



**Written submission from
Cameco Corporation**

**Mémoire de
Cameco Corporation**

In the Matter of

À l'égard de

**Application to consider a 1-year licence
renewal from Cameco Corporation
(Cameco) for its Cameco Fuel
Manufacturing Inc. (CFM) facility**

**Demande de renouvellement de permis d'un
an, présentée par Cameco Corporation
(Cameco) pour son installation de Cameco
Fuel Manufacturing Inc**

Public Hearing - Hearing in writing based on
written submissions

Audience Publique - Audience fondée sur des
mémoires

December 2021

Décembre 2021



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March 8, 2021

VIA EMAIL

CFM-10772-LTR

Mr. Marc LeBlanc
Secretariat
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
280 Slater Street
Ottawa, ON K1P 5S9

Dear Mr. LeBlanc:

Supplemental Submission for Cameco Fuel Manufacturing One Year Licence Renewal

On December 2, 2021 Cameco Corporation (Cameco) filed an application for renewal of the nuclear fuel facility operating licence FFOL-3641.0/2022 for Cameco Fuel Manufacturing (CFM) with the Canadian Nuclear Safety Commission (CNSC) to renew the CFM's licence for a 1-year term [Ref. 1].

With this correspondence, CFM provides supplemental information for this licence application in accordance with the requirements set out in the *General Nuclear Safety and Control Regulations*, *Class I Nuclear Facilities Regulations*, *Nuclear Substances and Radiation Devices Regulations* and *Nuclear Security Regulations*.

If you have any questions or concerns regarding this matter, then please contact me.

Yours truly,



Rebecca Peters
Superintendent, Special Projects

References:

1. Cameco Letter, D. Clark (Cameco) to M. Leblanc (CNSC Secretariat). Application for Renewal of the Cameco Fuel Manufacturing Inc. Operating Licence, FFOL-3641.0/2022

c. CNSC: G. Smith, C. Ducros, J. Thelen

CFM: D. Clark, L. Mooney, T. Smith, D. Jensen, M. Garrard, M. Longinov

Attachments:

1. Supplemental Submission for Renewal of FFOL 3641.0/2022 for Cameco Fuel Manufacturing Inc.



**CAMECO CORPORATION
FUEL SERVICES DIVISION**

**Supplemental Submission for Renewal of FFOL 3641.0/2022
For Cameco Fuel Manufacturing Inc.**

March 8, 2021

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1.0 INTRODUCTION

1.1 Cameco Corporation and the Fuel Services Division

Cameco Fuel Manufacturing Inc. (CFM), a wholly owned subsidiary of Cameco Corporation (Cameco), operates a Class IB nuclear fuel manufacturing facility in Port Hope, Ontario under Canadian Nuclear Safety Commission (CNSC) operating licence FFOL-3641.0/2022 (the Licence). The Licence is valid until February 28, 2022.

CFM is licensed by the CNSC to: (a) operate its nuclear fuel facility for the production of nuclear fuel bundles from depleted, natural, and enriched uranium compounds; and (b) 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 referred to in (a) above and detailed in the Licence.

Cameco's Vice-President, Fuel Services Division (FSD) on behalf of CFM, applied for a licence renewal for a period of one-year on December 2, 2020 with no changes to the authorized activities or approved production rates as set out in current licence, licence conditions handbook and referenced documents. This document supports the licence renewal application and is intended to demonstrate adherence of CFM's operations to the requirements of the current licence.

The business address of CFM in Port Hope is 200 Dorset Street East, Port Hope, Ontario, L1A 3V4.

The business address of Cameco's head office is 2121-11th Street West, Saskatoon, Saskatchewan, S7M 1J3.

