Cameco Corporation

Application to Renew Licence for the Cameco Blind River Refinery

CNSC Staff Presentation

Commission Hearing

November 24, 2021

CMD 21-H9.A

E-Docs: #6611232.pptx

E-Docs: #6636672.pdf

Presentation Outline

- Purpose of Hearing
- Facility Overview
- Review of Licence Application
- Regulatory Oversight
- Performance Assessment
- Other Matters of Regulatory Interest
- Licence and Licence Conditions Handbook (LCH)
- Conclusions and Recommendations

Errata

- CMD 29-H9, page 2, staff recommendation 2, the end date of the proposed licence needs to be changed from February 28, 3032 to February 28, 2032
- CMD 21-H9, page 37, Figure 3, the 2020 average effective dose needs to be changed from 2.4 to 2.5 mSv
- Environmental Protection Review Report: Blind River Refinery, page 33, public dose is primarily due to gamma radiation not the result of historical operations. The incorrect sentence needs to be removed.

Purpose of Hearing

Cameco has applied to the Commission to:

- Renew Cameco's Blind River Refinery operating licence for a period of 10 years

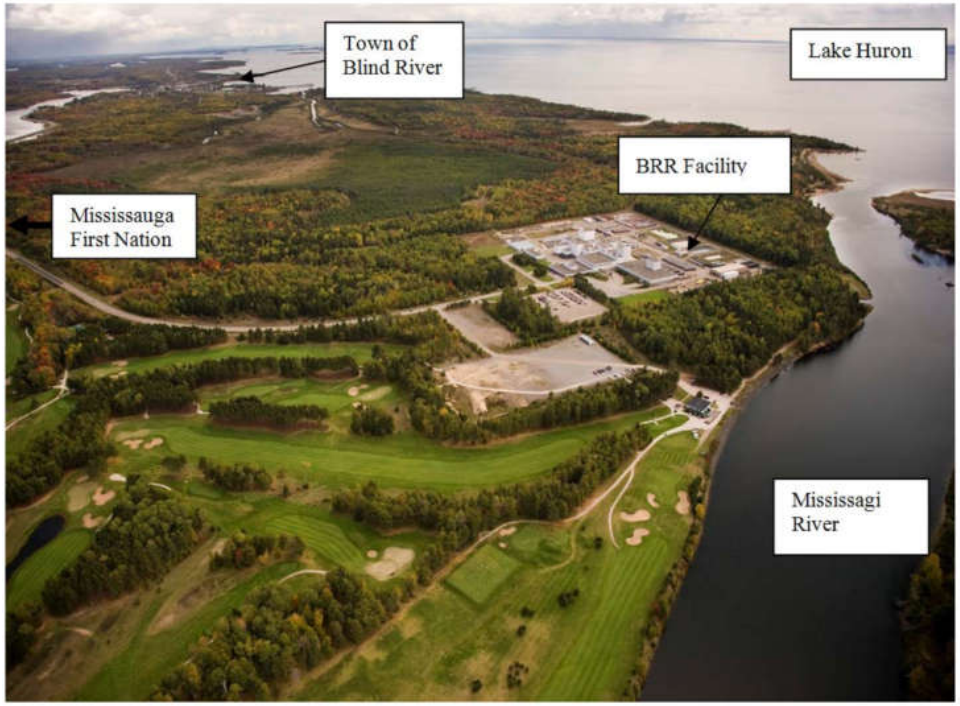
CNSC staff recommend that the Commission:

- 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 provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
- Renew the operating licence for a period of 10 years, until February 28, 2032
- Accept the proposed financial guarantee of C$57.5 million and the proposed instrument, which remains a letter of credit
- Delegate authority as set out in CMD 21-H9

