included in the draft LCH.

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 at the BRR facility include:

- facilities and equipment
- response arrangements
- security practices

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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
BRR has implemented and maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the *Nuclear Security Regulations* (NSR) to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information.								

3.12.2 Discussion

The GNSCR and NSR require that licence applications contain information including the proposed measures to control access to the site of the activity to be licensed, the nuclear substance, and the prescribed equipment or prescribed information.

In addition, REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, Version 2.1 provides regulatory expectations and guidance for licensees regarding the CNSC's expectations under the GNSCR and NSR for security.

In addition to the regulatory requirements stipulated in the GNSCR, this facility is identified as a named entity within Schedule 2 of the NSR. As such, and as identified by paragraph 40(1)(b) of the NSR, BRR is subject to Part 2 of the NSR, specifically sections 39 to 48. Part 2 of the NSR provides additional requirements, specifically with regard to access control, facilities and equipment, response arrangements, training, staff trustworthiness and reliability programs, practices and procedures, as they relate to security.

CNSC staff conducted 2 focused inspections in 2016 and 2017. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

BRR has implemented and maintained a security program that meets regulatory requirements under the GNSCR and Part 2 of the NSR to prevent the loss, unauthorized removal and sabotage of nuclear substances, nuclear materials, prescribed equipment or information.

3.12.3 Summary

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

3.12.3.1 Past Performance

Specific area performance evaluation for security is identified as security sensitive information and has been designated as Confidential – Prescribed Information. This information is not available for public release.

Facilities and Equipment

BRR has maintained a security program that provides sufficient security systems and devices for the facility and the areas that involve the processing, use, or storage of nuclear substances. In addition, BRR has identified processes for effectively testing and maintaining the security devices and assessment and detection systems.

Response Arrangements

Alarm detection and assessment systems are continuously monitored by onsite security staff. BRR has established a response protocol with the Ontario Provincial Police to ensure timely off-site armed response, should a security-related incident occur.

Security Practices

CNSC staff assessed and verified BRR's implementation of the physical protection program from the access control perspective. Measures for controlling access to persons and vehicles were assessed as meeting regulatory requirements.

The licensee has implemented a satisfactory Facility Access Security Clearance (FASC) process that includes a Criminal Record Name Check for individuals with the FASC. In addition, BRR has a security awareness program for all staff and a supervisory awareness program for managers and supervisors to enhance capabilities in identifying and responding to changes in employee behaviour. The facility's physical protection program includes administrative and technical measures that meet current CNSC regulatory requirements for nuclear security.

Through ongoing compliance oversight, CNSC staff have confirmed that effective security measures have been implemented at the facility. The facility has been operating in a manner compliant with CNSC requirements for the security SCA. CNSC staff are satisfied that an effective security program has been implemented at the facility, and expect this to continue at BRR.

3.12.3.2 Regulatory Focus

CNSC staff will continue to monitor BRR's performance for the security SCA through regulatory oversight activities, including onsite inspections and technical assessments of relevant program documentation.

3.12.3.3 Proposed Improvements

The current programs at BRR for this SCA are considered adequate and no improvements within this SCA are proposed.

3.12.4 Conclusion

CNSC staff confirmed that BRR has met regulatory requirements for the security SCA throughout the licensing period, and that the performance rating of "Satisfactory" is supported. CNSC staff will continue to monitor and provide regulatory oversight of BRR's implementation and operation of their security program.

CNSC staff's expectations for BRR's compliance with the security SCA include ensuring adequate provisions for the security of nuclear substances, the implementation of measures to alert the licensee to the illegal use or removal of nuclear substances, and sabotage or attempted sabotage, anywhere at the site, and that all workers will be instructed on the facility's security program and their obligations therein.

3.12.5 Recommendation

One standardized licence condition is included in the proposed licence for this SCA. Licence condition 12.1 requires the licensee to implement and maintain a security program. Compliance verification criteria for this licence condition are included in the draft LCH.

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 Canada/International Atomic Energy Agency (IAEA) safeguards agreements (see Appendix C, section C.1 regulatory basis, safeguards and non-proliferation), as well as other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons.*

The specific areas that comprise this SCA at the BRR facility include:

- nuclear material accountancy and control
- access and assistance to the IAEA
- operational and design information
- safeguards equipment, containment and surveillance
- import and export

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								
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
BRR continues to perform satisfactorily in this SCA. Overall, CNSC staff concluded BRR's safeguards and non-proliferation SCA meets regulatory requirements.								

3.13.2 Discussion

In February 2018, the CNSC published REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*, which BRR implemented in 2019. This document has replaced the RD-336, *Accounting and Reporting of Nuclear Material* and sets out requirements and guidance for safeguards programs for applicants and licensees who possess nuclear material, operate a uranium and/or thorium mine, carry out specified types of nuclear fuel-cycle related research and development work, and/or carry out specified types of nuclear-related manufacturing activities. The requirements and guidance in this document are essential to Canadian compliance with the safeguards agreements entered into with the IAEA, and are consistent with modern national and international practices.

CNSC staff reviewed Cameco's FSD Safeguards Program document, which applies to the BRR, against the requirements in REGDOC 2.13.1 and concluded that Cameco's safeguards program is satisfactory.

3.13.3 Summary

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

3.13.3.1 Past Performance

Details pertaining to the specific areas within this SCA are presented in the following subsections.

Nuclear Material Accountancy and Control

CNSC staff determined that the facility complied with CNSC's regulatory requirements in accordance with REGDOC-2.13.1, *Safeguards and Nuclear Material Accountancy*.

During this licensing period, BRR continued to improve nuclear material accountancy, including through support for the CNSC's use of 3D laser scanning determinations of the contents of BRR's de-nitration pots and through refinement to the assessment of nuclear material content in some waste products.

Access and Assistance to the IAEA

CNSC staff determined that the facility granted adequate access and assistance to the IAEA for safeguards activities.

During 2012 –20, the IAEA performed inspections and verifications that included 7 Physical Inventory Verifications (PIVs), 24 Design Information Verifications, 1 Complementary Access, and 24 short notice random inspections. In addition, the CNSC performed 2 physical inventory-taking evaluations when the PIV was not performed by the IAEA and other safeguards activities. In all cases, the facility provided the IAEA and CNSC with the necessary access and assistance to perform the activities and complied with all regulatory requirements.

Operational and Design Information

The licensee submitted its annual operational programs, annual updates to the additional protocol, and other required information to the IAEA and the CNSC in a timely manner.

Safeguards Equipment, Containment and Surveillance

The IAEA installed standard weights at BRR in 2019. The BRR has used these standard weights for its accountability scale validation and calibration to ensure the accuracy of measurements and nuclear material accounting. While knowledge of the accountability scale's measurement performance continues to be gained through BRR's ongoing use of the standard weights, improvements to BRR's calibration process and procedure have been identified by CNSC staff and raised to BRR's attention. CNSC staff continue to monitor BRR's progress on this matter.

Import and Export

The scope of the non-proliferation program under this licence is limited to the tracking and reporting of foreign obligations and origins of nuclear material. CNSC staff determined that the licensee complied with the CNSC's regulatory requirements in this respect.

The licensee requires a licence, separate from the licensing of their operations, for the import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations.*

3.13.3.2 Regulatory Focus

BRR continues to improve nuclear material measurement and accountancy. CNSC staff will continue to monitor and evaluate the licensee's performance through participation in IAEA inspections, CNSC evaluations, and ongoing assessments of compliance with licensing requirements.

3.13.3.3 Proposed Improvements

No changes are anticipated in the near future for this SCA.

3.13.4 Conclusion

CNSC staff have assessed BRR documentation under the safeguards and non-proliferation SCA and have found the documentation to be acceptable and compliant with regulatory requirements. CNSC staff concluded the overall performance of the SCA is satisfactory and BRR is qualified to carry out the authorized activities in this SCA. It is important to note that the current facility's past performance is presented as an indicative of the performance expected for the future operation of BRR.

3.13.5 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition 13.1, requires that the licensee implement and maintain a safeguards program. Compliance verification criteria for this licence condition is included in the draft LCH.

3.14 Packaging and Transport

The packaging and transport SCA covers the safe packaging and transport of nuclear substances to and from the licensed facility.

The specific areas that comprise this SCA at the BRR facility include:

- package design and maintenance
- packaging and transport

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								
2012	2013	2014	2015	2016	2017	2018	2019	2020
SA	SA	SA	SA	SA	SA	SA	SA	SA
Comments								
Throughout the licensing period, BRR implemented and maintained a packaging and transport program that ensures the compliance with the applicable regulations.								

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* (PTNSR), and the *Transportation of Dangerous Goods Regulations* for all shipments to and from the site.

During this licence period, CNSC staff conducted 2 inspections focused on packaging and transport and also assessed the performance of the licensee through other compliance verification activities, including event reviews and review of annual compliance reports submitted by BRR.

BRR's packaging and transport program was reviewed and assessed by CNSC staff and found to be satisfactory. This was done through desktop reviews of the program and associated documentation. The last review occurred in July 2020, and no findings were noted.

CNSC staff concluded that BRR's packaging and transport SCA met all applicable regulatory requirements and CNSC staff's expectations.

3.14.3 Summary

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

3.14.3.1 Past Performance

Over the current licence period, BRR maintained satisfactory performance in the area of package design and maintenance. Radioactive materials are presented for transport in packages that meet the regulatory requirements and that are maintained in accordance with the regulations. BRR also maintained satisfactory performance in packaging and transport by ensuring that the radioactive materials are appropriately consigned and offered for transport.

To ensure compliance of BRR, CNSC staff conducted 2 focused compliance inspections in 2014 and 2019. CNSC staff classified all findings from these inspections as low safety significance and all enforcement actions associated with these inspections are closed to CNSC staff's satisfaction.

Fourteen events related to package and transport were reported in the current licence period and none of them resulted in a risk to the health and safety of persons and the environment. Events included receipt of damaged drums and minor traffic accidents. Traffic accidents are to be reported to the CNSC even when the packages are not directly affected. The required event reports for those events were submitted in accordance with the regulatory requirements. They have been review by CNSC staff and found satisfactory.

CNSC staff are satisfied with the performance of BRR in this SCA, and find that the licensee is qualified to conduct the activities as proposed in its application for the renewal of its operating licence.

3.14.3.2 Regulatory Focus

CNSC staff will continue to monitor BRR's performance for the packaging and transport SCA through onsite inspections and assessments of annual compliance reporting and revisions to BRR's written notification documentation.

Note that package and transport has been removed from Part IV (ii) of the proposed licence, since those activities do not require a licence under the NSCA and associated regulations. Section 26 of the NSCA subjects Cameco to the PTNSR, where subsection 6 (1) states that a person may transport a nuclear substance without a licence issued under subsection 24 (2) of the Act for that purpose, except for 6 conditions (paragraphs 6 (1) (a) to (f) of the PTNSR 2015). CNSC staff have determined that the conditions that would require a licence under paragraphs 6 (1) (a) to (f) of the PTNSR 2015 do not apply to the BRR activities.

This change would not have an impact on the licence conditions or the licence conditions handbook as the licensee would still be required to implement and maintain a packaging and transport program as per Licence condition 14.1.

3.14.3.3 Proposed Improvements

There are no proposed improvements for this SCA.

3.14.4 Conclusion

CNSC staff concluded that BRR meets the requirements covered under the packaging and transport SCA. The licensee's performance remained satisfactory in the area of packaging and transport throughout the current licensing period.

3.14.5 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition 14.1 requires that the licensee implements and maintains a packaging and transport program. Compliance verification criteria for this licence condition is included in the draft LCH.

4. OTHER MATTERS OF REGULATORY INTEREST

4.1 Indigenous Engagement

The common law duty to consult with Indigenous peoples applies when the Crown contemplates actions that may adversely impact potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licensing decisions under the 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*.

4.1.1 Discussion

CNSC staff have identified the First Nation and Métis groups who may have an interest in the renewal of the BRR licence. These groups include:

- Métis Nation of Ontario Region 4 (Historic Sault Ste. Marie Métis Council and North Channel Métis Council)
- Mississauga First Nation
- Sagamok Anishnawbek
- Serpent River First Nation
- Thessalon First Nation

These Indigenous groups were identified due to the proximity of their communities, treaty areas and/or traditional territories to the BRR site, or due to previously expressed interest in being kept informed of CNSC licensed activities occurring in or proximal to their territories. The umbrella organization Anishinabek Nation was also notified of updates provided to their member nations, as previously requested.

CNSC Staff Engagement Activities

In January 2021, CNSC staff sent letters of notification to the First Nation and Métis groups who may have an interest in the BRR licence renewal application. These letters provided information regarding the licence application and details on how to participate in the Commission's public hearing process. In March 2021, CNSC staff sent emails to each group indicating the availability of participant funding to facilitate participation in the regulatory process. CNSC staff followed up by phone after each written notification to ensure that emails had been received and to answer any questions about the licence renewal application, the regulatory process, or participant funding. Mississauga First Nation applied for and was awarded participant funding. (See section 4.2).

All of the identified Indigenous groups have been encouraged to participate in the regulatory review process and in the public hearing to advise the Commission directly of any concerns they may have in relation to this licence renewal application. CNSC staff remain open to meeting with Indigenous groups to discuss this licence renewal application and to encourage and maintain productive and respectful relationships.

To date, the identified Indigenous groups have not expressed any specific concerns with regards to the licence renewal application. Should any concerns be identified, CNSC staff will provide additional information with regards to on-going engagement activities, including any concerns expressed by Indigenous groups, to the Commission and the public in CNSC staff's presentation to the Commission and/or a supplemental CMD, if required.

Licensee Engagement Activities

CNSC REGDOC-3.2.2, *Indigenous Engagement*, sets out requirements and guidance for licensees whose proposed projects may raise the Crown's duty to consult. Based on the information received in the licensee's application, this licence renewal is not expected to cause any new adverse impacts to potential or established Indigenous and/or treaty rights and therefore does not raise the formal requirements of REGDOC-3.2.2.

Cameco has informed the identified Indigenous groups through letters of their application to renew the BRR operating licence. These Indigenous groups are also target audiences in Cameco's FSD Public Information Program, which commits to keeping the groups informed, offering further engagement, and responding to requests. Cameco has in particular signed an Memorandum of Understanding (MOU) with Mississauga First Nation that includes regular meetings and sharing quarterly and annual reports. To date, CNSC staff have not been made aware of any concerns expressed by Indigenous groups through Cameco's engagement activities.

CNSC staff encourage Cameco to continue engaging with interested Indigenous groups regarding the BRR facility and activities including the licence renewal application.

4.1.2 Conclusion

Based on the information received in Cameco's licence application, CNSC staff do not expect this licence renewal to cause any new adverse impacts to potential or established Indigenous and/or Treaty rights.

However, the CNSC is committed to meaningful, ongoing engagement with Indigenous groups that have an interest in CNSC-regulated facilities and activities. CNSC staff engaged with all interested Indigenous groups in relation to this licence renewal application and encouraged them to identify any concerns and to participate in the regulatory review process, including the Commission hearing.

Cameco has informed and engaged with the identified Indigenous groups of their application to renew the BRR operating licence. CNSC staff encourage Cameco to continue to engage with interested Indigenous groups on this licence renewal application and other ongoing activities of interest.

4.2 Public Engagement

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.

Part of CNSC's mission is to provide objective scientific and regulatory information to the public concerning nuclear activities. 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 4.6.

CNSC staff annually report to the Commission and the public on the regulatory oversight of all the uranium processing facilities, including the BRR. The list of regulatory oversight reports is presented in the references within this CMD and are also available on the CNSC's website. The public has the opportunity to review, question and comment on the regulatory oversight report 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.

On May 12, 2021, CNSC staff hosted a webinar to provide an overview of the CNSC regulatory process, information on the Cameco licence renewal application for BRR, how to participate in the licensing hearing, and to answer any questions from the public. A second webinar on the Cameco licence renewal application for BRR is planned for September 15, 2021. The focus will be on specific SCAs that are of interest to the public.

The CNSC is committed to keeping interested communities informed of regulatory activities occurring at the BRR and will continue to look for ways to enhance the involvement of interested groups.

4.2.1 Discussion

The CNSC made available up to $75,000 through its PFP to Indigenous peoples, members of the public and stakeholders in providing value-added information to the Commission through informed and topic-specific interventions. This funding was offered to support recipients' review of Cameco's application and associated documents and to prepare written submissions and oral presentations for the Commission hearing.

The deadline for applications was May 7, 2021. A Funding Review Committee (FRC), independent from CNSC staff, reviewed the funding applications received, and made recommendations on the allocation of funding to eligible applicants. Based on recommendations from the FRC, the CNSC awarded a total of $52,527.55 in funding to the following recipients, who are required to submit their written interventions to the Commission Secretariat by Oct 19, 2021, for the Commission's consideration:

- Northwatch
- Mississauga First Nation

4.2.2 Conclusion

CNSC staff continued to inform the public of regulatory activities through regular website updates, publicly webcast Commission proceedings, social media and discussion with key audiences in the Blind River area.

Through the PFP, the CNSC has offered assistance to interested members of the public, Indigenous groups, and other stakeholders to prepare for and participate in the Commission's public hearing on Cameco's application to renew the BRR licence.