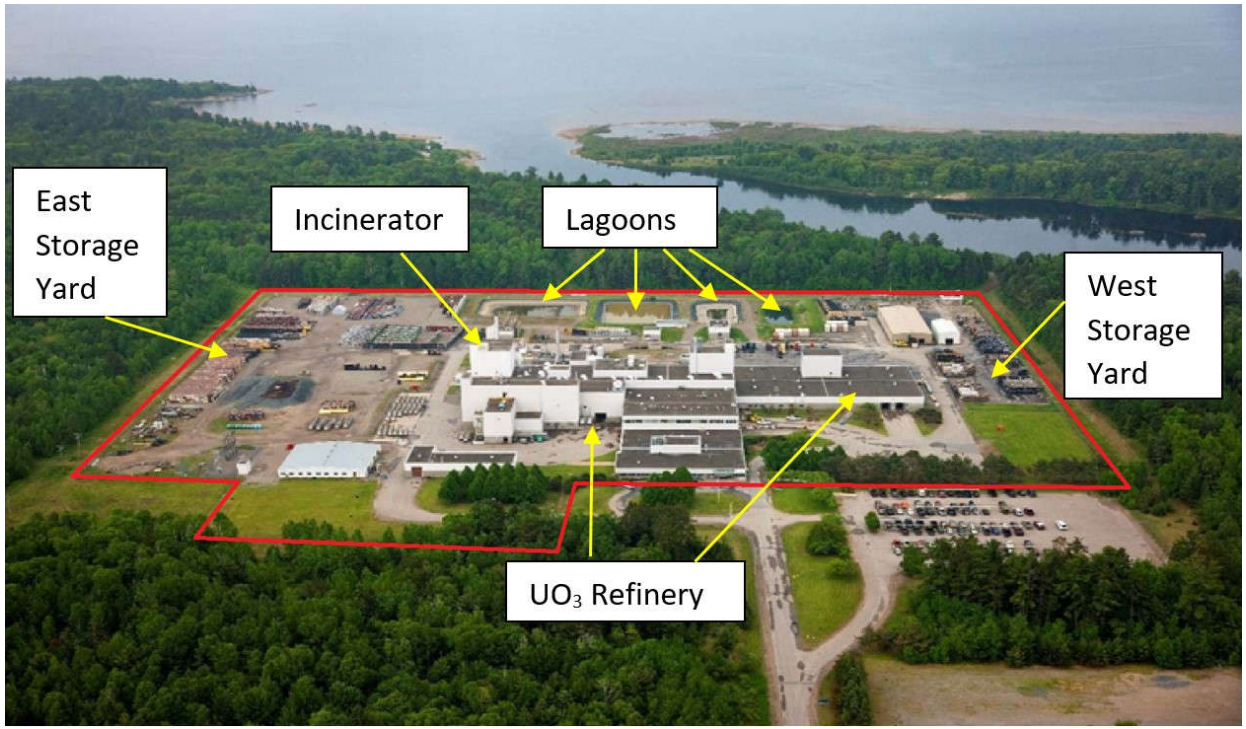
Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

FACILITY OVERVIEW

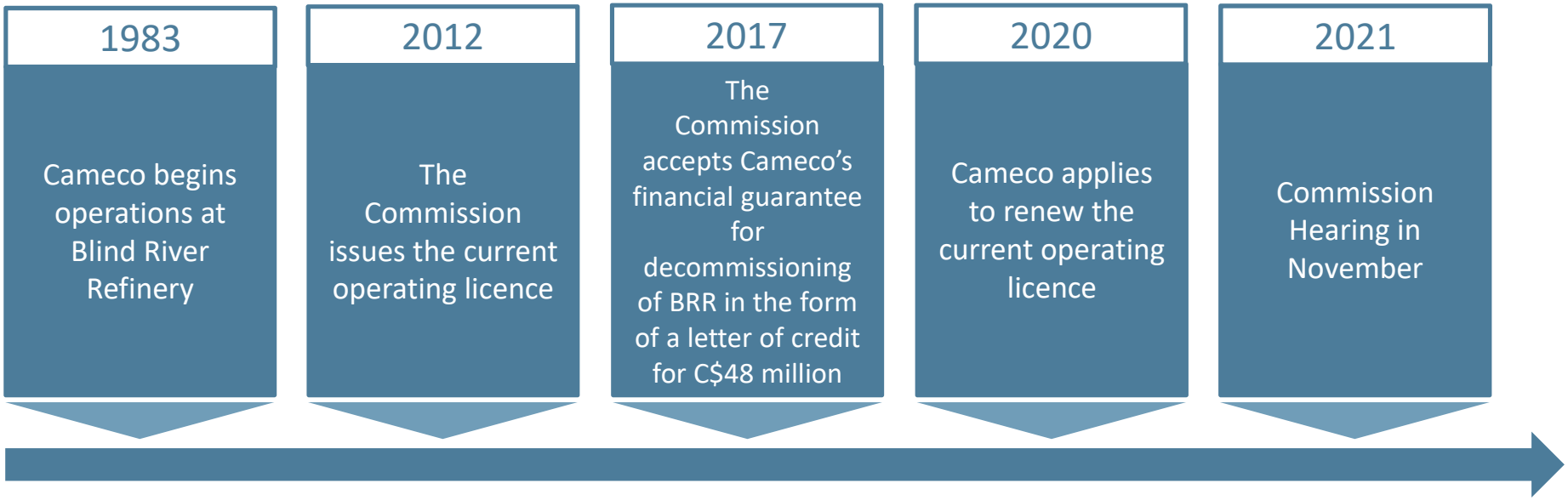
Facility Location



Facility Overview

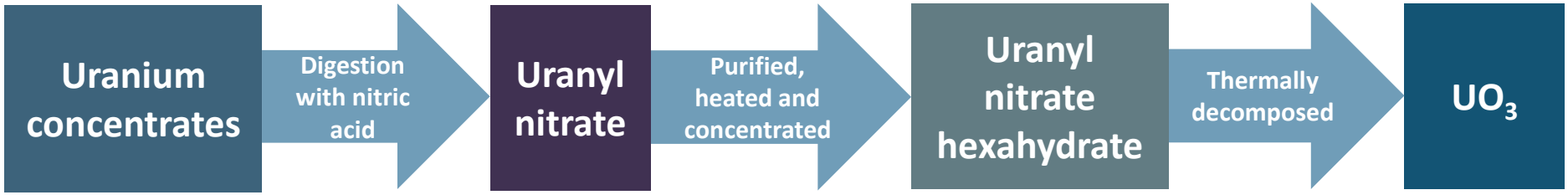


Timeline


1983
Cameco begins operations at Blind River Refinery
2012
The Commission issues the current operating licence
2017
The Commission accepts Cameco's financial guarantee for decommissioning of BRR in the form of a letter of credit for C$48 million
2020
Cameco applies to renew the current operating licence
2021
Commission Hearing in November

Operations Description

The Cameco Blind River facility refines uranium concentrates (yellowcake) received from uranium mines worldwide to produce uranium trioxide (UO_3).



Uranium concentrates and UO_3 are transported in compliance with regulatory requirements

Current Licence

- Last renewed March 1, 2012, valid until February 28, 2022
- Authorizes Cameco to:
  - Operate the BRR facility for the production of UO_3 from uranium ore concentrates
  - Possess, transfer, use, process, import, package, transport, manage, store and dispose of nuclear substances for the production of UO_3
  - Possess and use prescribed equipment and prescribed information for the production of UO_3
  - Increase annual production capacity to 24,000 tonnes of uranium as UO_3 subject to conditions specified in the licence conditions handbook

Licence Renewal

Cameco's licence application requests the Commission:

- To renew the operating licence for a period of 10 years and maintain the authorizations granted in 2012
- To accept a proposed revised financial guarantee of C$57.5 million through a letter of credit in the amount of C$57.5 million, the terms of which will not change

UO_3 Tote Bin Loading Area
Photo source Cameco

No changes requested to authorized activities

Indigenous Engagement

The Blind River Refinery is situated in the traditional and treaty territories of many Indigenous communities.