4.3 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, Regulatory Activity Plan fees.

4.3.1 Discussion

CNSC staff confirmed that Cameco is in good standing with respect to CRFR requirements and has paid their cost recovery fees in full. CNSC staff do not have concerns regarding payment of future cost recovery fees for this licensee.

4.3.2 Conclusion

Based on previous performance there is no concern over the payment of future cost recovery fees.

4.3.3 Recommendation

There is no requirements for any additional licensing activity or any additional licence conditions.

4.4 Financial Guarantees

The NSCA and associated regulations require that licensees make adequate provision for the safe decommissioning of their facilities. Requirements and guidance for establishing a financial guarantee (FG) for decommissioning are provided in REGDOC-3.3.1, *Financial Guarantees for Decommissioning of Nuclear Facilities and Termination of Licensed Activities* published in January 2021. Prior to that, regulatory guidance and the associated acceptance criteria for establishing a FG were provided in the CNSC regulatory guide *G-206, Financial Guarantees Guide for the Decommissioning of Licensed Activities*.

Cameco currently maintains a FG for decommissioning of the BRR facility as per Licence condition 16.1 of its current licence. A FG for decommissioning must be established to fund the activities described in the PDP. The FG shall be acceptable to the Commission.

4.4.1 Discussion

In November 2017, the Commission accepted Cameco's financial guarantee for decommissioning of BRR in the form of a letter of credit for C$48 million [18].

In October 2020, as part of their licence renewal application, Cameco submitted an updated PDP and cost estimate for decommissioning of the BRR facility [19]. CNSC staff have reviewed the PDP against CNSC regulatory guide G-206 which was in effect at the time, and found that it meets the applicable regulatory requirements and provides an acceptable basis for a decommissioning cost estimate.

Based on the updated PDP, Cameco has estimated the cost for decommissioning of BRR to be C$57.5 million. The proposed amount includes 20% contingency and an escalation of 2-3% for 5 years to account for inflation until the next review period.

The proposed amount of C$57.5 million is an increase of C$9.5 million from the current FG of C$48million. The increase is due to the updated unit rates and the applied 2020 labour rates and disposal costs.

CNSC staff have assessed the cost estimate against the criteria set out in G-206 and consider the proposed amount to be adequate for decommissioning of the BRR facility.

Cameco is proposing to continue to use a Letter of Credit (LOC) to fund its financial guarantee. The LOC is an acceptable financial instrument for the financial guarantees as identified in G-206.

Cameco has provided a draft of the irrevocable letter of credit with terms and conditions acceptable to CNSC staff. Cameco has requested 90 days from the date of the Record of Decision by the Commission to have the financial guarantee in place. The current financial guarantee will continue to remain valid until the revised financial guarantee is in place.

The NSCA and associated regulations require the licensees to make adequate provisions for the safe decommissioning of their facilities. Requirements and guidance for establishing a financial guarantee for decommissioning are provided in REGDOC 3.3.1, published in January 2021, and superseding G-206. G-206 was in effect when reviewing the FG for BRR.

CNSC staff expect that Cameco will implement REGDOC 3.3.1 for the next revision of the BRR FG.

4.4.2 Conclusion

CNSC staff concluded the Cameco currently has in place a valid, in effect and approved by the Commission FG and recommend that the Commission accept the proposed new FG.

4.4.3 Recommendation

CNSC staff recommend that the Commission accept the proposed new FG in the form of a LOC for an amount of C$57.5 million and direct Cameco to provide the original instruments within 90 days from the issuance of a decision on this matter.

One standardized licence condition is included in the proposed licence. Licence condition G.3 requires that the licensee maintain a financial guarantee for decommissioning that is acceptable to the Commission. Compliance verification criteria for this licence condition is included in the draft LCH.

4.5 Improvement Plan and Significant Future Activities

Other than the continued authorization of a production increase, subject to the conditions and hold points previously approved by the Commission, Cameco has not identified any significant future activities at its BRR facility. See section 1.2 Highlights of this CMD for additional information on the production increase.

4.6 Licensee Public Information Program

A Public Information and Disclosure Program (PIDP) is a regulatory requirement for 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 and Indigenous groups.

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 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.

4.6.1 Discussion

Cameco's FSD operates the BRR as well as 2 other nuclear processing facilities: PHCF and CFM. The BRR is located in Northern Ontario, situated between Sudbury and Sault Ste. Marie (approximately a 1.5 hour drive from both major centres).

BRR is required under its licence to maintain a PIDP as per REGDOC-3.2.1, Public Information and Disclosure. In 2020, the 3 Public Information Programs for the BRR, CFM and PHCF were amalgamated into one FSD-wide document that was submitted to and accepted by the CNSC.

During the course of the previous 10-year licensing period, BRR has been successful in meeting its public disclosure and reporting obligations. It has made improvements to its website, adopted social media platforms and documented areas of community engagement (tours, media, government and stakeholder relations, and community events). Independent public polling of residents in 2021 indicates extremely strong community support for the BRR facility and its application renewal, including perceptions that the facility is operating safely.

As expected, the COVID pandemic provided challenges for BRR. Despite the cancellation of in person meetings and events, BRR was still able to reach the community through their quarterly electronic and direct mail out newsletter (Energize), increased use of social media channels and updates through earned media and their own website.

CNSC staff have reviewed BRR's PIDP and determined that it:

- identifies clear goals and objectives in terms of dissemination of information to targeted audiences
- identifies multiple target audiences such as residents and businesses in close proximity to the licensed facility, elected and government representatives, local schools, local health units and first responders, community leaders and associations, and local Indigenous groups
- provides contact information for members of the public who want to obtain additional information
- provides key topics intended for sharing with target audience and/or other interested parties
- outlines communications tactics that BRR will deploy to reach target audiences (newsletters, email lists, website content, facility tours, social media, public meetings, public advertisements, volunteering, community investment and community relations activities).

CNSC staff will continue to monitor BRR's compliance with public information requirements and ongoing implementation of the PIDP.

4.6.2 Conclusion

CNSC staff concluded that BRR's PIDP meets the regulatory requirements for public information and disclosure. CNSC staff continue to oversee BRR's implementation of the PIDP to ensure that it meets obligations regarding disseminating and notifying the public and Indigenous communities on its licensed activities.

CNSC staff also encourage BRR to refine and update its PIDP on a regular basis to meet the changing information needs of its target audiences. BRR has expressed a commitment to do this within their current PIPD.

4.6.3 Recommendation

One standardized licence condition is included in the proposed licence. Licence condition G.4 requires that the licensee implements and maintains a public information program. Compliance verification criteria for this licence condition is included in the draft LCH.

4.7 Nuclear Liability Insurance

BRR is not a designated facility under the *Nuclear Liability and Compensation Act* (NLCA).

4.7.1 Discussion

BRR only processes natural uranium, which is excluded from the definition of nuclear material under the NLCA. As a result, BRR's operations do not meet the criteria to be designated as a nuclear installation and are not under the purview of the NLCA. The NLCA does not apply to this facility.

4.7.2 Conclusion

There is no requirement at present to have nuclear liability insurance coverage for the BRR facility.

4.7.3 Recommendation

There is no requirements for any additional licensing activity or any additional licence conditions.

4.8 Proposed Licence Period

Cameco has submitted an application [2] with a request to renew its CNSC-issued operating licence for the BRR for a period of 10 years.

4.8.1 Discussion

CNSC's regulatory framework includes a standardized licence and licence conditions handbook (LCH), which provides for effective regulatory oversight of this facility. This includes aspects such as the periodic review every 5 years of the safety analysis report and the environmental risk assessment, and continuous improvement through updates to BRR programs to comply with updated regulatory requirements. Cameco is required by its licence to report on its compliance performance annually through its Annual Compliance Monitoring and Operational Performance Report, including changes to its operations.

BRR completed implementation of REGDOC 3.1.2 on reporting requirements at Class I Facilities in 2018 (see section 3.3.3.1 Past Performance, Reporting and Trending). REGDOC 3.1.2 includes requirements for annual compliance reporting, event reporting, action level exceedance reporting and reporting under the PTNSR. Prior to the implementation of REGDOC 3.1.2, detailed requirements for reporting unplanned situations or events were included in BRR's LCH and were based on the general reports submitted pursuant to section 29 of the GNSCR.

Through CNSC's compliance monitoring program, CNSC staff also verified Cameco's effective and proper implementation of program improvements over this current licence term. BRR is a mature facility with established programs and a management system focused on continuous improvement. Cameco has strong operating experience and demonstrated compliance in carrying out the activities under its BRR licence in a safe and environmentally sound manner. BRR's programs provide assurances that safety-related activities are examined and maintained. Cameco's performance in all SCAs has remained stable during the current licence term.

Annual regulatory oversight reports are presented to the Commission at public proceedings to allow for updates regarding licensee performance and CNSC regulatory oversight activities [1, 13, 14, 20, 21, 22, 23, 24]. These regulatory oversight reports ensure reporting to the Commission and the public on licensee performance, important events and changes to the facility.

CNSC staff will continue to engage regularly with local communities to ensue ongoing communication on safety performance, and the facilitate discussion on any matters of concern as they relate to regulated activities.

All activities, including proposed changes, will be governed by the licence and LCH. Any changes outside of the licensing basis will continue to require Commission review and approval through the Commission public hearing process.

4.8.2 Conclusion

Given the above analysis, CNSC staff concluded that a 10-year licence period will align licence submission and CNSC staff reviews. Cameco's performance has been consistent and adequate over the current licence period and reporting processes are in place to monitor performance over the proposed licensing period.

4.8.3 Recommendation

It is recommended that the Commission grant a licence to Cameco's BRR for a period of 10 years.

4.9 Licence Conditions Handbook

The LCH associated with the BRR provides compliance verifications criteria used to determine whether the conditions in the licence have been met. The LCH sets out how CNSC staff will assess Cameco's compliance with the licence. It provides details associated with each licence condition, such as applicable CSA Group standards and CNSC regulatory documents, regulatory interpretation, compliance verification criteria, version-controlled documents, licensees' written notification documents and guidance. This structure allows more freedom for the facility to evolve and update its documentation within the licensing basis.

4.10 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 are two proposed licence conditions in the proposed BRR licence, FFL-3632.00/2032 that contain the phrase "the Commission or a person authorized by the Commission":

- LC 3.2 Reporting Requirements
- LC 15.1Nuclear Facility Specific

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

- Director, Nuclear Processing Facilities Division
- Director General, Directorate or Nuclear Cycle and Facilities Regulation
- Executive Vice-President and Chief Regulatory Operations Officer, Regulatory Operations Branch

5. OVERALL CONCLUSIONS AND RECOMMENDATIONS

CNSC staff's conclusions and recommendations consider an overall assessment of Cameco's compliance with the NSCA and its regulations during the current licence period (2012-2020). Cameco has programs, resources, and measures in place at the BRR 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.

CNSC staff's assessment determined that the application complies with the regulatory requirements. CNSC staff concluded that Cameco's performance during the current licensing term was satisfactory and met regulatory requirements.

CNSC staff concluded that the proposed financial guarantee of C$57.5 million, through a letter of credit in the amount of C$57.5 million, is a credible cost estimate, and the financial guarantee instrument is acceptable.

Based on the above conclusions, CNSC staff recommend the Commission:

1. Conclude, pursuant to paragraph 24(4)(a) and (b) of the NSCA, in that Cameco:
   i. is qualified to carry on the activities authorized by the licence.
   ii. will 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.
2. Approve the issuance of a 10-year nuclear fuel facility licence effective March 1, 2022 to February 28, 2032 for the BRR facility
3. Approve Cameco's request to maintain the current authorization for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, subject to the following facility-specific licence condition:

   The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iv) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity
4. Accept the proposed financial guarantee of C$57.5 million, through one financial instrument, a letter of credit for C$57.5 million, and direct Cameco to provide the original instrument within 90 days of the issuance of a decision on this matter.
5. Delegate authority as set out in section 4.10 of this CMD.

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3. Letter from C. Astles (Cameco) to J. Jaferi (CNSC), Subject: *Cameco Responses to Bantrel Recommendations in Engineering Assessment Report*, June 28, 2011 (e-Doc 3746402).
4. CMD 08-H130, *Information and Recommendation of Canadian Nuclear Safety Commission Staff, Recommendation for the Acceptance of the Proposed Environmental Assessment Screening Report regarding the Proposed Production Increase at the Blind River Refinery, Blind River, Ontario* (e-doc 3279350).
5. CNSC. 2008. Record of Proceedings, Including Reasons for Decisions in the Matter of Cameco Corporation Environmental Assessment Screening Report for the Proposed Increase of the Annual Production Capacity at the Blind River Refinery (e-Doc 3302994).
6. CMD 11-H18, *Application by Cameco Corporation for Renewal of Class IB Nuclear Fuel Facility Operating Licence for Blind River Refinery in Ontario* (e-Doc 3767715).
7. CNSC. 2012. Record of Proceedings, Including Reasons for Decisions in the Matter of Cameco Corporation Application to Renew its Nuclear Fuel Facility Operating Licence for Blind River Refinery, Public Hearing Dates November 3, 2011 and January 19, 2012 (e-Doc 3919225).
8. Letter from T. Smith (Cameco) to M. Jones (CNSC), Subject*: Review of Production Increase at Blind River Refinery*, March 17, 2021 (e-doc 6515535).
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11. CNSC. 2012. CMD 12-M43. Event Initial Report, Cameco Corporation: Contamination Incident at Blind River Refinery (e-Doc 3971784).
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16. Cameco, *Environmental Risk Assessment for the Blind River Refinery*, November 2016.

17. Cameco, *Review of the Environmental Risk Assessment for Blind River Refinery*, September 2020.

18. CNSC. 2017. Record of Decision, Financial Guarantee for the future Decommissioning of Cameco Corporation's Blind River Refinery (e-Doc 5393103).

19. Cameco, Blind River Refinery Preliminary Decommissioning Plan, revision 11, February 2021 (e-Doc 6482838) (Confidential) BRR Public Summary - PDP.

20. CMD 13-M51, *Regulatory Oversight Report for Canadian Uranium Fuel Cycle and Processing Facilities: 2012 (*e-doc 4213565).

21. CMD 14-M59, *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities: 2013* (e-Doc 4470860).

22. CMD 17-M45, *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2016*.

23. CMD 18-M47, *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2017*.

24. CMD 19-M35, *Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2018*.

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
ALARA	As low as reasonably achievable
BRR	Blind River Refinery
Cameco	Cameco Corporation
CCM	Contaminated combustible material
CCME	Canadian Council of Ministers of the Environment
CCR	Code Compliance Reviews
CEAA	*Canadian Environmental Assessment Act*
CFM	Cameco Fuel Manufacturing
CMD	Commission Member Document
CNSC	Canadian Nuclear Safety Commission
CINFR	Class 1 Nuclear Facilities Regulations
CRFR	*Cost Recovery Fees Regulations*
CSA	Canadian Standards Association
DCEV	Dust Collection and Exhaust Ventilation
DRL	Derived Release Limit
EBRLs	Exposure Based Release Limits
EIR	Event initial report
EMS	Environmental management system
EPR	Environmental Protection Reviews
ERA	Environmental Risk Assessment
ERT	Emergency response team
FASC	Facility Access Security Clearance
FFOL	Facility Fuel Operating Licence
FFL	Facility Fuel Licence

FG	Financial Guarantee
FHA	Fire Hazard Analysis
FHSC	Facility Health and Safety Committee
FPP	Fire Protection Program
FRC	Funding Review Committee
FS	Fully Satisfactory
FSD	Fuel Services Division
FTE	Full Time Equivalent
GNSCR	General Nuclear Safety and Control Regulations
IAEA	International Atomic Energy Agency
IEMP	Independent Environmental Monitoring Program
JHA	Job hazard analysis
LCH	Licence conditions handbook
LOC	Letters of Credit
LTI	Lost-time injuries
MECP	Ontario Ministry of the Environment, Conservation and Parks
MFN	Mississauga First Nation
mSv	Millisievert
MOU	Memorandum of Understanding
MSPM	Management Systems Program Manual
NBCC	National Building Code of Canada
NEW	Nuclear Energy Workers
NLCA	Nuclear Liability and Compensation Act
NFCC	National Fire Code of Canada
NOx	Oxides of nitrogen
NSR	*Nuclear Security Regulations*
NSCA	Nuclear Safety and Control Act
PDP	Preliminary Decommissioning Plan
PFP	Participant Funding Program
PHCF	Port Hope Conversion Facility
PIDP	Public Information and Disclosure Program
PIV	Physical Inventory Verification
PPE	Personal protective equipment

PTNSR	*Packaging and Transport of Nuclear Substances Regulations*
REGDOC	Regulatory Document
RP	Radiation protection
SA	Satisfactory
SAR	Safety Analysis Report
SAT	Systematic approach to training
SCA	Safety and Control Areas
SSC	Structures, Systems and Components
TSSA	Technical Standards and Safety Authority
UNH	Uranyl nitrate hexahydrate
UO_3	Uranium trioxide
WMP	Waste management plan

A. RISK RANKING

The CNSC uses a risk-informed regulatory approach in the management and control of regulated facilities and activities. CNSC staff have therefore established an approach to identifying appropriate levels of regulatory monitoring and control for specific classes of licensed facilities and types of licensed activities based on risk ranking.