CNSC staff engagement activities included:

- Nov 2020 — Letters of notification with follow-up phone calls
- Mar 2021 — Letters on participant funding program with follow-up phone calls
- Aug 2021 — Virtual meeting with Mississauga First Nation
- Aug 2021 — Indigenous groups provided with CMD 21-H9
- Sept – Oct 2021 — Follow-up communications
- Oct 2021 — Virtual meeting with Mississauga First Nation

Indigenous Nations:

- Mississauga First Nation
- Métis Nation of Ontario
- Sagamok Anishnawbek
- Serpent River First Nation
- Thessalon First Nation

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

REVIEW OF LICENCE APPLICATION

CNSC's Review of the Licence Application

CNSC staff:

- Verified that the information submitted in support of the application is complete in satisfying CNSC regulatory requirements, including the *Nuclear Safety and Control Act* (NSCA) and associated regulations, for all 14 safety and control areas (SCAs)
- Assessed Cameco's past performance and record (compliance activities and environmental monitoring)

CNSC staff conclude the application complies with regulatory requirements

Environmental Protection Review under the NSCA

- CNSC staff conducted an Environmental Protection Review (EPR) under the NSCA
- The EPR assessed the environmental and health effects of the Blind River Refinery
- CNSC staff's assessment was based on information submitted by Cameco, as well as technical assessment and independent verification activities conducted by CNSC staff
- The EPR report is available on the open government portal and supports the recommendations in CNSC staff's CMD 21-H9

CNSC staff concluded Cameco has made adequate provision for the protection of the environment and the health of persons

Production Increase Review

- In 2012 the Commission authorized Cameco to increase annual production capacity from 18,000 to 24,000 tonnes of uranium as UO_3
- Cameco has not implemented the production increase during the current licensing period
- Cameco submitted updated safety documentation to support maintaining the authorization which were reviewed and accepted by CNSC staff
- Facility-specific licence condition 15.1 is proposed by CNSC staff - Cameco is to submit a final commissioning report that is acceptable to the Commission or a person authorized by the Commission prior to commercial production at the increased production capacity

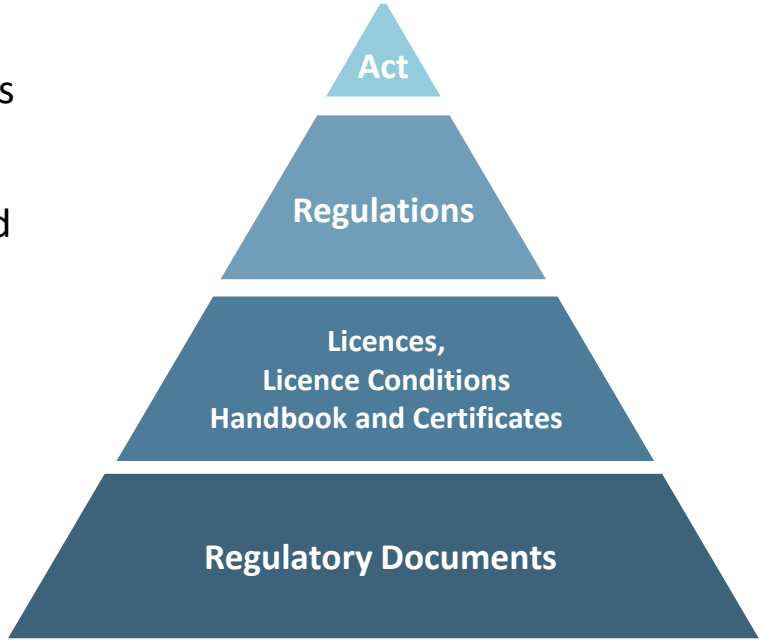
The proposed modifications to increase BRR's capacity continue to be acceptable and staff will verify satisfactory implementation prior to commercial production

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

REGULATORY OVERSIGHT

Regulatory Oversight

- *Nuclear Safety and Control Act* and its regulations provide requirements
- CNSC licence and licence conditions establish and set licensee-specific requirements
- Licence Conditions Handbook provides clear and comprehensive criteria for compliance according to the licence
- Regulatory documents, CSA standards and international guidance provide clarity on expectations



Licensing and Compliance Activities

Activity	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Number of inspections	2	3	4	3	4	4	5	4	3	**32**
Number of events reported	4	2	7	4	4	4	2	2	4	**33**

The CNSC has a facility assessment and compliance team with oversight of all licensed activities

Compliance Inspections

- 32 inspections conducted over 9 years – covered all 14 SCAs
- Issues identified were corrected in a timely manner
- Non-compliances tracked by CNSC staff using the CNSC Regulatory Information Bank