Risk ranking is applied to each SCA, and is determined by considering the probability and consequence of adverse incidents associated with each SCA as it relates to the given facility and activity types.

The methodology used to determine risk ranking is based on Canadian Standards Association guideline CAN/CSA-Q850, Risk Management: Guideline for Decision Makers. This guideline provides a description of the major components of the risk management decision process and their relationship to each other, and describes a process for acquiring, analyzing, evaluating, and communicating information that is necessary for making decisions.

In section 2.2 of the CMD, in the Relevant Safety Control Areas table, the "Risk Ranking" column shows a high (H), moderate (M) or low (L) indicator for each SCA that is relevant to the current facility and activities being addressed in this CMD. The risk rankings are not static and will change over time for a given facility and activities (e.g., facilities age, facilities and equipment are upgraded, activities cease or begin, licensees change, technology and programs mature, knowledge and understanding of impacts and probabilities increase, etc.).

The following matrix provides a high-level overview of risk ranking, and the management and monitoring approach associated with the various degrees of risk.

APPROACH TO ASSESSING AND MANAGING POTENTIAL RISK			
CONSEQUENCE	**MANAGEMENT/MONITORING APPROACH**		
Significant Impact	Considerable management of risk is required	Must manage and monitor risk with occasional control	Extensive management is essential. Constant monitoring and control
Moderate Impact	Occasional monitoring	Management effort is recommended	Management effort and control is required
Low Impact	Random monitoring	Regular monitoring	Manage and monitor
Probability of Occurrence	Unlikely to Occur	Might Occur	Expected to Occur

RISK RANKING SCALE					
L	Low Risk	**M**	Moderate Risk	**H**	High Risk

On this basis, a high-risk SCA would be subject to increased regulatory scrutiny and control while a low-risk SCA would generally require minor verification and control.

B. RATING LEVELS

Fully Satisfactory (FS)

Safety and control measures implemented by the licensee are highly effective. In addition, compliance with regulatory requirements is fully satisfactory, and compliance within the safety and control area (SCA) or specific area exceeds requirements and CNSC expectations. Overall, compliance is stable or improving, and any problems or issues that arise are promptly addressed.

Satisfactory (SA)

Safety and control measures implemented by the licensee are sufficiently effective. In addition, compliance with regulatory requirements is satisfactory. Compliance within the SCA meets requirements and CNSC expectations. Any deviation is minor and any issues are considered to pose a low risk to the achievement of regulatory objectives and CNSC expectations. Appropriate improvements are planned.

Below Expectations (BE)

Safety and control measures implemented by the licensee are marginally ineffective. In addition, compliance with regulatory requirements falls below expectations. Compliance within the SCA deviates from requirements or CNSC expectations to the extent that there is a moderate risk of ultimate failure to comply. Improvements are required to address identified weaknesses. The licensee is taking appropriate corrective action.

Unacceptable (UA)

Safety and control measures implemented by the licensee are significantly ineffective. In addition, compliance with regulatory requirements is unacceptable and is seriously compromised. Compliance within the SCA is significantly below requirements or CNSC expectations, or there is evidence of overall non-compliance. Without corrective action, there is a high probability that the deficiencies will lead to unreasonable risk. Issues are not being addressed effectively, no appropriate corrective measures have been taken and no alternative plan of action has been provided. Immediate action is required.

C. BASIS FOR THE RECOMMENDATION(S)

C.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 *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 3(d), the proposed management system for the activity to be licensed, including measures to promote and support safety culture.
- The *General Nuclear Safety and Control Regulations* require that an application for a licence shall contain, under paragraphs:
  - 3(1)(*k*), the applicant's organizational management structure insofar as it may bear on the applicant's compliance with the NSCA and the regulations made under the NSCA, including the internal allocation of functions, responsibilities and authority.
  - 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.

Human Performance Management

The regulatory foundation for the recommendation(s) associated with Human Performance Management includes the following:

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraphs:
  - 3(d.1), the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty.
  - 6(*m*), the proposed responsibilities of and the qualification requirements and training program for workers, including the procedures for the requalification of workers
  - 6(*n*), the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.

- The *General Nuclear Safety and Control Regulations* require that licensees, under paragraphs:
  - 12(1)(*a*), ensure the presence of a sufficient number of qualified workers to carry on the licensed activity safely and in accordance with the Act, the regulations made under the Act and the licence.
  - 12(1)(*b*), train the workers to carry on the licensed activity in accordance with the Act, the regulations made under the Act and the licence.
  - 12(1)(*e*), require that every person at the site of the licensed activity to use equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence.

Operating Performance

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

- The *Class I Nuclear Facilities Regulations* require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraph:
  - 6(*d*), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

Safety Analysis

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

- The *General Nuclear Safety and Control Regulations* require that an application for a licence shall contain, under paragraph:
  - 3(1)(*i*), a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.
- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraphs:
  - 6(*c*), a final safety analysis report demonstrating the adequacy of the design of the nuclear facility.
  - 6(*h*), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, 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 *General Nuclear Safety and Control Regulations* 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.
- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraphs:
  - 3(*a*), a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;
  - 3(*b*), plans showing the location, perimeter, areas, structures and systems of the nuclear facility;
  - 6(*a*), a description of the structures at the nuclear facility, including their design and their design operating conditions;
  - 6(*b*), a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;
  - 6(*c*), a final safety analysis report demonstrating the adequacy of the design of the facility; and
  - 6(*d*), proposed measures, policies, methods and procedures for operating and maintaining the facility.

Fitness for Service

The regulatory foundation for the recommendation(s) associated with fitness for service includes the following:

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 6(*d*), the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

Radiation Protection

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

- The *General Nuclear Safety and Control Regulations* 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 *Radiation Protection Regulations*.
  - 3(1)(*f*), any proposed action level for the purpose of section 6 of the *Radiation Protection Regulations*.
- The *Radiation Protection Regulations*

- The *Class I Nuclear Facilities Regulations* require that an application for a licence to operate a Class I nuclear facility shall contain, under paragraphs:
  - 6(*e*), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.
  - 6(*h*), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measure that will be taken to prevent or mitigate those effects.

Conventional Health and Safety

The regulatory foundation for the recommendation(s) associated with Conventional Health and Safety includes the following:

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 3(*f*), the proposed worker health and safety policies and procedures.
- BRR's activities and operations must comply with the *Canada Labour Code*, Part II: *Occupational Health and Safety*.

Environmental Protection

The regulatory foundation for the recommendation(s) associated with Environmental Protection includes the following:

- The *General Nuclear Safety and Control Regulations*, 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 *Radiation Protection Regulations* prescribe dose limits for the general public, which under Subsection 1(3) is 1 mSv per calendar year.
- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraphs:
  - 3(*e*), the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on.
  - 3(*g*), the proposed environmental protection policies and procedures.
  - 3(*h*), the proposed effluent and environmental monitoring programs.
  - 6(*e*), the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.
  - 6(*h*), the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects.

- 6*(i)*, the proposed location of points of release, 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 their physical, chemical and radiological characteristics.
- 6*(j)*, the proposed measures to control releases of nuclear substances and hazardous substances into the environment.

Emergency Management and Fire Protection

The regulatory foundation for the recommendation(s) associated with Emergency Management and Response includes the following:

- 12(1)(c) of the *General Nuclear Safety and Control Regulations* states that every licensee shall "take all reasonable precautions to protect the environment and the health and safety of persons and to maintain security".
- 12(1)(f) of the *General Nuclear Safety and Control Regulations* states that every licensee shall "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".
- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 6(*k*) information on the licensee's 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 national security, including measures to:
    - Assist offsite authorities in planning and preparing to limit the effects of an accidental release;
    - Notify offsite authorities of an accidental release or the imminence of an accidental release;
    - Report information to offsite authorities during and after an accidental release;
    - Assist offsite authorities in dealing with the effects of an accidental release; and
    - Test the implementation of the measures to prevent or mitigate the effects of an accidental release.

Waste Management

The regulatory foundation for the recommendation(s) associated with Waste Management includes the following:

- The *General Nuclear Safety and Control Regulations* require that an application for a licence include, under paragraph:
  - 3(1)(*j*), the name, quantity, form 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.

Security

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

- It is a requirement of all Class I licensees to comply with the *Nuclear Security Regulations*.

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 *General Nuclear Safety and Control Regulations* under paragraph 12(1)(i) that each licensee take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement, where the applicable agreements are:
  - 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.

Packaging and Transport

The regulatory foundation for the recommendation(s) associated with Packaging and Transport includes the following:

- The *Packaging and Transport of Nuclear Substances Regulations, 2015*; and
- Transport Canada's *Transportation of Dangerous Goods Regulations*.

Decommissioning Strategy and Financial Guarantees

The regulatory foundation for the recommendation(s) associated with BRR's Decommissioning Strategy and Financial Guarantees includes:

- The *General Nuclear Safety and Control Regulations* require that an application for a licence shall contain, under paragraph:

- 3(1)(*l*), a description of any proposed financial guarantee relating to the activity to be licensed.

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 3(*k*), the proposed plan for the decommissioning of the nuclear facility or of the site.

Licensee's Public Information Program

- The *Class I Nuclear Facilities Regulations* require that an application for a licence shall contain, under paragraph:
  - 3(*j*), information on the licensee's public information program.

C.2 Detailed Summary of CNSC Assessment of Application

CNSC staff's assessment of Cameco's licence application 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 *Nuclear Safety and Control Act* and its 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 in order to address CNSC requirements. Additional information and clarifications on the application and supporting documents was provided by Cameco and is considered part of the application.

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;	Application Section 1.1 and 1.3 Application Cover Letter	Y	Y	Y
(b) the activity to be licensed and its purpose;	Application Sections 1.3 and 2.3 Facility Licensing Manual	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?**
(c) the name, maximum quantity and form of any nuclear substance to be encompassed by the licence;	Application Sections 1.3, 2.3 and 2.4	Y	Y	Y
(d) a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence;	Application Sections 1.3 and 2.3	Y	Y	Y
(e) the proposed measures to ensure compliance with the *Radiation Protection Regulations*, the *Nuclear Security Regulations* and the *Packaging and Transport of Nuclear Substances Regulations, 2015;*	Documents referenced in application appendix 2 Supporting Documents Facility Licencing Manual	Y	Y	Y
(f) any proposed action level for the purpose of section 6 of the *Radiation Protection Regulations*;	Application Sections 4.7.6, 4.7.8, 4.7.9	Y	Y	Y
(g) the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information;	Application Section 4.7 and 4.12 Supporting Documents - Facility Licencing Manual	Y	Y	Y
(h) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;	Application Sections 4.12	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?**
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	Application Sections 4.4, 4.7, 4.9 and 4.11 Supporting Documents - Facility Licencing Manual, Derived Release Limit, Environmental Risk Assessment, Safety Analysis Report	Y	Y	Y
(j) 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;	Application Sections 4.4 and 4.11 Supporting Documents - Facility Licencing Manual, Safety Analysis Report	Y	Y	Y
(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;	Application Sections 2.1 and 4.1.1 Supporting Documents - Facility Licencing Manual	Y	Y	Y
(l) a description of any proposed financial guarantee relating to the activity to be licensed; and	Application Sections 2.5 and 4.11.3 Supporting Documents – Preliminary Decommissioning Plan	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?**
(m) any other information required by the *Act* or the regulations made under the *Act* for the activity to be licensed and the nuclear substance, nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence.	All relevant information is contained within the application, the facility licensing manual and supporting documents referenced in the application and the facility licensing manual.	Y	Y	Y

Pursuant to Subsection 3(1.1) of the *General Nuclear Safety and Control Regulations* Other Information Requested by CNSC Staff	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(1.1) The Commission or a designated officer authorized under paragraph 37(2)(c) of the *Act* may require any other information that is necessary to enable the Commission or the designated officer to determine whether the applicant: (a) is qualified to carry on the activity to be licensed; or (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of	As required	Y	Y	Y

Pursuant to Subsection 3(1.1) of the *General Nuclear Safety and Control Regulations* Other Information Requested by CNSC Staff	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
national security and measures required to implement international obligations to which Canada has agreed.				

Pursuant to Section 15 of the *General Nuclear Safety and Control Regulations* Obligations – Representatives of Applicants and Licensees	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
5 An application for the renewal of a licence shall contain:				
(a) the information required to be contained in an application for that licence by the applicable regulations made under the Act; and	Application and identified supporting documentation	Y	Y	Y
(b) A statement identifying the changes in the information that was previously submitted.	Not applicable	-	-	-

Pursuant to Section 15 of the *General Nuclear Safety and Control Regulations* Obligations – Representatives of Applicants and Licensees	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
15 Every applicant for a licence and every licensee shall notify the Commission of:				

Pursuant to Section 15 of the *General Nuclear Safety and Control Regulations* Obligations – Representatives of Applicants and Licensees	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(a) the persons who have authority to act for them in their dealings with the Commission;	Application Sections 2.1 and 4.1.1 Supporting Document – Facility Licensing Manual Sufficiency Check Response	Y	Y	Y
(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; and	Application Sections 2.1 and 4.1.1 Supporting Document – Facility Licensing Manual Sufficiency Check Response	Y	Y	Y
(c) any change in the information referred to in paragraphs (a) and (b), within 15 days after the change occurs.	Facility Licensing Manual	Y	Y	Y

Pursuant to Section 3 of the *Class I Nuclear Facilities Regulations* Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
3 An application for a licence in respect of a Class I nuclear facility, other than a licence to abandon, shall contain the following information in addition to the information required by Section 3 of the *General Nuclear Safety and Control Regulations*:				

Pursuant to Section 3 of the *Class I Nuclear Facilities Regulations* Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(a) a description of the site of the activity to be licensed, including the location of any exclusion zone and any structures within that zone;	Application Section 2.2 Sufficiency Check Response	Y	Y	Y
(b) plans showing the location, perimeter, areas, structures and systems of the nuclear facility;	Application Section 2.2 Sufficiency Check Response	Y	Y	Y
(c) evidence that the applicant is the owner of the site or has authority from the owner of the site to carry on the activity to be licensed;	Sufficiency Check Response - Deeds and Leases for the BRR	Y	Y	Y
(d) the proposed management system for the activity to be licensed, including measures to promote and support safety culture;	Application Section 4.1 Supporting Documents – Facility Licensing Manual	Y	Y	Y
(d.1) the proposed human performance program for the activity to be licensed, including measures to ensure workers' fitness for duty;	Application Section 4.2 Supporting Documents – Facility Licensing Manual	Y	Y	Y
(e) the name, form, characteristics and quantity of any hazardous substances that may be on the site while the activity to be licensed is carried on;	Application Section 4.4 Supporting Documents – Facility Licencing Manual, Safety Analysis Report, Environmental Risk Assessment, Derived Release Limit	Y	Y	Y

Pursuant to Section 3 of the *Class I Nuclear Facilities Regulations* Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(f) the proposed worker health and safety policies and procedures;	Application Section 4.8	Y	Y	Y
(g) the proposed environmental protection policies and procedures;	Application Section 4.9	Y	Y	Y
(h) the proposed effluent and environmental monitoring programs;	Application Section 4.9	Y	Y	Y
(i) if the application is in respect of a nuclear facility referred to in paragraph 2(*b*) of the *Nuclear Security Regulations*, the information required by section 3 of those Regulations;	Not applicable	-	-	-
(j) the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed; and	Application Section 2.4	Y	Y	Y
(k) the proposed plan for the decommissioning of the nuclear facility or of the site.	Application Sections 2.5 and 4.11.3 Supporting Documents – Facility Licencing Manual, Preliminary Decommissioning Plan	Y	Y	Y

Pursuant to Section 6 of the *Class I Nuclear Facilities Regulations* Licence Applications – Licence to Operate	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
6 An application for a licence to operate a Class I nuclear facility shall contain the following information in addition to the information required by section 3:				
(a) a description of the structures at the nuclear facility, including their design and their design operating conditions;	Applications Sections 2.2, 2.3, 4.4, 4.5 and 4.6 Supporting documents – Facility Licencing Manual, Safety Analysis Report	Y	Y	Y
(b) a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;	Applications Sections 2.2, 2.3, 4.4, 4.5 and 4.6 Supporting documents – Facility Licencing Manual, Safety Analysis Report	Y	Y	Y
(c) a final safety analysis report demonstrating the adequacy of the design of the nuclear facility;	Applications Section 4.4 Supporting documents – Facility Licencing Manual, Safety Analysis Report	Y	Y	Y
(d) the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility;	Application Sections 4.1, 4.2, 4.3, 4.5 and 4.6 Supporting Documents – Facility Licencing Manual	Y	Y	Y
(e) the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances;	Application Sections 4.2, 4.3, 4.7 and 4.14 Supporting Documents – Facility Licencing Manual	Y	Y	Y

Pursuant to Section 6 of the *Class I Nuclear Facilities Regulations* Licence Applications – Licence to Operate	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(f) the proposed measures to facilitate Canada's compliance with any applicable safeguards agreement;	Application Section 4.13 Supporting documents – Facility Licencing Manual	Y	Y	Y
(g) the proposed commissioning program for the systems and equipment that will be used at the nuclear facility;	Application Sections 4.1 and 4.5 Supporting documents – Facility Licencing Manual	Y	Y	Y
(h) the effects on the environment and the health and safety of persons that may result from the operation and decommissioning of the nuclear facility, and the measures that will be taken to prevent or mitigate those effects;	Application Sections 4.4, 4.7 and 4.9 Supporting Documents – Facility Licensing Manual, Environmental Risk Assessment, Safety Analysis Report, Derived Release Limit	Y	Y	Y
(i) the proposed location of points of release, 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 their physical, chemical and radiological characteristics;	Application Sections 4.4 and 4.9 Supporting Documents – Facility Licensing Manual, Environmental Risk Assessment, Safety Analysis Report, Derived Release Limit	Y	Y	Y

Pursuant to Section 6 of the *Class I Nuclear Facilities Regulations* Licence Applications – Licence to Operate	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(j) the proposed measures to control releases of nuclear substances and hazardous substances into the environment;	Application Sections 4.4 and 4.9 Supporting Documents – Facility Licensing Manual, Environmental Risk Assessment, Safety Analysis Report, Derived Release Limit	Y	Y	Y

Pursuant to Section 6 of the *Class I Nuclear Facilities Regulations* Licence Applications – Licence to Operate	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(k) 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 national security, including measures to: (i) assist off-site authorities in planning and preparing to limit the effects of an accidental release; (ii) notify off-site authorities of an accidental release or the imminence of an accidental release; (iii) report information to off-site authorities during and after an accidental release; (iv) assist off-site authorities in dealing with the effects of an accidental release; and (v) test the implementation of the measures to prevent or mitigate the effects of an accidental release.	Application Sections 4.4, 4.9 and 4.10 Supporting Documents – Facility Licensing Manual, Environmental Risk Assessment, Safety Analysis Report, Derived Release Limit	Y	Y	Y

Pursuant to Section 6 of the *Class I Nuclear Facilities Regulations* Licence Applications – Licence to Operate	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(l) the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility, including measures to alert the licensee to such acts;	Application 4.12	Y	Y	Y
(m) the proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the requalification of workers; and	Application 4.2 Supporting Documents – Facility Licencing Manual	Y	Y	Y
(n) the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.	Application 4.2 Supporting Documents – Facility Licencing Manual	Y	Y	Y

Pursuant to Section 3 of the *Nuclear Substances and Radiation Devices Regulations*: Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
3(1) An application for a licence in respect of a nuclear substance or a radiation device, other than a licence to service a radiation device, shall contain the following information in addition to the information required by section 3 of the *General Nuclear Safety and Control Regulations*:				
(a) the methods, procedures and equipment that will be used to carry on the activity to be licensed;	Application Sections 2.3, 4.4, 4.7, 4.9 and 4.10 Supporting documents – Facility Licencing Manual	Y	Y	Y
(b) the methods, procedures and equipment that will be used while carrying on the activity to be licensed, or during and following an accident, to:				
(i) monitor the release of any radioactive nuclear substance from the site of the activity to be licensed;	Application Sections 2.3.3, 4.7 and 4.9 Supporting documents – Facility Licencing Manual	Y	Y	Y
(ii) detect the presence of and record the radiation dose rate and quantity in becquerels of radioactive nuclear substances at the site of the activity to be licensed;	Application Sections 2.3.3, 4.7 and 4.9 Supporting documents – Facility Licencing Manual	Y	Y	Y

Pursuant to Section 3 of the *Nuclear Substances and Radiation Devices Regulations*: Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(iii) limit the spread of radioactive contamination within and from the site of the activity to be licensed; and	Application Sections 2.3.3, 4.7 and 4.9 Supporting documents – Facility Licencing Manual	Y	Y	Y
(iv) decontaminate any person, site or equipment contaminated as a result of the activity to be licensed.	Application Sections 2.3.3, 4.7 and 4.9 Supporting documents – Facility Licencing Manual	Y	Y	Y
(c) a description of the circumstances in which the decontamination referred to in subparagraph (b)(iv) will be carried out;	Application Sections 4.4, 4.7, 4.9, 4.10 and 4.11 Supporting documents – Facility Licencing Manual	Y	Y	Y
(d) the proposed location of the activity to be licensed, including a description of the site;	Application Section 2.2 Sufficiency Check Response	Y	Y	Y
(e) the roles, responsibilities, duties, qualifications and experience of workers;	Application Section 4.2	Y	Y	Y
(f) the proposed training program for workers;	Application Section 4.2	Y	Y	Y
(g) the proposed instructions for dealing with accidents, including fires and spills, in which the nuclear substance may be involved;	Application Sections 4.4, 4.7, 4.9, 4.10 Supporting Documents - Facility Licencing Manual	Y	Y	Y
(h) the proposed inspection program for the equipment and systems that will be used to carry on the activity to be licensed;	Application Sections 4.4, 4.7, 4.9, 4.10 Supporting Documents - Facility Licencing Manual	Y	Y	Y

Pursuant to Section 3 of the *Nuclear Substances and Radiation Devices Regulations*: Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(i) the methods, procedures and equipment that will be used to calibrate radiation survey meters in accordance with these Regulations;	Application Section 2.3.3 and 4.7	Y	Y	Y
(j) the methods, procedures and equipment that will be used to calibrate and verify the calibration of dosimeters referred to in paragraphs 30(3)(d) and (e);	Application Sections 2.3.3 and 4.7	Y	Y	Y
(k) the methods, procedures and equipment that will be used to conduct the leak tests and surveys required by these Regulations;	Application Sections 2.3.3 and 4.7	Y	Y	Y
(l) where the application is in respect of a nuclear substance that is an unsealed source and that is to be used in a room, the proposed design of the room;	Application Sections 2.3.3 and 4.7	Y	Y	Y
(m) if the application is in respect of a nuclear substance that is contained in a radiation device, the brand name and model number of the radiation device, and the quantity of the devices;	Application Sections 2.3.3 and 4.7	Y	Y	Y
(n) where the application is in respect of Category I, II or III nuclear material, as defined in section 1 of the *Nuclear Security Regulations*:	Not applicable	-	-	-

Pursuant to Section 3 of the *Nuclear Substances and Radiation Devices Regulations*: Licence Applications – General Requirements	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
(i) the measures that will be taken to prevent nuclear criticality; and	Not applicable	-	-	-
(ii) the information required by section 3 or 4 of the *Nuclear Security Regulations*, as applicable.	Not applicable	-	-	-
(o) if the applicant will be manufacturing or distributing radiation devices referred to in paragraph 5(1)(c) or section 6 or 7, or check sources mentioned in section 8.1, the proposed procedure for the disposal of each radiation device or check source or for its return to the manufacturer.	Not applicable	-	-	-

Pursuant to Part 2 of the *Nuclear Security Regulations*: PART 2 SECURITY OF NUCLEAR FACILITIES LISTED IN SCHEDULE 2 – LICENCE APPLICATIONS	**Location in Application or Supporting Document(s) as Noted by Cameco**	**Complete?**	**Sufficient?**	**Adequate?**
41 An application for a licence in respect of a nuclear facility shall contain, in addition to the information required by sections 3 to 8 of the *Class I Nuclear Facilities Regulations*, a description of the physical protection measures to be taken to ensure compliance with sections 42 to 48.	Application Section 4.12	Y	Y	Y

C.3 Technical Basis

The technical basis for the recommendations presented in this CMD are listed in the table below.

BRR - Applicable Standards and Codes per Safety and Control Area

SCA	Document Title	Sufficient?	Adequate?
Management System	CSA N286-12 (reaffirmed 2017): *Management System Requirements for Nuclear Facilities*	Y	Y
	CNSC REGDOC-2.1.2 (2018): *Safety Culture*	Y	Y
Human Performance Management	CNSC REGDOC-2.2.2 (2016): *Personnel Training, Version 2*	Y	Y
Operating Performance	CNSC REGDOC-3.1.2 (2018): *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*	Y	Y
Physical Design	CSA B51 (2019): *Boiler Pressure Vessel and Pressure Piping Code*	Y	Y
	CSA N393-13 (R2018): *Fire Protection for facilities that process, store and handle nuclear substances*	Y	Y
	NRCC 56190 (2015): *National Building Code of Canada*	Y	Y
	NRCC 56192 (2015): *National Fire Code of Canada*	Y	Y

SCA	Document Title	Sufficient?	Adequate?
Fitness for Service	CSA N393-13 (R2018): *Fire Protection for facilities that process, handle or store nuclear substances*	Y	Y
	NRCC 56192 (2015): *National Fire Code of Canada*	Y	Y
Radiation Protection	CNSC REGDOC-3.1.2 (2018): *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*	Y	Y
Conventional Health and Safety	CSA Z94.4 (2018), *Selection, Use and Care of Respirators*	Y	Y
Environmental Protection	CSA N288.1 (R2019): *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities*	Y	Y
	CSA N288.4 (R2015): *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*	Y	Y
	CSA N288.5 (R2016): *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*	Y	Y
	CSA N288.6 (R2017): *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*	Y	Y
	CSA N288.8 (2017): *Establishing and implementing action levels for releases to the environment from nuclear facilities*	Y	Y
	CNSC REGDOC-3.1.2 (2018): *Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*	Y	Y
	CNSC REGDOC-2.9.1 (2013): *Environmental Protection: Policies, Programs and Procedures*	Y	Y
Emergency Management and Fire Protection	CNSC REGDOC-2.10.1 (2016): *Nuclear Emergency Preparedness and Response*	Y	Y
	CSA N393-13 (R2018): *Fire Protection for facilities that process, handle or store nuclear substances*	Y	Y
	NRCC 56190 (2015): *National Building Code of Canada*	Y	Y
	NRCC 56192 (2015): *National Fire Code of Canada*	Y	Y

SCA	Document Title	Sufficient?	Adequate?
Waste Management	CSA N292.0-14 (2014): *General Principles for the Management of Radioactive Waste and Irradiated Fuel*	Y	Y
	CSA N292.3-14 (2014): *Management of Low- and Intermediate –level Radioactive Waste*	Y	Y
	CSA N294-09 (2019): *Decommissioning of Facilities Containing Nuclear Substances*	Y	Y
	CNSC G-219, *Decommissioning Planning for Licensed Activities*	Y	Y
Security	CNSC REGDOC-2.12.3 (2020): Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	Y	Y
Safeguards	CNSC REGDOC-2.13.1 (2018): *Safeguards and Nuclear Material Accountancy*	Y	Y
Public Information Program	CNSC REGDOC-3.2.1 (2018): *Public Information and Disclosure*	Y	Y
Financial Guarantee	CNSC G-206 (2000): *Financial Guarantees Guide for the Decommissioning of Licensed Activities*	Y	Y

D. SAFETY AND CONTROL AREA FRAMEWORK

D.1 Safety and Control Areas Defined

The safety and control areas identified in section 2.2, and discussed in summary 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 licensee staff is sufficient in number in all relevant job areas and that licensee staff have the necessary knowledge, skills, procedures and tools in place to safely carry out their duties.
	Operating Performance	This includes an overall review of the conduct of the licensed activities and the activities that enable effective performance.
Facility and Equipment	Safety Analysis	Maintenance of the safety analysis that supports that 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.
	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.

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	**Safety and Control Area**	**Definition**
	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 includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.
Core Control Processes	Radiation Protection	Covers the implementation of a radiation protection program in accordance with the Radiation Protection Regulations. The program must ensure that contamination levels and radiation doses received by individuals are monitored, controlled and maintained ALARA.
	Conventional Health and Safety	Covers the implementation of a program to manage workplace safety hazards and to protect personnel and equipment.
	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 exercise participation.
	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. Also covers the planning for decommissioning.
	Security	Covers the programs required to implement and support the security requirements stipulated in the regulations, in their licence, in orders, or in expectations for their facility or activity.
	Safeguards and Non-Proliferation	Covers the programs and activities required for the successful implementation of the obligations arising from the Canada/IAEA safeguards agreements as well as all other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons*.

SAFETY AND CONTROL AREA FRAMEWORK		
Functional Area	**Safety and Control Area**	**Definition**
	Packaging and Transport	Programs that cover the safe packaging and transport of nuclear substances and radiation devices to and from the licensed facility.

D.2 Specific Areas for Uranium Processing Facilities

The following table identifies the specific areas that comprise each SCA for a uranium processing facility as applicable for this licence application:

SPECIFIC AREAS FOR URANIUM PROCESSING FACILTIES		
Functional Area	**Safety and Control Area**	**Specific Areas**
Management	Management System	▪ Management System ▪ Organization ▪ Performance Assessment, Improvement and Management Review ▪ Change Management ▪ Safety Culture ▪ Records Management
	Human Performance Management	▪ Human Performance Programs ▪ Personnel Training ▪ Work organization and job design
	Operating Performance	▪ Conduct of Licensed Activity ▪ Procedures ▪ Reporting and Trending
Facility and Equipment	Safety Analysis	▪ Deterministic Safety Analysis ▪ Hazard Analysis
	Physical Design	▪ Design Governance ▪ Site Characterization ▪ Facility Design ▪ Structure Design ▪ System Design
	Fitness for Service	▪ Equipment Fitness for Service/Equipment Performance ▪ Maintenance ▪ Ageing Management ▪ Periodic Inspection and Testing
Core Control Processes	Radiation Protection	▪ Application of ALARA ▪ Worker Dose Control ▪ Radiation Protection Program Performance ▪ Radiological Hazard Control

SPECIFIC AREAS FOR URANIUM PROCESSING FACILTIES		
Functional Area	**Safety and Control Area**	**Specific Areas**
	Conventional Health and Safety	▪ Performance ▪ Practices ▪ Awareness
	Environmental Protection	▪ Effluent and Emissions Control (releases) ▪ Environmental Management System (EMS) ▪ Assessment and Monitoring ▪ Protection to the Public ▪ Environmental Risk Assessment (ERA)
	Emergency Management and Fire Protection	▪ Nuclear Emergency Preparedness and Response ▪ Fire Emergency Preparedness and Response ▪ Fire Protection
	Waste Management	▪ Waste Characterization ▪ Waste Minimization ▪ Waste Management Practices ▪ Decommissioning Plans
	Security	▪ Facilities and Equipment ▪ Response Arrangements ▪ Security Practices
	Safeguards and Non-Proliferation	▪ Nuclear Material Accountancy and Control ▪ Access and Assistance to the IAEA ▪ Operational and Design Information ▪ Safeguards Equipment, Containment and Surveillance ▪ Import and Export
	Packaging and Transport	▪ Package Design and Maintenance ▪ Packaging and Transport

E. SUPPORTING DETAILS

E.1 Radiation Protection

Action level exceedances, pursuant to BRR's RP program, reported to the CNSC (2012-2020)

Year	Parameter	Description
2012	**Exceedance of the monthly dosimetry wearing period action level of 2 mSv whole body dose**	In May 2012, a worker's dosimeter recorded a whole body dose of 2.3 mSv. Cameco's investigation revealed that the worker had not been routinely returning their dosimeter to the dosimeter rack at the end of their shift. The majority of the dose recorded on the dosimeter was deemed not personal, and a dose change request was pursued by Cameco and approved by the CNSC. The worker was coached on the proper practices related to the use and storage of dosimeters.
	Exceedance of routine weekly urine sample action level of 63 µg Uranium/litre of urine (µg U/L)	In June 2012, a significant contamination event occurred, where upon opening a pressurized drum of UO_3, a plume of approximately 26 kg of the uranium product entered a work area and contaminated a worker. The event resulted in a worker's urine sample having a concentration of 15,540 µg U/L. The committed effective dose to the worker was determined to be approximately 1.7 mSv. Although the kidney burden of the worker exceeded the kidney toxicity guideline for uranium[2], medical diagnostic tests has shown normal kidney function. This event resulted in several improvements in drum handling and processing operations at BRR, to ensure that the incident will not be repeated. For example, Cameco implemented design improvements to the auger sampling process station to ensure the radiation safety of workers. *This event is discussed in section 3.3., Operating Performance.*
	Exceedance of monthly skin dose action level of 10 mSv	In October 2012, a worker's dosimeter recorded a skin dose of 14.7 mSv. Cameco's investigation concluded that the dose was a result of the worker spending more time than usual at the bottom floor below the concentrated raffinate storage tanks due to operating problems in the area at the time. Corrective actions included reinforcing the ALARA principle with the worker, including the need to minimize time spent in high dose areas.

[2] *Uranium Intake – Dose Assessment Guide Report of the CNSC Working Group on Internal Dosimetry Draft 7*. Canadian Nuclear Safety Commission 2002-November-07.