CNSC Inspector at air sampling station

CNSC staff verify completion of corrective actions as part of ongoing regulatory oversight

Event Reporting

- Licensees must report all events as required by the NSCA, associated Regulations, licence conditions and regulatory documents
- Cameco provided 33 reportable event notifications.
  - One event initial report in 2012, presented to the Commission as CMD 12-M43, was the result of a drum pressurization
  - 16 radiological action level exceedances were reported in the annual regulatory oversight report, all below regulatory limits
  - Other events included transportation incidents and a yard fire
  - There were no lost time injuries or environmental events
- Cameco's event notifications and follow-up reports were acceptable to CNSC staff

CNSC staff conclude Cameco met regulatory event reporting requirements during the current licence period

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

PERFORMANCE ASSESSMENT

Assessment of Safety and Control Areas (SCA)

- CNSC staff assessed all 14 safety and control areas for Cameco BRR's licence application
- Information submitted in support of the application satisfies CNSC requirements under the NSCA and its regulations
- Assessment criteria and results are summarized in CMD 21-H9

Cameco BRR's programs meet regulatory requirements

Safety and Control Areas
Management System
Human Performance Management
Operating Performance
Safety Analysis
Physical Design
Fitness for Service
Radiation Protection
Conventional Health and Safety
Environmental Protection
Emergency Management and Fire Protection
Waste Management
Security
Safeguards and Non-Proliferation
Packaging and Transport

SCA – Management System

Program Highlights

CNSC staff's assessment:

- Cameco has implemented and maintains a management system in accordance with CSA N286-12, *Management system requirements for nuclear facilities*.
- Annual management review of performance and internal audits meet requirements
- Design and change control programs ensure that changes to physical and documented processes are identified, justified, reviewed and approved before implementation
- The records management process encompasses the control of documents
- Safety culture assessments have been completed which confirm a strong commitment to safety

Cameco's management system governs all licensed activities and meets requirements

SCA – Safety Analysis

Program Highlights

CNSC staff's assessment:

- Safety Analysis Report (2020) identifies facility hazards, analyses consequences and identifies mitigation measures
- Safety Analysis of hazards demonstrated adequate safety through defence-in-depth
- The SAR takes into account the proposed modifications for the production increase

Defence-in Depth
Level 1 Prevent deviations from normal operations
Level 2 Detect and control deviations to prevent upset conditions from becoming accident scenarios
Level 3 Inherent and/or engineered safety features, fail-safe design, and procedures
Level 4 Mitigation of consequences of accidents
Level 5 Mitigate offsite consequences