2013	**Exceedance of monthly skin dose action level of 10 mSv**	In February 2013, a worker's dosimeter recorded a skin dose of 13.9 mSv. Cameco's investigation revealed that the worker was working in a higher dose rate area during the month, which also contributed to the elevated result. This area has the highest radiation fields of all processing areas at BRR. Historically, the majority of workers who have exceeded a radiological dose action level have worked at least a portion of their time in this area. Therefore, the dose was determined to be representative of the worker's work activities.
	Exceedance of monthly skin dose action level of 10 mSv	In June 2013, a worker's dosimeter recorded a skin dose of 14.6 mSv. Although Cameco's investigation could not identify a definitive reason for the dose, the worker was coached on the proper practices related to the use and storage of dosimeters.
2014	**Exceedance of monthly skin dose action level of 10 mSv**	In February 2014, a worker's dosimeter recorded a skin dose of 10.6 mSv. Cameco's investigation revealed that the dose was representative of the worker's work activities, and no specific corrective actions were implemented. The worker had been working in an area that has the highest radiation fields of all processing areas at BRR. Historically, the majority of workers who have exceeded a radiological dose action level have worked at least a portion of their time in this area.
	Exceedance of quarterly whole body dose action level of 0.7 mSv	In the first quarter of 2014, a worker's dosimeter recorded a whole body dose of 0.77 mSv. Cameco's investigation determined that the dose was representative of the worker's work activities during the quarter, due to operational issues requiring the worker to spend more time than usual in a higher dose rate area at BRR. The worker was coached on ALARA principles of time, distance and shielding.
	Exceedance of monthly skin dose action level of 10 mSv	In April 2014, the same worker that was subject to the February 2014 skin dose action level exceedance recorded a skin dose of 12.2 mSv. Cameco's investigation determined that the dose was again representative of the worker's work activities during the month, for similar reasons as described in the first skin dose action level exceedance that occurred in February 2014.

	Exceedances of (1) monthly whole body dose action level of 2 mSv, and (2) monthly skin dose action level of 10 mSv	In May 2014, a worker's dosimeter recorded (1) a whole body dose of 2.2 mSv and (2) a skin dose of 47.1 mSv. Cameco's investigation revealed that these doses were mostly not personal. The dosimeter was not being returned to the storage rack at the end of the worker's shift. The dosimeter had also been lost for a period of time in a processing area, and was not reported as lost. When it was subsequently found, the worker continued to wear the dosimeter. The worker was coached on the proper practices related to the use and storage of dosimeters. Cameco pursued dose change requests, which were approved by the CNSC.
	Exceedance of the monthly whole body dose action level of 2 mSv	In June 2014, a worker's dosimeter recorded a whole body dose of 2.5 mSv. Cameco's investigation could not identify any specific reason to explain the dose, and therefore no specific corrective action could be taken. However, Cameco reviewed the proper practices related to the use and storage of dosimeters with all workers, and radiation safety training packages related to the use and storage of dosimeters were also reviewed to ensure these key points are emphasized in future refresher training activities.
	Exceedance of monthly whole body dose action level of 2 mSv	In December 2014, a worker's dosimeter recorded a whole body dose of 2.9 mSv. The dose was flagged as an irregular exposure by the licensed dosimetry service provider, which means that the dosimeter was partially shielded, exposed at an extreme angle or exposed from the back. Cameco's investigation also revealed poor handling and storage practices of the worker's dosimeter. A dose change request was pursued by Cameco and approved by the CNSC.
2015	**No action level exceedances reported**	
2016	**No action level exceedances reported**	
2017	**Exceedance of monthly whole body dose action level of 2 mSv**	In June 2017, a worker's dosimeter recorded a whole body dose of 4.6 mSv. Cameco's investigation determined that the dose was not personal due to a review of the worker's work activities. An irregular exposure of the dosimeter was also identified by the dosimetry service provider. The irregular exposure indicated that the response of the dosimeter did not correspond to any known radiation source. A dose change request was pursued by Cameco and approved by the CNSC.

2018	**No action level exceedances reported**	
2019	**Exceedances of (1) quarterly whole body dose action level of 0.7 mSv, and (2) quarterly skin dose action level of 6 mSv**	In the second quarter of 2019, a worker's dosimeter recorded (1) a whole body dose of 0.72 mSv and (2) a skin dose of 13.6 mSv. Cameco's investigation determined that the doses were mostly not personal due to the dosimeter being lost for a period of time in a processing area, where it was exposed to ionizing radiation. Cameco reviewed the worker's work practices during the quarter, and developed a more reasonable dose estimate. A dose change request was pursued by Cameco and approved by the CNSC.
2020	**Exceedance of the monthly skin dose action level of 15 mSv**	In July 2020, a worker's dosimeter recorded a skin dose of 26.4 mSv. Cameco's investigation determined that the dose was mostly not personal due to the dosimeter being lost for a period of time in a processing area. A dose change request was pursued by Cameco and approved by the CNSC.

PART TWO

Part Two provides all relevant information pertaining directly to the licence, including:

25. Any proposed changes to the conditions, licensing period, or formatting of an existing licence;
26. The proposed licence;
27. The proposed licence conditions handbook; and
28. The current licence.

PROPOSED LICENCE CHANGES

Overview

Cameco currently operates the BRR under a Nuclear Fuel Facility Operating Licence, FFOL-3632.00/2022. The proposed licence incorporates standardized licence conditions in a standard format.

Licence Conditions

The proposed licence incorporates the standardized licence conditions applicable to BRR as a uranium processing facility as developed by CNSC staff. One other notable change to the proposed Nuclear Fuel Facility Licence for BRR is described below:

- Packaging and transport have been removed as licencing activities from Part IV of the proposed licence. For BRR, these activities are not licenced activities as per the *Nuclear Safety and Control Act* and *Packaging and Transport of Nuclear Substances Regulations, 2015* (PTNSR 2015). Section 26 of the NSCA subjects Cameco to the PTNSR, where subsection 6 (1) states that a person may transport a nuclear substance without a licence issued under subsection 24 (2) of the Act for that purpose, except for six conditions (paragraphs 6 (1) (a) to (f) of the PTNSR 2015). CNSC staff have determined that the conditions that would require a licence under paragraphs 6 (1) (a) to (f) of the PTNSR 2015 do not apply to the BRR activities.

Licence Format

The existing licence, produced in 2012, is written in a different format than the current CNSC standard licences. The proposed licence for BRR is written in the current standardized format.

Licence Period

Cameco has requested a renewal of its licence for a period of 10 years. Based on CNSC staff's review of Cameco's application, performance history, and supporting information, CNSC staff recommend Cameco's request for a licence period of 10 years to the Commission. Over the proposed 10-year period, CNSC staff would provide regular reporting on regulatory oversight conducted at the BRR facility in public Commission proceedings.

PROPOSED LICENCE

e-Doc 6505924 (WORD)

e-Doc 6589208 (PDF)

DRAFT

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

NUCLEAR FUEL FACILITY LICENCE

CAMECO CORPORATION BLIND RIVER REFINERY

I) LICENCE NUMBER: FFL-3632.00/2032

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

III) LICENCE PERIOD: This licence is valid from **March 01, 2022** to **February 28, 2032**, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

(i) operate and modify the Cameco Corporation Blind River Refinery for the production of uranium trioxide from uranium ore concentrates located at 328 Eldorado Rd, Blind River, Ontario.

(ii) possess, transfer, use, process, import, manage, store and dispose of the nuclear substances that are required for, associated with, or arise from the activities described in (i);

(iii) possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i); and

(iv) modify the Cameco Blind River Refinery and commission equipment for the purpose of the increase in annual production capacity for the production of uranium trioxide from uranium ore concentrates described in (i).

V) EXPLANATORY NOTES:

(i) Nothing in this licence shall be construed to authorize non-compliance with any other applicable legal obligation or restriction.

(ii) 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 associated Regulations.

(iii) The Cameco Corporation Blind River Refinery Licence Conditions Handbook (LCH) provides compliance verification criteria used to verify compliance with the conditions set out in this licence. The LCH also provides information regarding applicable versions of documents and a process for version control of codes, standards or other documents that are used as compliance verification criteria.

VI) CONDITIONS:

The licensee shall comply with the following conditions, established pursuant to subsection 24(5) of the *Nuclear Safety and Control Act*.

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; and

(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 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 Operating 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.

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.

5.2 Pressure Boundary Program and Authorized Inspection Agency

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

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 seven days.

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 seven days.

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.

15. Nuclear Facility Specific

15.1 The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iv) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity.

SIGNED at OTTAWA, this day of February, 2022.

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

DRAFT LICENCE CONDITIONS HANDBOOK

e-Doc 6489135 (WORD)

e-Doc 6589348 (PDF)

DRAFT

Canada's Nuclear Regulator

e-Doc 6489135 (Word)
e-Doc 6589348 (PDF)

LICENCE CONDITIONS HANDBOOK

CAMECO BLIND RIVER REFINERY

Nuclear Fuel Facility Licence

FFL-3632.00/2032

Revision 0

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire
Canada

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Licence Conditions Handbook **Effective: Month day, 2022**

LCH-FFL-3632.00/2032

Cameco Blind River Refinery

Nuclear Fuel Facility Licence

FFL-3632.00/2032

SIGNED at OTTAWA this day of month 2022

_____

Andrew McAllister, Director

Nuclear Processing Facilities Division

Directorate of Nuclear Cycle and Facilities Regulation

CANADIAN NUCLEAR SAFETY COMMISSION

Revision History:

Effective Date	Revision	Word e-Doc and Version	Description of the Changes	CAF e-DOC
Month Day, 2022	0		Original Document	N/A

TABLE OF CONTENTS

INTRODUCTION

The general 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 Cameco performs the licensed activities at the Blind River Refinery (BRR) in accordance with the licensing basis for the BRR and the intent of the licence. The LCH should be read in conjunction with the licence.

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

The documents referenced in the LCH by e-Access numbers are not publicly available. The links provided in the LCH are references to the internal CNSC electronic filing system, and those documents cannot be opened from outside of the CNSC network.

Current versions of the licensing basis publications, licensee documents that require notification of change and guidance documents referenced in the LCH are tracked in the document *Cameco Blind River Refinery Written Notification Documents Tracking Sheet (Licence FFL-3632.00/2032)* (e-Doc 4601394*)*, which is controlled by the Nuclear Processing Facilities Division (NPFD) and is available to the licensee upon request.

Most CNSC documents referenced in the LCH are available through the CNSC website. Documents listed on CNSC website may contain prescribed information as defined by the *General Nuclear Safety and Control Regulations* (GNSCR). Information in these documents will be made available only to stakeholders with appropriate security clearance on a valid need to know.

The licensee documents referenced in the LCH are not publicly available; they contain proprietary information or prescribed information as defined by the GNSCR.

Domestic and international standards (in particular consensus standards produced by the CSA Group) are an important component of the CNSC's regulatory framework. Standards support the regulatory requirements established through the *Nuclear Safety and Control Act* (NSCA), its regulations and licences by setting out the necessary elements for acceptable design and performance at a regulated facility or a regulated activity. Standards are one of the tools used by the CNSC to evaluate whether licensees are qualified to carry out licensed activities.

The CNSC offers complimentary access to the CSA Group suite of nuclear standards through the CNSC website. This access platform allows interested stakeholders to view these standards online through any device that can access the Internet. Standards applicable to the licensees are documented in the CVC or guidance as appropriate.

This LCH has the two appendices:

- Appendix A, which provides definitions of terms and a list of acronyms used throughout this LCH.

- Appendix B, which provides a list of version controlled documents referenced in this LCH.

This licence authorizes the licensee to:

i. operate and modify the Cameco Corporation Blind River Refinery for the production of uranium trioxide from uranium ore concentrates located at 328 Eldorado Rd, Blind River, Ontario, (hereinafter "the facility");
ii. possess, transfer, use, process, import, manage, store and dispose of the nuclear substances that are required for, associated with, or arise from the activities described in (i);
iii. possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i); and
iv. modify the Cameco Blind River Refinery and commission equipment for the purpose of the increase in annual production capacity for the production of uranium trioxide from uranium ore concentrates described in (i).

Cameco Corporation is authorized to operate the facility. The facility is located about 5 km to the west of the Town of Blind River, Ontario on the north shore of Lake Huron. The plant layout drawings that describe the facility are written notification documents found under LC 5.1.

GENERAL

Licence Condition 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; and

(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:

The licensing basis sets the boundary conditions for acceptable performance at a regulated facility or activity, and thus establishes the basis for the CNSC's compliance program with respect of that regulated facility or activity. The degree to which the regulatory requirements are applied to Cameco facilities and activities should reflect their importance to the health and safety of persons, environment, national security, international obligations to which Canada has agreed, licensee's quality and economic expectations, the complexity of facility or activity, and the possible consequences if accidents occur or the activity is carried out incorrectly.

Where the LC requires the licensee to implement and maintain a particular program, the licensee documents that describe and implement the program are part of the licensing basis.

Compliance Verification Criteria:

Regulatory Role of the Licensing Basis

The licensing basis is established when the Commission renders its decision regarding the licence application. LC G.1 requires the licensee to conduct the licensed activities in accordance with the licensing basis. For activities that are not in accordance with the licensing basis, the licensee shall take action as soon as practicable to return to a state consistent with the licensing basis, taking into account the risk significance of the situation.

The licensing basis is not intended to unduly inhibit the ongoing management and operation of the facility or the licensee's ability to adapt to changing circumstances and continuously improve, in accordance with its management system.

Part (i) of the Licensing Basis

Part (i) of the licensing basis refers to applicable laws and regulations. There are many federal and provincial acts and regulations, and international laws, agreements, guidelines, etc., applicable to activities performed at Cameco's BRR.

The laws, regulations and international agreements for which CNSC has a regulatory role are:

- *Nuclear Safety and Control Act* (NSCA) and its Regulations
- *Impact Assessment Act* and its Regulations
- *Canadian Environment Protection Act*
- *Nuclear Liability and Compensation Act*
- *Transportation of Dangerous Goods Act* and its Regulations
- *Radiation Emitting Devices Act*
- *Access to Information Act*
- *Canada/IAEA Safeguards Agreements*
- *Canada Labour Code, Part II*
- Ontario Ministry of the Environment, Conservation and Parks Acts and Regulations
- Environment and Climate Change Canada Acts and Regulations

Part (ii) of the Licensing Basis

Part (ii) of the licensing basis refers to the conditions and the safety and control measures included in the licence and in the documents directly referenced in the licence.

Under the standardized format and content, the licence requires the licensee to implement and maintain certain programs. There are no documents directly referenced in the standardized BRR licence. For the purpose of a licence requirement, a program may be a series of documented, coordinated activities, not necessarily a single document.

Part (iii) of the Licensing Basis

Part (iii) of the licensing basis consists of the safety and control measures described in the licence application and in the documents in support of that licence application. The safety and control measures include important aspects of that documentation, as well as important aspects of analysis, design, operation, etc. They may be found in high-level, programmatic licensee documents but might also be found in lower-level, supporting licensee documentation. LC G.1 requires the licensee to conform to, and/or implement, all these safety and control measures.

Part (iii) of the licensing basis also includes the safety and control measures in the standards, codes and CNSC regulatory documents referenced in the application or in the licensee's supporting documentation. Note, however, this does not mean that all details in these referenced documents are part of the licensing basis; some of these documents may contain administrative, informative or guidance sections that are not considered to be part of the licensing basis.

Applicable licensee documents are listed in the LCH under the heading "Licensee Documents that Require Notification of Change". Applicable CNSC regulatory documents, CSA standards and other documents are listed in the LCH under the heading "Licensing Basis Publications". The documents listed in the LCH could cite other documents that also contain safety and control measures. Applicable licensing basis publications are listed in tables in this LCH 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 also explained under the most relevant LC.

Details that are not directly relevant to safety and control measures for facilities or activities authorized by the licence are excluded from the licensing basis. Details that are relevant to a different safety and control area (i.e., not the one associated with the main document), are only part of the licensing basis to the extent they are consistent with the main requirements for both safety and control areas.

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

CNSC Staff's Approach to Assessing the Licensing Basis for BRR

In accordance with LC G.2, Cameco will submit relevant documentation for CNSC staff review regarding proposed changes to the facility or its operation, including deviation from design, operating conditions, policies, programs and methods referred to in the licensing basis. This includes, but is not limited to changes to equipment, processes, supporting activities, specific licensee documentation or any other item considered a safety or control measure under the licensing basis. There are specific licensee documents listed in the LCH, which require written notification every time a new version of the document is approved by Cameco. CNSC staff will review the information submitted by Cameco to confirm Cameco`s assessment that the proposed change remains within the licensing basis. CNSC staff assess a proposed change as being within the licensing basis based on changes or impact on the overall safety at BRR. Cameco may proceed with the proposed initiatives if they are found to be within the licensing basis.

Any proposed activity, facility or other change, which CNSC staff consider to be outside the licensing basis, will be discussed with Cameco and should Cameco choose to proceed with the change, CNSC staff will submit the matter to the Commission for consideration. If the Commission grants approval to the change, it will become part of the licensing basis for BRR and will be reflected in updates to LCH as appropriate.

Licence Application Documents and Supporting Documents

Submission Date	Document Title	e-Doc
September 30, 2020	Cameco Corporation - Blind River Refinery Renewal of Licence FFOL-3632.0/2022 for a 10-year term – Cover Letter	6392010
September 30, 2020	Cameco Corporation – 2022 Licence Renewal Application for the Blind River Refinery	6392009
December 16, 2020	Cameco Blind River Refinery Response to CNSC Staff Sufficiency Check for the Blind River Refinery Licence Renewal Application	6448833

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC- 3.5.3	Regulatory Fundamentals	2018

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 CNSC related to licensee changes are discussed under LC G.2.

Licence Condition 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:

CNSC staff tracks the version history of licensee documents that require notification of change in document *Cameco Blind River Refinery Written Notification Documents Tracking Sheet (Licence FFOL-3632.00/2022)* (e-Doc 4331479) (with the exception of security-related documents).

The objective of the licensing basis, as defined in the LCH under LC G.1, is to set the boundary conditions for acceptable performance at the facility. The licensee is encouraged to make continuous improvements to their programs and documents throughout the licensing period as long as they remain within the licensing basis authorized by the Commission.

Compliance Verification Criteria:

Written notification is a physical or electronic communication from a person authorized to act on behalf of the licensee to the CNSC.

Under the licensee's management system, a change control process requires justifying changes and the review of changes by relevant stakeholders. Proposed changes with the potential to negatively impact designs, operating conditions, policies, programs, methods, or other elements that are integral to the licensing basis, are documented and written notification of the change shall be provided to the CNSC. Written notifications shall include a summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis (e.g., an evaluation of the impact on health, safety, security, the environment and Canada's international obligations). A copy of the revised document shall accompany the notification. All written notifications shall be transmitted to CNSC per established communications protocols.

Many changes for which the licensee shall notify the CNSC are captured as changes to licensee documents under part (iii) of the licensing basis. The LCH identifies specific documents that require written notification under the most relevant LC. However, other documents identified in the application or in the licensee's supporting documentation may require notification of change if they describe safety and control measures applicable to the licensing basis. For example, if a licensee document in the CVC refers to another document, including a third-party document, without citing the revision number of that document, if that document changes and the licensee uses the revised version, the licensee shall determine if it is necessary to notify the CNSC of the change.

The documents needed to support the licence application may include documents produced by third parties (e.g., reports prepared by third party contractors). Changes to these documents require written notification to the CNSC only if the new version continues to form part of the licensing basis. That is, if the licensee implements a new version of a document prepared by a third party, it shall inform the CNSC of the change(s), per LC G.2. On the other hand, if a third party has updated a certain document, but the licensee has not adopted the new version as part of its safety and control measures, the licensee is not required to inform the CNSC that the third party has changed the document.

Licensee documents listed in the CVC of the LCH are subdivided into groups having different requirements for notification of change.

Category	Definition
PN	Prior notification – The licensee shall submit the notice to the CNSC prior to implementing the change; typically, the requirement is to submit the proposed changes 30 days prior to planned implementation; however 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
NT	Notification - The licensee shall submit the notice at time of making the change

Notification of some proposed changes (i.e., engineered physical changes, new processes/activities for the facility) may not be best captured through an update to a licensee document. In these cases, a standalone submission may be made that includes the summary description of the change, the rationale for the change, expected duration (if not a permanent change), and a summary explanation of how the licensee has concluded that the change remains in accordance with the licensing basis.

Changes that are not clearly in the safe direction require further assessment of impact to determine if Commission approval is required in accordance with LC G.1.

Guidance:

For proposed changes that would not be in accordance with the licensing basis, the Guidance for LC G.1 applies.

Licence Condition G.3: Financial Guarantee

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

Preamble:

The *General Nuclear Safety and Control Regulations* requires that a licence application contain a description of any proposed financial guarantee relating to the activity to be licensed. 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 cost estimate for decommissioning should be based on the facility's most up-to-date preliminary decommissioning plans. The facility's current financial guarantee is covered by an irrevocable letter of credit for the full value of the estimated decommissioning cost.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
CNSC G-206	Financial Guarantees for the Decommissioning of Licensed Activities	2000	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
N/A	Blind River Refinery Preliminary Decommissioning Plan	PN

The licensee shall report annually to confirm that their financial guarantee for decommissioning remains, valid, in effect and sufficient to meet the decommissioning needs according to the current PDP. The licensee shall submit this report as part of the Annual Compliance Report, or at any time as the Commission may request.

Guidance:

None provided.

Licence Condition G.4: Public Information and Disclosure

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

Preamble:

The *Class I Nuclear Facilities Regulations* requires that an application for a licence contain the proposed program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the activity to be licensed.

The primary goal of a public information and disclosure program 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 the nuclear facilities are effectively communicated to the public. In addition, the program shall include a commitment to a disclosure protocol for ongoing, timely communication of information related to the licensed facility during the course of the licence period.

This LC requires the licensee to implement and maintain a public information and disclosure program to improve the public's level of understanding about Cameco's BRR and activities.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-3.2.1	Public Information and Disclosure	2018	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FSD-PGR-PIP-001	Public Information Program	NT

Guidance:

None provided.

SCA – MANAGEMENT SYSTEM

Licence Condition 1.1: Management System

The licensee shall implement and maintain a management system.

Preamble:

The *Class I Nuclear Facilities Regulations* require that a licence application contain information on the proposed management system for the activity to be licensed, including the measures to promote and support safety culture.

The *General Nuclear Safety and Control Regulations* requires that a licence application contain the applicant's organizational management structure, including the internal allocation of functions, responsibilities and authority.

CSA N286 *Management System Requirements for Nuclear Facilities* contains the requirements for a management system throughout the life cycle of a nuclear facility and extends to all safety and control areas.

CSA N286.0.1 *Commentary on N286-12, Management System Requirements for Nuclear Facilities* provides background information concerning certain clauses and requirements in CSA N286. This background information can help the user clarify the context of the CSA N286 requirements.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
CSA N286	Management System Requirements for Nuclear Facilities*	2012 (R2017)	Implemented
REGDOC-2.1.2	Safety Culture	2018	To be implemented by June 30, 2022

*This document is applicable to all LC's.

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
AM 100	Facility Licensing Manual*	PN
AM 400	Management Systems Program Manual*	PN
AM 37	Change Management Procedure	NT
PR 33	Design Control Procedure	NT

*This document is applicable to all LCs.

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.1.1	Management System	2019
CSA N286.0.1	Commentary on N286-12, Management System Requirements for Nuclear Facilities	2021

SCA – HUMAN PERFORMANCE MANAGEMENT

Licence Condition 2.1: Training Program

The licensee shall implement and maintain a training program.

Preamble:

This LC requires the licensee to develop and implement training programs for workers. It also provides the requirements regarding the program and processes necessary to support responsibilities of, qualifications and requalification training of persons at the nuclear facility.

As defined by the *General Nuclear Safety and Control Regulations*, a worker is a person who performs work that is referred to in a licence. This includes contractors and temporary employees. Training requirements apply equally to these types of workers as to the licensee's own employees. The GNSCR require that licensees ensure that there are a sufficient number of properly trained and qualified workers to conduct the licensed activities safely.

The *Class I Nuclear Facilities Regulations* require that licence applications include the proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the requalification of workers; and the results that have been achieved in implementing the program for recruiting, training and qualifying workers in respect of the operation and maintenance of the nuclear facility.

The *Class I Nuclear Facilities Regulations* require every licensee to keep a record of the status of each worker's qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the licence.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-2.2.2	Personnel Training, Version 2	2016	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
AM 300	Training Program Manual	PN

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.2.5	Minimum Staff Complement	2019

SCA – OPERATING PERFORMANCE

Licence Condition 3.1: Operating Program

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

Preamble:

The *Class I Nuclear Facilities Regulations* require that a licence application contain the following information: the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. The *Nuclear Substances and Radiation Devices Regulations* have requirements for records to be kept and retained for nuclear substances.

An operating program includes an up-to-date set of operating limits for the facility and activities authorized under the licence, including: production limits and limits for the possession, use, management, transfer, storage of nuclear substances, and an inventory of nuclear substances possessed under the licensees' operating licence.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
ET 110	Environmental Protection Program	PN
RS 100	Radiation Safety Program Manual	PN
RP 3.2.4	Radioisotope Source Control Procedure	PN

Nuclear Substances and Radiation Device

The licensee shall ensure the sealed sources are controlled (by maintaining an inventory of sealed sources, and tracking and reporting their transfer) in order to achieve the objectives of REGDOC-2.12.3, *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material*, Version 2.

The licensee shall notify CNSC staff prior to possessing sources with aggregate activity levels which meet or exceed Category 3 sources as defined in REGDOC-2.12.3.

Annual Production Limit

The annual production for the facility shall not exceed the following limit:

- 18,000 tonnes of uranium as uranium trioxide (UO_3).

Guidance:

None provided.

Licence Condition 3.2: Reporting Requirements

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 program for reporting information to the Commission. This includes compliance monitoring, operational performance, responses to unusual events, and notifications of various types.

The *Nuclear Safety and Control Act* and its applicable regulations describe reporting to the Commission or a person authorized by the Commission. Reporting requirements are found in sections 29-32 of the *General Nuclear Safety and Control Regulations* and section 27 of the NSCA.

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 other otherwise specified, the delegation of authority by the Commission to act as a person authorized by the Commission (Delegated Officer) is only applied to the incumbents in the following positions:

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

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	2018	Implemented

The annual compliance and performance report covering the period January 1 to December 31 shall be submitted to CNSC staff by March 31 each year.

The licensee shall submit a quarterly compliance report within eight weeks of the end of each quarter, covering the following areas:

- facility operations
- conventional health and safety
- radiation protection monitoring data
- environmental monitoring data
- public information program summary

Guidance:

None provided.

SCA – SAFETY ANALYSIS

Licence Condition 4.1: Safety Analysis Program

The licensee shall implement and maintain a safety analysis program.

Preamble:

The *General Nuclear Safety and Control Regulations* requires that a licence application contains information that includes a description and the results of any test, analysis or calculation performed to substantiate the information included in the application.

The *Class I Nuclear Facilities Regulations* requires that a licence application contains information that includes a final safety analysis report demonstrating the adequacy of the design of the nuclear facility, and the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility.

The implementation and maintenance of a safety analysis program includes a process to identify and assess hazards and risks on an ongoing basis. 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. The results of this process will be used to set objectives and targets and to develop preventative and protective measures.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
EP 200	BRR Safety Report	PN

The licensee shall maintain the safety analysis report to ensure they adequately consider the hazards associated with the facility. The safety analysis shall be a systematic evaluation of the potential hazards associated with the conduct of a proposed activity or facility and consider the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

The licensee shall establish and maintain a process to periodically review and revise existing risk assessments to ensure, at a minimum of every 5 years, new risks and lessons learned are incorporated into an updated safety analysis report. This report shall be provided to CNSC staff for review.

Guidance:

The licensee should establish and maintain one or more safety committees at the facility to periodically assess safety issues related to the operation and modification of the facility. These committees should have among their membership the necessary breadth of knowledge and experience to conduct these assessments. The results of these assessments should feed into the safety analysis report.

Guidance Documents

Document Number	Document Title	Version
IAEA SSR-4	Safety of Nuclear Fuel Cycle Facilities	2017

SCA – PHYSICAL DESIGN

Licence Condition 5.1: Design Program

The licensee shall implement and maintain a design program.

Preamble:

The *Class I Nuclear Facilities Regulations* require that a licence application contain the proposed measures, policies, methods and procedures to maintain the nuclear facility. The *Class I Nuclear Facilities Regulations* require that a licence application contain a description of the structures, systems and equipment, including the relevant design information for the facility.

A design program ensures that the design of the facility is managed using a well-defined systematic approach. This LC requires that the licensee implement and maintain a design program to confirm that safety-related systems, structures and components (SSC) and any modifications to them continue to meet their design basis given new information arising over time and taking changes in the external environment into account. It also confirms that SSCs continue to be able to perform their safety functions.

This LC requires that the licensee implement and maintain a design control process to ensure that design outputs (both interim and final) are reviewed, verified and validated against the design inputs and performance requirements, and to ensure that the design inputs are selected such that safety, performance and dependability of the design item are achieved.

CSA N393, *Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances* provides the minimum fire protection requirements for the design, construction, commissioning, operation, and decommissioning of facilities which process, handle, or store nuclear substances, and other hazardous substances that directly relate to the nuclear substances being regulated.

The *National Fire Code of Canada 2015* sets out technical provisions regulating:

(a) activities related to the construction, use or demolition of buildings and facilities;

(b) the condition of specific elements of buildings and facilities;

(c) the design or construction of specific elements of facilities related to certain hazards; and

(d) protection measures for the current or intended use of buildings.

The *National Building Code of Canada 2015* sets out technical provisions for the design and construction of new buildings. It also applies to the alteration, change of use and demolition of existing buildings.

Compliance Verification Criteria:

Licensing Basis Publications

Document Number	Document Title	Version	Implementation Date
NRCC 56190	National Building Code of Canada 2015	2015	Implemented
NRCC 56192	National Fire Code of Canada 2015	2015	Implemented
CSA N393	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
AM 37	Change Management Procedure	NT
PR 33	Design Control Procedure	NT
BRR700P-C-0002200-01	Facility Licensed Area Drawing	PN
BRR700P-C-0002200-02	Owned and Leased Property Boundaries Drawing	PN
N/A	Cameco's Response to Third-Party Engineering Assessment Report Correspondence	NT

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.5.1	General Design Considerations: Human Factors	2019

Licence Condition 5.2: Pressure Boundary Program and Authorized Inspection Agency

The licensee shall implement and maintain a pressure boundary program and have in place a formal agreement with an Authorized Inspection Agency.

Preamble:

A pressure boundary is a boundary of any pressure retaining vessel, system or component of a nuclear or non-nuclear system, where the vessel, system or component is registered or eligible for registration. This LC provides regulatory oversight with regards to the licensee's implementation of a pressure boundary program and holds the licensee responsible for all aspects of pressure boundary registration and inspections. A pressure boundary program is comprised of processes and procedures and associated controls that are required to ensure compliance with the requirements set out in CSA B51, *Boiler Pressure Vessel and Pressure Piping Code.*

This licence condition also ensures that an Authorized Inspection Agency (AIA) will be subcontracted directly by the licensee. An AIA is an organization recognized by the CNSC as authorized to register designs and procedures, perform inspections, and other functions and activities as defined by CSA B51 and its applicable referenced publications.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
CSA B51	Boiler, Pressure Vessel, and Pressure Piping Code	2019	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
AM 110	Quality Control Manual for TSSA Certificate of Authorization	NT
N/A	Authorized Inspection Agency Services Agreement	NT*
ES 39	Pressure Boundary Systems New Installations, Alterations and Repairs Procedure	NT
PHU 21	Pressure Safety Valve and Pressure Relief Valve Inspection, Test, Service and Repair Procedure	NT

*Termination of the agreement is considered a change that requires prior notification to CNSC.

Formal Agreement with an Authorized Inspection Agency (AIA)

The licensee shall always have a valid AIA agreement, and shall adhere to the following:

(a) the licensee shall arrange for the AIA inspectors to have access to all areas of Cameco's facilities and records, and to the facility and records of the Cameco's pressure boundary contractors and material organizations, as necessary for the purposes of performing inspections and other activities required by the standards

(b) the licensee shall provide the inspectors of the AIA with: information, reasonable advance notice and time necessary to plan and perform inspections and other activities required by the standards

(c) where a variance or deviation from the standard exists, the licensee shall submit the proposed resolution to the AIA for evaluation

(d) design registration services shall be provided by an AIA legally entitled under the applicable provincial boilers and pressure vessels acts and regulations to register designs in the province of installation

The licensee shall obtain AIA acceptance for implementation of the licensee's programs and procedures for:

(a) calibration, repair and maintenance of overpressure protection devices

(b) repair and maintenance of mechanical joints

(c) periodic inspection of boilers and pressure vessels designed according to CSA standard B51

The licensee shall provide a copy of the signed AIA agreement to the CNSC. The licensee shall notify the CNSC in writing of any change to the terms and conditions of the agreement, including termination of the agreement.

For safety significant systems or components, the licensee shall submit a preliminary report immediately and submit a full report within 21 days on the following:

- a pressure boundary failure, deformation, degradation or leak
- the degradation of an over-pressure protection device for the pressure boundary that prevented, or could have prevented, the proper functioning of that device

Guidance:

None provided.

SCA – FITNESS FOR SERVICE

Licence Condition 6.1: Fitness for Service Program

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

Preamble:

The *Class I Nuclear Facilities Regulations* requires that a licence application contain information including the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility. It is expected that the licensee will conduct routine maintenance, inspection and testing to ensure that the availability, reliability and effectiveness of facilities and equipment that may impact the health, safety and protection of the environment.

Compliance Verification Criteria:

Licensing Basis Publications

Document Number	Document Title	Version	Implementation Date
NRCC 56192	National Fire Code of Canada	2015	Implemented
CSA N393	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	2013 (R2018)	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
MA 100	Preventative Maintenance System Procedure	NT

The maintenance program shall include testing and inspection and shall be performed in such a manner that the availability, reliability, and effectiveness of the facility remain consistent with the design and safety analysis documents submitted in support of the licence application.

The program shall document the frequency that the various maintenance, inspection, and testing are performed.

Guidance:

None provided.

SCA – RADIATION PROTECTION

Licence Condition 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 seven days.

Preamble:

The *Radiation Protection Regulations* requires that the licensee implement a radiation protection program and also ascertain and record doses for each person who performs any duties in connection with any activity that is authorized by the *Nuclear Safety and Control Act* or is present at a place where that activity is carried on. This program must ensure that doses to workers do not exceed prescribed dose limits and are kept as low as reasonably achievable (ALARA), social and economic factors being taken into account.