SARs are reviewed a minimum of once every five years

SCA – Radiation Protection

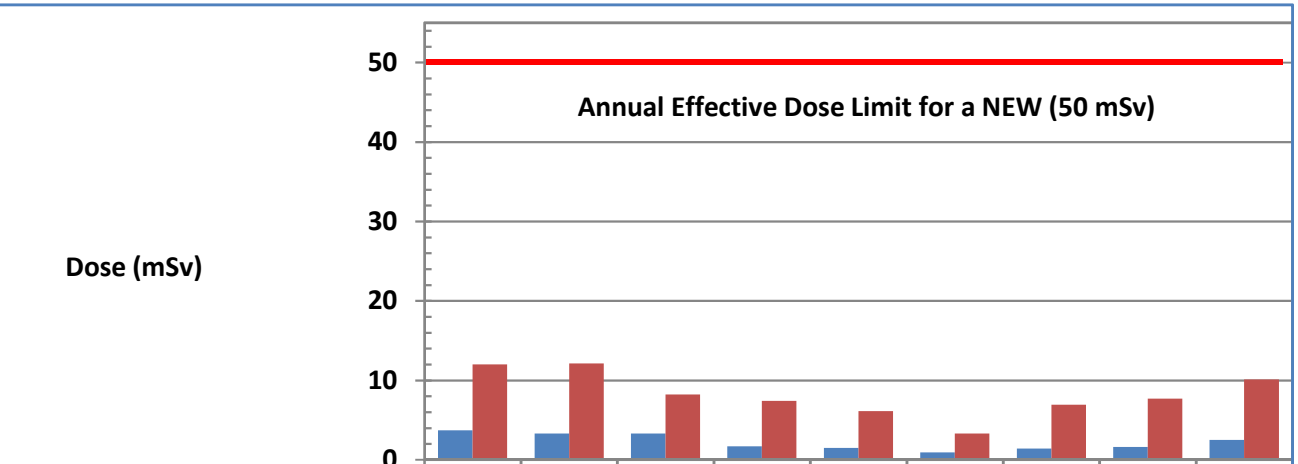
Program Highlights

CNSC staff's assessment:

- Cameco's radiation protection (RP) program meets the *Radiation Protection Regulations*
- Cameco's RP program is effective in keeping doses to workers well below CNSC regulatory dose limits
- Action levels are established and exceedances reported and investigated by Cameco as required

SCA – Radiation Protection

Occupational Exposures of BRR Nuclear Energy Workers (NEWs)



	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	2.5
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

Occupational exposures to NEWs are well below regulatory limits

SCA – Conventional Health and Safety

Program Highlights

CNSC staff's assessment:

- Cameco has an effective health and safety program
- Cameco has established tools for identifying and controlling hazards
- Employees are trained to identify hazards and the means for minimizing risk
- Safety is maintained through proper use of personal protective equipment, use of barriers and signage, housekeeping
- There have been no lost time injuries in 15 years

Cameco's conventional health and safety program meets regulatory requirements

SCA – Environmental Protection

Program highlights

CNSC staff's assessment:

- Cameco's environmental protection program is implemented effectively and meets regulatory expectations
- The 2020 environmental risk assessment is acceptable and concludes that the human health and ecological risk attributed to BRR operations are negligble
- Cameco's environmental monitoring program results confirm that the environment and human health are protected

Cameco's environmental protection program meets regulatory requirements

SCA – Environmental Protection

Air emission monitoring results, 2012 - 2020

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	**100**	**100**	**56**	**10**	**11,000**

Air emissions well below release limits

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Exposure based limits are proposed for renewed licence

SCA – Environmental Protection

Liquid effluent monitoring results, 2012 - 2020

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	**2**	**1000**	**1**	**6.0 ≤ 9.5**	

Liquid effluent releases well below release limits

-

Exposure based limits are proposed for renewed licence

SCA – Environmental Protection

New Exposure Based Release Limits in Licence Conditions Handbook

Contaminant	Medium	Current Release limit	New Release Limit	Averaging Period
Uranium	Water	2.0 mg/L	1.7 mg/L	Weekly composite
	Air – Absorber stack	0.100 kg/h	0.021 kg/h	Annual
	Air – DCEV stack	0.100 kg/h	0.093 kg/h	Annual
	Air – Incinerator stack	0.010 kg/h	0.029 kg/h	Annual
Particulate	Air – Combined stacks	11 kg/h	15 kg/h	Daily
Nitrogen Oxides (NOx)	Air – Absorber stack	56 kg/h	19 kg/h	Daily

SCA – Environmental Protection

Dose to the Public

Maximum Annual Effective Dose to a Member of the Public (mSv)									
Year	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Dose (mSv)	0.012	0.012	0.005	0.005	0.005	0.005	0.005	0.005	0.009

Radiation doses for a member of the public are well below the regulatory limit of **1 millisievert/year (mSv/yr)**

SCA – Environmental Protection

Independent Environmental Monitoring Program

- Five IEMP sampling campaigns in 2013, 2014, 2017, 2018 and 2020
- Samples included air, water and soil
- All samples analyzed for uranium and also for nitrate, pH and radium-226 for water samples
- Results posted on CNSC's IEMP online dashboard

SCA – Safeguards and Non-Proliferation

Program Highlights

CNSC staff's assessment:

- Cameco has implemented and maintains a safeguards program
- Nuclear Material Accountancy and Control is a key specific area and plays an important role in safeguards
- In this licensing period, BRR has implemented measures to increase the accuracy of its nuclear materials accountancy by performing routine calibration of its weigh scale used to weigh tote bins