The regulatory dose limits are explicitly provided in the *Radiation Protection Regulations*.

Action levels (ALs) are designed to alert licensees before regulatory dose limits are reached. By definition, if an action level is reached, a loss of control of some part of the associated radiation protection program may have occurred, and specific action is required, as defined in the *Radiation Protection Regulations*. ALs are not intended to be static and are to reflect operating conditions in the facility.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills	2018	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
RS 100	Radiation Safety Program Manual	PN

ALs for radiation protection are shown in the table below. In the event of a discrepancy between the tables and the licensee documentation upon which they are based, the licensee documentation shall be considered the authoritative source considering that the licensee has followed its own change control process.

Radiation Protection Action Levels

Parameter	Action Level	Period
Whole body exposure (NEW)	2.0 mSv	Monthly
	0.7 mSv	Quarterly
	2.0 mSv	Balance of pregnancy for a pregnant NEW
Skin exposure (NEW)	15.0 mSv	Monthly
	6.0 mSv	Quarterly
Urinalysis (NEW)	65.0 µg U/L	Bi-weekly
	44.0 µg U/L	Monthly
Lung counting (NEW)	Any result corresponding to 5.0 mSv internal dose since the last lung count	-

The licensee shall review and, if necessary, revise the ALs specified above at least once every 5 years in order to validate their effectiveness. The results of such reviews shall be provided to CNSC staff.

Guidance:

Guidance Documents

Document Number	Document Title	Version
G-129	Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"	2004
G-228	Developing and Using Action Levels	2001

SCA – CONVENTIONAL HEALTH AND SAFETY

Licence Condition 8.1: Conventional Health and Safety Program

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

Preamble:

The *Class I Nuclear Facilities Regulations* requires that a licence application contain information including the proposed worker health and safety policies and procedures. As a federal regulated site, Cameco BRR is also subject to the requirements of Part II of the *Canada Labour Code* and *Canada Occupational Health and Safety Regulations*.

CSA Z94.4, *Selection, Use and Care of Respirators* sets out requirements for the selection, use, and care of respirators and for the administration of an effective respiratory protection program in the workplace.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
CSA Z94.4	Selection, Use and Care of Respirators	2018	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
HS 100	Health and Safety Management System Program Manual	PN

Employment and Social Development Canada is mandated with overseeing and enforcing compliance with the *Canada Labour Code* and its underlying regulations. CNSC staff monitor licensee compliance with its conventional health and safety program, and will take regulatory actions for any potential unsafe work practice situations.

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.8.1	Conventional Health and Safety	2019

SCA – ENVIRONMENTAL PROTECTION

Licence Condition 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 seven days.

Preamble:

The *Class I Nuclear Facilities Regulations* require that a licence application contain the proposed environmental protection policies, procedures, effluent and environmental monitoring programs. The *General Nuclear Safety and Control Regulations* require that every licensee 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 *Radiation Protection Regulations* prescribe the radiation dose limits for the general public of 1 mSv per calendar year.

The release of hazardous substances is regulated by the CNSC as well as both the Ontario Ministry of the Environment, Conservation, and Parks and Environment and Climate Change Canada through various acts and regulations.

CSA N288.1, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities*, provides guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities.

CSA N288.4, *Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the design and implementation of an environmental monitoring program at nuclear facilities.

CSA N288.5, *Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the design and implementation of an effluent monitoring program at nuclear facilities.

CSA N288.6, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*, provides requirements for the performance and maintenance of an environmental risk assessment at nuclear facilities.

CSA N288.7, *Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills* provides requirements and guidance, which facilitate groundwater protection at nuclear facilities.

CSA N288.8, *Establishing and Implementing Action Levels for Releases to the Environment from Nuclear Facilities*, provides requirements for establishing and implementing action levels at nuclear facilities.

Compliance Verification Criteria:

Licensing Basis Publications

Document Number	Document Title	Version	Implementation Date
CSA N288.1	Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities	2014 (R2019)	Implemented
CSA N288.4	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	2010 (R2015)	Implemented
CSA N288.5	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	2011 (R2016)	Implemented
CSA N288.6	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	2012 (R2017)	Implemented
CSA N288.7	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines And Mills	2015	August 2021
CSA N288.8	Establishing And Implementing Action Levels for Releases to the Environment From Nuclear Facilities	2017	Implemented
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills	2018	Implemented
REGDOC-2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, Version 1.2	2020	August 2021

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FSD-PGR-EMS-001	FSD Environmental Management System	PN
ET 110	Environmental Protection Program	PN
N/A	Environmental Risk Assessment for the Cameco Blind River Refinery	PN
N/A	Review of Environmental Action Levels to Support the Environmental Protection Program	PN
N/A	Derived Release Limits Report	PN

The licensee shall review and revise the ERA in accordance with CSA N288.6. The results of such reviews shall be provided to CNSC staff.

The licensee's environmental protection program shall ensure control, monitoring and recording of environmental emissions from the BRR such that the releases do no exceed licencing limits as defined below.

Licence Limits – Air Releases

Release Source	Substance	Licence Limit	Averaging Period
Absorber Stack	Uranium	0.021 kg/h	Annual
	Oxides of Nitrogen (NO_x + HNO_3) as NO_2	19 kg/h	Daily
Dust Collection and Exhaust Ventilation (DCEV) Stack	Uranium	0.093 kg/h	Annual
Incinerator Stack	Uranium	0.029 kg/h	Annual
Combined for above three Stacks	Particulate	15 kg/h	Daily

Licence Limits – Liquid Releases

Release Source	Substance	Licence Limit	Frequency and Averaging Period
Liquid Effluent	Uranium	1.7 mg/L	Weekly composite

As noted in CNSC's letter on Cameco BRR's environmental action levels dated February 10, 2021 (e-Doc 6487331), CNSC staff accepted Cameco BRR's environmental action levels outlined in the tables below.

Action Levels – Air Releases

Release Source	Substance	Action Level	Frequency and Averaging Period
Absorber Stack	Uranium	0.00065 kg/h	Daily
	Oxides of Nitrogen (NO_x + HNO_3) as NO_2	12 kg/h	Daily
Dust Collection and Exhaust Ventilation (DCEV) Stack	Uranium	0.0011 kg/h	Daily

Action Levels – Liquid Releases

Release Source	Substance	Action Level	Frequency and Averaging Period
Liquid Effluent	Uranium	0.2 mg/L	Weekly composite
	Nitrate (as Nitrogen)	120 mg/L	
	Radium-226	0.1 Bq/L	

Action Levels – Gamma Radiation

Parameter	Action Level	Frequency
North Fence Line Gamma Radiation	0.25 µSv/h	Monthly

The licensee shall review and, if necessary, revise the action levels specified above at least once every 5 years in order to validate their effectiveness. The results of such reviews shall be provided to CNSC staff.

Guidance:

None provided.

SCA – EMERGENCY MANAGEMENT AND FIRE PROTECTION

Licence Condition 10.1: Emergency Preparedness Program

The licensee shall implement and maintain an emergency preparedness program.

Preamble:

The *Class I Nuclear Facilities Regulations* requires 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 national security, including measures to assist, notify, report to off-site authorities including the testing of the implementation of these measures.

This LC requires the licensee to establish an emergency preparedness program to prepare for, to respond to, and to recover from the effects of accidental radiological/nuclear and/or hazardous substance release. As part of the emergency preparedness program, the licensee shall prepare an onsite emergency plan and establish the necessary organizational structure for clear allocation of responsibilities, authorities, and arrangements for coordinating onsite activities and cooperating with external response organizations throughout all phases of an emergency.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response, Version 2	2016	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
EP 100	Emergency Response Plan	PN

Guidance:

None provided.

Licence Condition 10.2: Fire Protection Program

The licensee shall implement and maintain a fire protection program.

Preamble:

Licensees require a comprehensive fire protection program (the set of planned, coordinated, controlled and documented activities) to ensure 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

Document Number	Document Title	Version	Implementation Date
NRCC 56192	National Fire Code of Canada 2015	2015	Implemented
NRCC 56190	National Building Code of Canada 2015	2015	Implemented
CSA N393	Fire Protection for Facilities That Process, Handle, or Store Nuclear Substances	2013 (R2018)	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FS 100	Fire Safety Plan	PN
FS 200	Fire Protection Program	PN

Guidance:

None provided.

SCA – WASTE MANAGEMENT

Licence Condition 11.1: Waste Management Program

The licensee shall implement and maintain a waste management program.

Preamble:

The *General Nuclear Safety and Control Regulations* requires that a licence application contain information related to the in-plant management of radioactive waste or hazardous waste resulting from the licensed activities.

The *Class I Nuclear Facilities Regulations* requires that a licence application contain the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.

CSA N292.0, *General Principles for the Management of Radioactive Waste aAnd Irradiated Fuel* specifies common requirements for the management of radioactive waste and irradiated fuel from generation to storage or disposal.

CSA N292.3, *Management of Low- and Intermediate–Level Radioactive Waste* provides requirements specific to the management of low- and intermediate-level radioactive waste in solid, liquid, or gaseous states.

Compliance Verification Criteria:

Licensing Basis Publications

Document Number	Document Title	Version	Implementation Date
CSA N292.0	General Principles for the Management of Radioactive Waste and Irradiated Fuel	2014	Implemented
CSA N292.3	Management of Low- and Intermediate-Level Radioactive Waste	2014	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FSD-PGR-WM-001	Fuel Services Division Waste Management Program	PN
PR 300	Waste Management Plan	PN

Guidance:

Guidance Documents

Document Number	Document Title	Version
P-290	Managing Radioactive Waste	2004

Licence Condition 11.2: Decommissioning Plan

The licensee shall maintain a decommissioning plan.

Preamble:

The *Class I Nuclear Facilities Regulations* requires that a licence application contain information including the proposed plan for the decommissioning of the nuclear facility or of the site. This LC requires that the licensee maintain a decommissioning plan.

A decommissioning plan specifies the strategy for decommissioning and provides an overview of the proposed decommissioning approach. It should be 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 decommissioning plan defines areas to be decommissioned and the general structure and sequence of the principal work packages. The decommissioning plan forms the basis for establishing a financial guarantee for decommissioning to ensure that adequate funding will be available.

CSA N294, *Decommissioning of Facilities Containing Nuclear Substances* specifies requirements for the decommissioning of licensed facilities and other locations where nuclear substances are managed, possessed, or stored.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
CSA N294	Decommissioning of Facilities Containing Nuclear Substances	2019	Implemented

The planning for decommissioning of the BRR is documented in the BRR Preliminary Decommissioning Plan (PDP) and the associated cost estimate. The licensee shall revise the PDP at a minimum every 5 years, or if there are any changes to the facility operations or design that affect the estimated cost of decommissioning. When the PDP is revised, the cost of decommissioning shall be reviewed.

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
N/A	Blind River Refinery Preliminary Decommissioning Plan	PN

Guidance:

Guidance Documents

Document Number	Document Title	Version
G-219	Decommissioning Planning for Licensed Activities	2000

SCA – SECURITY

Licence Condition 12.1: Security Program

The licensee shall implement and maintain a security program.

Preamble:

The *General Nuclear Safety and Control Regulations* requires that a licence application contain information including the proposed measures to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information.

The *Class I Nuclear Facilities Regulations* requires that a licence application contain information including the proposed measures to prevent acts of sabotage or attempted sabotage at the nuclear facility, including measures to alert the licensee to such acts.

The *Nuclear Security Regulations* describes the application of Part 2 of these regulations, which is relevant to this licensee.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	2020	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
ST 100	Security Plan	PN

Guidance:

None provided.

SCA – SAFEGUARDS AND NON-PROLIFERATION

Licence Condition 13.1: Safeguards Program

The licensee shall implement and maintain a safeguards program.

Preamble:

The *General Nuclear Safety and Control Regulations* require the licensee to take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement, and defines reporting requirements for safeguards events.

The *Class I Nuclear Facilities Regulations* require that a licence application contain information on the licensee's proposed measures to facilitate Canada's compliance with any applicable safeguards agreement.

Safeguards is a system of inspection and other verification activities undertaken by the International Atomic Energy Agency (IAEA) in order to evaluate a Member State's compliance with its obligations pursuant to its safeguards agreements with the IAEA.

Canada has entered into a Safeguards Agreement and an Additional Protocol (hereafter referred to as "safeguards agreements") with the IAEA pursuant to its obligations under the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/140). The objective of the Canada-IAEA safeguards agreements is for the IAEA to provide assurance on an annual basis to Canada and to the international community that all declared nuclear materials are in peaceful, non-explosive uses and that there is no indication of undeclared nuclear materials or activities. This conclusion confirms that Canada is in compliance with its obligations under the following Canada-IAEA safeguards agreements:

- *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*; and
- *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.*

These are reproduced in information circulars *INFCIRC/164* and *INFCIRC/164/Add.1*.

The scope of the non-proliferation program carried out under this licence is limited to tracking and reporting of foreign obligations and origins of nuclear material. Additionally, the import and export of controlled nuclear substances, equipment and information identified in the *Nuclear Non-proliferation Import and Export Control Regulations* requires separate authorization from the CNSC, consistent with subsection 3(2) of the GNSCR.

Compliance Verification Criteria:

Licensing Basis Publication

Document Number	Document Title	Version	Implementation Date
REGDOC-2.13.1	Safeguards and Nuclear Material Accountancy	2018	Implemented

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FSD-PGR-SG-001	FSD Safeguards Program	PN

Guidance:

None provided.

SCA – PACKAGING AND TRANSPORT

Licence Condition 14.1: Packaging and Transport Program

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

Preamble:

The *Class I Nuclear Facilities Regulations* requires that a licence application contain information on the proposed procedures for transporting nuclear substances and hazardous substances.

The transport of nuclear substances or hazardous substances shall be done in accordance with the requirements of the *Packaging and Transport of Nuclear Substances Regulations, 2015*, (PTNSR) and *Transportation of Dangerous Goods Regulations* (TDGR) set out by Transport Canada.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
FSD-PGR-TRN-001	FSD Packaging and Transportation Program	PN

The licensee shall implement and maintain a packaging and transport program that will be in compliance with all the regulatory requirements set out in the PTNSR and in the TDGR.

Every person who transports or causes to be transported nuclear substances (included in Class 7 of the Schedule to the *Transportation of Dangerous Goods Act)* shall act in accordance with the requirements of the TDGR set out by Transport Canada.

The PTNSR provides specific requirements for the design of transport packages, the packaging, marking and labeling of packages and the handling and transport of nuclear substances.

Guidance:

Guidance Documents

Document Number	Document Title	Version
REGDOC-2.14.1	Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015	2016

NUCLEAR FACILITY SPECIFIC

Licence Condition 15.1: Changes to Annual Production Capacity

The licensee shall submit a final commissioning report related to the increase in annual production capacity as described in paragraph (i) and (iii) of Part IV of this licence that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity.

Preamble:

This licence condition requires the licensee to submit a commissioning report to the Commission demonstrating completion of modifications necessary to increase the annual production capacity at the BRR facility. The BRR facility may be operated at the increased annual production capacity once the Commissioning Report is accepted by the Commission, or a person authorized by the Commission.

Compliance Verification Criteria:

Licensee Documents that Require Notification of Change

Document Number	Document Title	Notification
N/A	Cameco Responses to Third-Party Recommendations in Production Increase Engineering Assessment Report*	NT

*****A review of the production increase was re-assessed by Cameco and a letter submitted to the CNSC on March 17, 2021, titled *Review of the Production Increase at the Blind River Refinery*.

Annual Production Capacity Increase

Cameco has requested continued authorizations to carry out modification to the facility to support operations at 24,000 tonnes of uranium as uranium trioxide (UO_3) per year. The detailed conditions and hold points are defined in Cameco's correspondence dated March 17, 2021.(e-Doc 6515535). After receiving approval from the Commission to modify the facility as requested, all the conditions and hold points as defined in Cameco's correspondence dated March 17, 2021, shall be met before increasing the annual production capacity.

In the licence renewal application dated September 30, 2020, Cameco has requested approval to retain the authorization granted in 2012 by the Commision for a production increase which allows BRR to operate at an annual production capacity of 24,000 tonnes of uranium as UO_3, pending completion of a number of plant modifications. The proposed modifications with expected completion schedules are described in Cameco's correspondence dated March 17, 2021.

(Pending Commission Decision in 2021 Hearing)

As noted in the CNSC's letter on Cameco BRR facility's licence renewal, *Complete Record of Proceedings and Reasons for Decision* (e-Doc XXXXX), the Commission approved Cameco's request to retain the authorization granted in 2012 by the Commission for a production increase at BRR. Accordingly, subject to completing the following conditions, Cameco may operate its BRR facility at an annual production rate of 24,000 tonnes of uranium as UO_3:

(a) the proposed modifications of the facility as specified in Cameco's letter dated March 17, 2021, are completed and commissioned;

(b) a final commissioning report on the proposed modifications specified in Cameco's letter dated March 17, 2021, is submitted to the Commission or a person authorized by the Commission for review and confirmation; and

(c) the final commissioning report specified in (b) above is confirmed in writing by the Commission or a person authorized by the Commission.

The review and confirmation of the final commissioning report is administrative and will confirm that Cameco has completed the proposed modifications specified in Cameco's letter dated March 17, 2021.

Guidance:

None provided

APPENDIX A – DEFINITIONS AND ACRONYMS

1. DEFINITIONS

The following is a list of definitions of words or expressions used in the LCH that may need clarification; they are defined for the purpose of the LCH only. All other terms and expressions used in the LCH are consistent with the definitions provided in the NSCA, the regulations made pursuant to the NSCA, or in the CNSC regulatory document REGDOC-3.6, Glossary of CNSC Terminology.

Accept/ed/able/ance – meets regulatory requirements, which mean it is in compliance with the documents referenced in the LCH.

Approval – Commission's permission to proceed, for situations or changes where the licensee would be:

(a) Not compliant with a regulatory requirements set out in applicable laws and regulations;

(b) not compliant with a licence condition; and

(c) not in the safe direction but the objective of the licensing basis is met.

Boundary Conditions – procedural, administrative rules and operating limits for ensuring safe operation of the facility based on safety analyses and any applicable regulatory requirements.

Compliance Verification Criteria – regulatory criteria used by CNSC staff to verify compliance with the licence conditions.

Design Basis – the entire range of conditions for which the nuclear facility is designed, in accordance with established design criteria, and for which damage to the fuel and/or the release of radioactive material is kept within authorized limits.

Guidance – non-mandatory information on how the licensee may comply with a LC.

Implementation Date – the date that a given document is implemented by the licensee. If the licensee implements the document before or at the issuance of the licence then "implemented" will be stated.

Notification Document – a document which is submitted to the CNSC at the time of implementing the change.

Prior Notification Document – a document which is submitted to the CNSC prior to implementing the change.

Program(s) – a documented group of planned activities, procedures, processes, standards and instructions coordinated to meet a specific purpose.

Qualified Staff – trained licensee staff, deemed competent and qualified to carry out tasks associated with their respective positions.

Safe Direction – changes in facility safety levels that would not result in:

(a) a reduction in safety margins;

(b) a breakdown of barrier;

(c) an increase (in certain parameters) above accepted limits;

(d) an increase in risk;

(e) impairment(s) of safety systems;

(f) an increase in the risk of radioactive releases or spills of hazardous substances;

(g) injuries to workers or members of the public;

(h) introduction of a new hazard;

(i) reduction of the defence-in-depth provisions; or

(j) causing hazards or risks different in nature or greater in probability or magnitude than those stated in the safety analysis of the nuclear facility.

Safety and Control Measures – measures or provisions which demonstrate that the applicant:

(a) Is qualified to carry on the licensed activities; and

(b) has made adequate provision for the protection of the environment, the health and safety of persons, the maintenance of national security and any measures required to implement international obligations to which Canada has agreed.

Written Notification – a physical or electronic communication between CNSC staff and a person authorized to act on behalf of the licensee

2. ACRONYMS LIST

Acronym	Definition
AIA	Authorized Inspection Agency
ALARA	As Low As Reasonably Achievable
AL	Action Level
Bq	Becquerel
BRR	Blind River Refinery
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association (now CSA Group)
CVC	Compliance Verification Criteria
DCEV	Dust Collection and Exhaust Ventilation
FFL	Nuclear Fuel Facility Licence
FFOL	Nuclear Fuel Facility Operating Licence
FSD	Fuel Services Division
g	Gram
GNSCR	*General Nuclear Safety and Control Regulations*
h	Hour
H_3O^+	Hydronium Ion
HNO_3	Nitric Acid
IAEA	International Atomic Energy Agency
kg	Kilogram
L	Litre
LC	Licence Condition
LCH	Licence Conditions Handbook
mSv	Millisievert
N/A	Not Applicable
NEW	Nuclear Energy Worker
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides

NPFD	Nuclear Processing Facilities Division
NSCA	*Nuclear Safety and Control Act*
NT	Notification
PDP	Preliminary Decommissioning Plan
PN	Prior Notification
PTNSR	*Packaging and Transport of Nuclear Substances Regulations*
SCA	Safety and Control Area
SSCs	Systems, Structures and Components
t	Tonne
TDGR	*Transportation of Dangerous Goods Regulations*
µg	Microgram
µSv	Microsievert
U	Uranium
UO_3	Uranium Trioxide

APPENDIX B – LIST OF VERSION CONTROLLED DOCUMENTS

Codes, Standards and Regulatory Documents

Document Number	Document Title	Revision
CSA B51	Boiler, pressure vessel, and pressure piping code	2014
CSA N286	Management systems requirements for nuclear facilities	2012 (R2017)
CSA N286.0.1	Commentary on N286-12, Management systems requirements for nuclear facilities	2021
CSA N288.1	Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities	2014 (R2019)
CSA N288.4	Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills	2010 (R2015)
CSA N288.5	Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills	2011 (R2016)
CSA N288.6	Environmental risk assessments at Class I nuclear facilities and uranium mines and mills	2012 (R2017)
CSA N288.7	Groundwater protection programs at Class I nuclear facilities and uranium mines and mills	2015
CSA N288.8	Establishing and implementing action levels for releases to the environment from nuclear facilities	2017
CSA N292.0	General principles for the management of radioactive waste and irradiated fuel	2014
CSA N292.3	Management of low- and intermediate-level radioactive waste	2014
CSA N294	Decommissioning of facilities containing nuclear substances	2019
CSA N393	Fire protection for facilities that process, handle, or store nuclear substances	2013 (R2018)

Document Number	Document Title	Revision
CSA Z94.4	Selection, use and care of respirators	2011
G-129	Keeping Radiation Exposures and Doses "As Low as Reasonably Achievable (ALARA)"	2004
G-206	Financial Guarantee for the Decommissioning of Licensed Activities	2000
G-219	Decommissioning Planning for Licensed Activities	2000
G-228	Developing and Using Action Levels	2001
IAEA SSR-4	Safety of Nuclear Fuel Cycle Facilities	2017
NRCC 56190	National Building Code of Canada 2015	2015
NRCC 56192	National Fire Code of Canada 2015	2015
P-290	Managing Radioactive Waste	2004
REGDOC-2.1.1	Management System	2019
REGDOC-2.1.2	Safety Culture	2018
REGDOC-2.2.2	Personnel Training, Version 2	2016
REGDOC-2.2.5	Minimum Staff Complement	2019
REGDOC-2.5.1	General Design Considerations: Human Factors	2019
REGDOC-2.8.1	Conventional Health and Safety	2019
REGDOC-2.9.1	Environmental Protection: Environmental Principles, Assessments and Protection Measures, version 1.2	2020
REGDOC-2.10.1	Nuclear Emergency Preparedness and Response	2016
REGDOC-2.12.3	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.1	2020
REGDOC-2.13.1	Safeguards and Nuclear Material Accountancy	2018

Document Number	Document Title	Revision
REGDOC-2.14.1	Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015	2016
REGDOC-3.1.2	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	2018
REGDOC-3.2.1	Public Information and Disclosure	2018
REGDOC-3.5.3	Regulatory Fundamentals	2018
REGDOC-3.6	Glossary of CNSC Terminology	2016

Licensee Documents

Document Number	Document Title	Notification
AM 100	Facility Licensing Manual	PN
AM 110	Quality Control Manual for TSSA Certificate of Authorization	NT
FSD-PGR-PIP-001	Public Information Program	NT
AM 300	Training Program Manual	PN
AM 37	Change Management Procedure	NT
AM 400	Management Systems Program Manual	PN
BRR700P-C-0002200-01	Facility Licensed Area Drawing	PN
BRR700P-C-0002200-02	Owned and Leased Property Boundaries Drawing	PN
EP 100	Emergency Response Plan	PN
EP 200	BRR Safety Report	PN
ET 110	Environmental Protection Program	PN
ES 39	Pressure Boundary Systems New Installations, Alterations and Repairs Procedure	NT

Document Number	Document Title	Notification
FS 100	Fire Safety Plan	PN
FS 200	Fire Protection Program	PN
FSD-PGR-EMS-001	FSD Environmental Management System	PN
FSD-PGR-SG-001	FSD Safeguards Program	PN
FSD-PGR-TRN-001	FSD Packaging and Transportation Program	PN
FSD-PGR-WM-001	FSD Waste Management Program	PN
HS 100	Health and Safety Management System Program Manual	PN
MA 100	Preventative Maintenance System Procedure	NT
N/A	Authorized Inspection Agency Services Agreement	NT
N/A	Blind River Refinery Preliminary Decommissioning Plan	PN
N/A	Cameco Responses to Third-Party Recommendations in Production Increase Engineering Assessment Report	NT
N/A	Derived Release Limits Report	PN
N/A	Environmental Risk Assessment for the Cameco Blind River Refinery	PN
N/A	Review of Environmental Action Levels to Support the Environmental Protection Program	PN
PHU 21	Pressure Safety Valve and Pressure Relief Valve Inspection, Test, Service and Repair Procedure	NT
PR 300	Waste Management Plan	PN
PR 33	Design Control Procedure	NT
RP 3.2.4	Radioisotope Source Control Procedure	PN
RS 100	Radiation Safety Program Manual	PN

Document Number	Document Title	Notification
ST 100	Security Plan	PN

CURRENT LICENCE

e-Doc 3727597 (WORD)

e-Doc 3767717 (PDF)

Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

PDF Ref.: E-DOCS-#: 3767717
Word Ref.: E-DOCS-#: 3727597
File / Dossier: 2.02

NUCLEAR FUEL FACILITY OPERATING LICENCE

CAMECO CORPORATION BLIND RIVER FACILITY

I) LICENCE NUMBER: FFOL-3632.00/2022

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
S7M1J3

III) LICENCE PERIOD: This licence is valid from **01 March 2012** to **28 February 2022**, unless suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES:

This licence authorizes the licensee to:

(i) Operate its nuclear fuel facility for the production of uranium trioxide from uranium ore concentrates, (hereinafter "the facility") at a site located in Blind River, in the province of Ontario, as more particularly described in the Blind River Facility Licensed Area drawing BRR700P-C-0002200-01 Rev 0 dated 24 May 2011;

(ii) Possess, transfer, use, process, import, package, transport, manage store and dispose of the nuclear substances that are required for, associated with, or arise from the activities described in (i); and

(iii) Possess and use prescribed equipment and prescribed information that are required for, associated with, or arise from the activities described in (i).

V) EXPLANATORY NOTES:

(i) 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 associated regulations.

(ii) The content of any appendix attached to this licence forms part of the licence.

(iii) The "CAMECO CORPORATION – BLIND RIVER FACILITY LICENCE CONDITION HANDBOOK (LCH)" provides compliance verification criteria in order to meet the conditions listed in the

licence. The LCH also provides information regarding delegation of authority and applicable version control of documents.

VI) CONDITIONS:

1. General

1.1 The licensee shall conduct the activities described in Part IV of this licence in accordance with the licensing basis described in the LCH, unless otherwise permitted in this licence.

1.2 Changes to the safety and control measures described in the application and the documents needed to support that application are permitted provided that the objective of the licensing basis is met.

1.3 Changes that are outside of the licence conditions are not permitted without the prior written approval of the Canadian Nuclear Safety Commission (hereinafter "the Commission").

1.4 The licensee shall, in the event of any conflict or inconsistency between licence conditions, codes or standards or regulatory documents referenced in this licence, direct the conflict or inconsistency to the Commission, or a person authorized by the Commission.

2. Management System

2.1 The licensee shall implement and maintain a management system for the facility.

2.2 The licensee shall prepare an annual compliance and performance report.

2.3 The licensee shall prepare a quarterly compliance report for each calendar quarter.

2.4 The licensee shall implement and maintain a process for reporting to the Commission or a person authorized by the Commission that includes reporting of all events required by the *Nuclear Safety and Control Act* and its Regulations, and routine reports on the results of monitoring programs. The process shall define the frequency of the routine reports.

2.5 Where any release limit stipulated in Appendix A to this licence is exceeded, the licensee shall:

(a) Notify the Commission, Environment Canada, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, the Town of Blind River, and the Mississauga First Nation within 24 hours of detecting the event;

(b) Investigate the cause and the circumstances; and

(c) Within a time approved by the Commission take corrective action to comply with the release limit stipulated in Appendix A to this licence.

2.6 The licensee shall implement and maintain a public information program for the facility, including a public disclosure protocol.

2.7 The licensee shall give written notification of any changes to the management system program document prepared to meet condition 2.1.

3. Human Performance Management

3.1 The licensee shall implement and maintain a program for training staff for the facility.

4. Operating Performance

4.1 The licensee shall implement and maintain a program for the safe operation of the facility.

4.2 The operating program shall provide direction for safely operating the facilities and shall reflect the safety analysis referred to in condition 5.1.

4.3 The licensee shall establish and maintain, in addition to any record required to be maintained pursuant to the *Nuclear Safety and Control Act* and its Regulations, full and accurate records to show:

a) the acquisition of nuclear substances including the quantity received, the form of the substance, and the name of the vendor;

b) the inventory of all nuclear substances at the facility; and

c) the disposition of all nuclear substances acquired for use or processed by the facility, including the name and address of the recipient, a copy of the recipient's licence (if applicable), the quantity of nuclear substance, and the date of shipment.

4.4 The licensee shall implement and maintain a pressure boundary program for the facility.

4.5 The licensee shall have a formal agreement with an Authorized Inspection Agency, designated by the Commission as authorized to register, pressure boundary designs and procedures, perform inspections, and perform other applicable functions at the licensed facility.

5. Safety Analysis

5.1 The licensee shall implement and maintain a safety analysis for the facility.

6. Physical Design

6.1 The licensee shall implement and maintain a program for physical design for the facility.

6.2 The licensee shall not make any change to the design of, or equipment at the facility, that would introduce hazards different in nature or greater in probability than those considered by the safety analysis, without the prior written approval of the Commission or a person authorized by the Commission.

7. Fitness for Service

7.1 The licensee shall implement and maintain a program for maintenance for the facility.

7.2 The licensee shall implement and maintain a program for periodic inspection and testing for the facility.

8. Radiation Protection

8.1 The licensee shall implement and maintain a radiation protection program.

8.2 The licensee shall notify the Commission or a person authorized by the Commission within 24 hours of becoming aware that an action level has been exceeded and shall file a written report within 45 working days of becoming aware of the matter.

9. Conventional Health and Safety

9.1 The licensee shall implement and maintain an occupational health and safety program for the facility.

10. Environmental Protection

10.1 The licensee shall implement and maintain an environmental protection program for the facility.

10.2 The licensee shall control, monitor and record releases of nuclear substances to the environment from the facility such that the releases do not exceed the release limits specified in Appendix A.

10.3 The licensee shall control and monitor and record the releases of hazardous substances.

10.4 The licensee shall notify the Commission within 24 hours of becoming aware that an action level has been reached (or exceeded) and shall file a written report within 45 working days of becoming aware of the matter.

11. Emergency Management and Fire Protection

11.1 The licensee shall implement and maintain a program for emergency preparedness to address on-site and off-site events which can affect the facility.

11.2 The licensee shall implement and maintain a program for fire protection for the facility.

12. Waste Management

12.1 The licensee shall implement and maintain a program for waste management for the facility.

12.2 The licensee shall maintain a preliminary decommissioning plan (PDP) for decommissioning the facility. This PDP shall be reviewed every five years or when requested by the Commission, or a person authorized by the Commission.

13. Security

13.1 The licensee shall implement and maintain a program for nuclear security at the facility.

14. Safeguards

14.1 The licensee shall implement and maintain a safeguards program and undertake all measures required to ensure safeguards implementation at the facility.

14.2 The licensee shall not make changes to operations, equipment or procedures that would affect the implementation of safeguards measures, except with the prior written approval of the Commission, or a person authorized by the Commission.

15. Packaging and Transport

15.1 The licensee shall implement and maintain a program for the facility for the receipt, packaging and transport of nuclear and hazardous substances.

16. Facility-Specific

16.1 **Financial Guarantee**

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

SIGNED at OTTAWA, this 28 day of February, 2012.

M. Binder

Michael Binder, President
on behalf of the Canadian Nuclear Safety Commission

E-DOCS-#: 3727597 (WORD)
E-DOCS-#: 3767717 (PDF)

APPENDIX A – RELEASE LIMITS

Liquid Releases

Substance	Units	Limit	Averaging Period
Nitrate (as Nitrogen)	mg/L	1,000	Monthly average of weekly composite samples
Uranium	mg/L	2.0	Monthly average of weekly composite samples
Radium -226	Bq/L	1.0	Monthly average of weekly composite samples
Acid Balance (as H_3O^+)	pH	≥6.0 and ≤9.5	Daily

Air Releases

Release Source	Substance	Units	Limit	Averaging Period
Absorber stack (1)	Uranium	kg/hr	0.10	Weekly
DCEV stack (2)	Uranium	kg/hr	0.10	Weekly
Incinerator stack (3)	Uranium	kg/hr	0.01	Daily
Combined for above three stacks (1+2+3)	Particulate	kg/hr	11.0	Weekly
Absorber stack	Oxides of Nitrogen as NO_2	kg/hr	56.0	Weekly