Cameco's safeguards and non-proliferation program meets regulatory requirements

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

OTHER MATTERS OF REGULATORY INTEREST

Preliminary Decommissioning Plan

CNSC staff's assessment:

- Preliminary Decommissioning Plan (PDP) meets the requirements of:
  - CSA N294-19, *Decommissioning of facilities containing nuclear substances*
  - CNSC Regulatory Guide G-219, *Decommissioning Planning for Licensed Activities*
- PDP captures strategies, activities and cost estimates for decommissioning the Blind River Refinery facility

PDP must be updated and resubmitted every 5 years at a minimum

Financial Guarantee

- As part of the licence application, Cameco proposed an increased financial guarantee from C$48 million to C$57.5 million through 1 proposed instrument:
  - **A letter of credit in the amount of C$57.5 million**
- CNSC staff assessed the proposed financial guarantee amounts and instruments, and determined that they meet the criteria of CNSC regulatory Guide G-206.

Proposed amounts are credible and the financial instrument is acceptable

Public Information and Disclosure Program

CNSC staff have reviewed BRR's Public Information Disclosure Program and determined that it:

- Identifies clear goals and objectives in terms of dissemination of information
- Identifies multiple target audiences in close proximity to the licensed facility
- Provides contact information for members of the public who want to obtain additional information
- Outlines communication approaches that Cameco will deploy to reach target audiences

Meets regulatory requirements for public information and disclosure

Public Engagement

Event	Date
Announcement for Notice of Hearing	March 8, 2021
CNSC Webinar # 1	May 12, 2021
CNSC Webinar # 2	October 6, 2021

Webinar Outline

- Overview of the CNSC
- Cameco Blind River Refinery licence renewal application
  - Commission Member Document (CMD)
  - Participating in the process
- Safety & Control Areas (SCA's)
  - Safety Analysis
  - Radiation Protection
  - Environmental Protection
  - Waste Management
- Questions

Participant Funding Program

Funding was provided to assist members of the public and Indigenous Nations in providing valuable information directly to the Commission.

CNSC awarded $52,527.55 to the following recipients:

- Northwatch
- Mississauga First Nation

Main Themes from Interventions

Indigenous engagement and consultation	Events and other concerns in the 80s and 90s
CNSC commitment to reconciliation	Health effects due to uranium processing
Independent Environmental Monitoring Program	Lack of environmental monitoring in nearby Indigenous community
Emergency preparedness and response	Preliminary decommissioning plan

Main Themes from Interventions

Support from local businesses and groups	Waste management and preliminary decommissioning plan
Mid-term performance review report licence condition	Sufficiency of waste information in Cameco's application
Soil monitoring data reporting licence conditions	Incinerator as a separate licence
Environmental monitoring	Length of licence period

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

LICENCE AND LICENCE CONDITIONS HANDBOOK

Proposed Licence and Draft Licence Conditions Handbook

Proposed BRR Operating Licence

- 10 year licence term
- Standard licence conditions
- 1 nuclear facility specific condition (15.1)

Draft Licence Conditions Handbook (LCH)

- Preamble
- Compliance Verification Criteria
- Guidance

Proposed Licence Term

- The requested 10-year term is the same length as the current term and consistent with CNSC licences issued to other uranium processing facilities and nuclear facilities across Canada
- Mature facility with established programs and a management system focused on continuous improvement
- Licensee has a good track record of regulatory compliance
- CNSC staff will continue to provide regulatory oversight and report on this and the licensee's performance through the Regulatory Oversight Report

CNSC staff recommend a 10- year licence term

Cameco Blind River Refinery Licence Renewal: CMD 21-H9.A

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the technical assessment of Cameco's application and supporting information, CNSC staff conclude that:

- The application complies with the regulatory requirements
- The licensee's performance during the licensing term was satisfactory and met regulatory requirements
- 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

Recommendations

CNSC staff recommend that the Commission:

- 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 provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed
- Renew the operating licence for a period of 10 years, until February 28, 2032
- Accept the proposed financial guarantee of C$57.5 million and the proposed instrument, which remains a letter of credit
- Delegate authority as set out in CMD 21-H9

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