1.2 Licensing Basis

The basis for licensing consists of applicable laws and regulations, the safety and control measures in the licence and the licence application and documents in support of the application. This includes the *Nuclear Safety and Control Act* (NSCA) and associated regulations, including, but not limited to the following:

- *General Nuclear Safety and Control Regulations*
- *Class I Nuclear Facilities Regulations*
- *Radiation Protection Regulations*
- *Packaging and Transport of Nuclear Substances Regulations, 2015*
- *Nuclear Substances and Radiation Devices Regulations*

- *Nuclear Non-proliferation Import and Export Control Regulations*
- *Nuclear Security Regulations*

Other laws, regulations and international agreements that are applicable to CFM operations:

- *Impact Assessment Act* and its regulations;
- *Canadian Environment Protection Act, 1999* and its regulations;
- *Fisheries Act* and its regulations;
- *Nuclear Liability and Compensation Act*;
- *Transportation of Dangerous Goods Act, 1992* and its regulations;
- *Access to Information Act*;
- *Canada/IAEA Safeguards Agreements*;
- *Canada Labour Code, Part II*;
- *Ontario Environmental Protection Act* and its regulations;
- *Ontario Water Resources Act* and its regulations; and
- *Ontario Technical Standards and Safety Act, 2000* and its regulations;

The safety and control measures are described in the Licence Conditions Handbook (LCH). The CNSC regulatory framework uses CNSC regulatory documents (REGDOCs), Canadian Standards Association (CSA) standards, codes and other regulatory documentation to provide compliance verification criteria, additional recommendations and guidance for CFM in implementing control measures at the facility.

CFM maintains programs and plans to meet the requirements of the Safety and Control Areas (SCA) as required by its licence. These are summarized in the Facility Licensing Manual (FLM). This application for licence renewal and the referenced supporting documents describe how CFM meets licensing requirements and provides the basis for renewal of the operating licence (licensing basis). This application, the FLM and summaries of significant reports supporting the licensing basis as described in the application are made available to the public through the FSD community website (www.camecofuel.com). Documents referred to in the application and/or FLM are not publicly available; they contain confidential and proprietary information, controlled nuclear information or prescribed information as defined by the *General Nuclear Safety and Control Regulations* (GNSCR).

1.3 Cameco Fuel Manufacturing

CFM fabricates nuclear fuel for power and research reactors at its Fuel Fabrication Facility located at 200 Dorset Street East, Port Hope, Ontario (Figure 1) in the Municipality of Port Hope (MPH). The CFM Port Hope site comprises the main manufacturing building and three steel pre-fabricated buildings; the Waste Storage Building, the Maintenance Storage Building and the Fuel Storage Building. There are also miscellaneous smaller outbuildings and storage trailers present at the site. The facility is adjacent to the approved truck route

for the municipality, which also links MPH with the Town of Cobourg to the south and to the north of the property is a Canadian Pacific Railway (CPR) right-of-way.

2.0 DESCRIPTION OF OPERATIONS AND OTHER LICENSED ACTIVITIES

2.1 Organization and Responsibilities

Cameco is governed by a board of directors. Operationally, CFM is part of the Cameco's FSD, which is led by a Vice-President. The Vice-President, FSD reports directly to the Chief Operating Officer, who ultimately reports to Cameco's Chief Executive Officer. The organizational structure is further discussed in section 4.1.1.

Cameco's Chief Executive Officer is ultimately responsible to ensure that the facility is operated in accordance with the conditions of the licence, the NSCA and associated regulations. The licensing authority in accordance with subsection 15(a) of the GNSCR for the facility is the General Manager, Cameco Fuel Manufacturing. Day-to-day compliance activities are the responsibility of the site General Manager with support and direction from the site regulatory compliance staff. Divisional compliance responsibilities for FSD are handled by the Director of Regulatory Compliance and Licensing, with support and direction from divisional compliance and licensing staff. All personnel with the authority to act for CFM in dealings with the CNSC are identified in the FLM.

2.2 Facility Location and Layout

The facility is located at 200 Dorset Street East, Port Hope, Ontario, adjacent to Peter Street (formally Highway #2), which links the MPH and the Town of Cobourg. The MPH is situated on the north side of Lake Ontario approximately 100 kilometers east of Metropolitan Toronto.

The licensed facility is on part of Lot 2, Concession 1, Municipality of Port Hope, County of Northumberland and more particularly described in Instrument Number 89833 Parts 1 & 2 deposited in the Land Registry Office for the Registry Division of Port Hope, on the 4th of November, 2005. Site drawing 05C144, version 4 (dated April 16, 2009) provides detailed information regarding the facility layout.

CFM also owns 12 hectares of property to the north and east of the licensed facility described above. This land is not being used for any activity at this time. Site drawing 00A084 provides detailed information regarding the CFM property.

Figure 1 – Location of Cameco Fuel Manufacturing

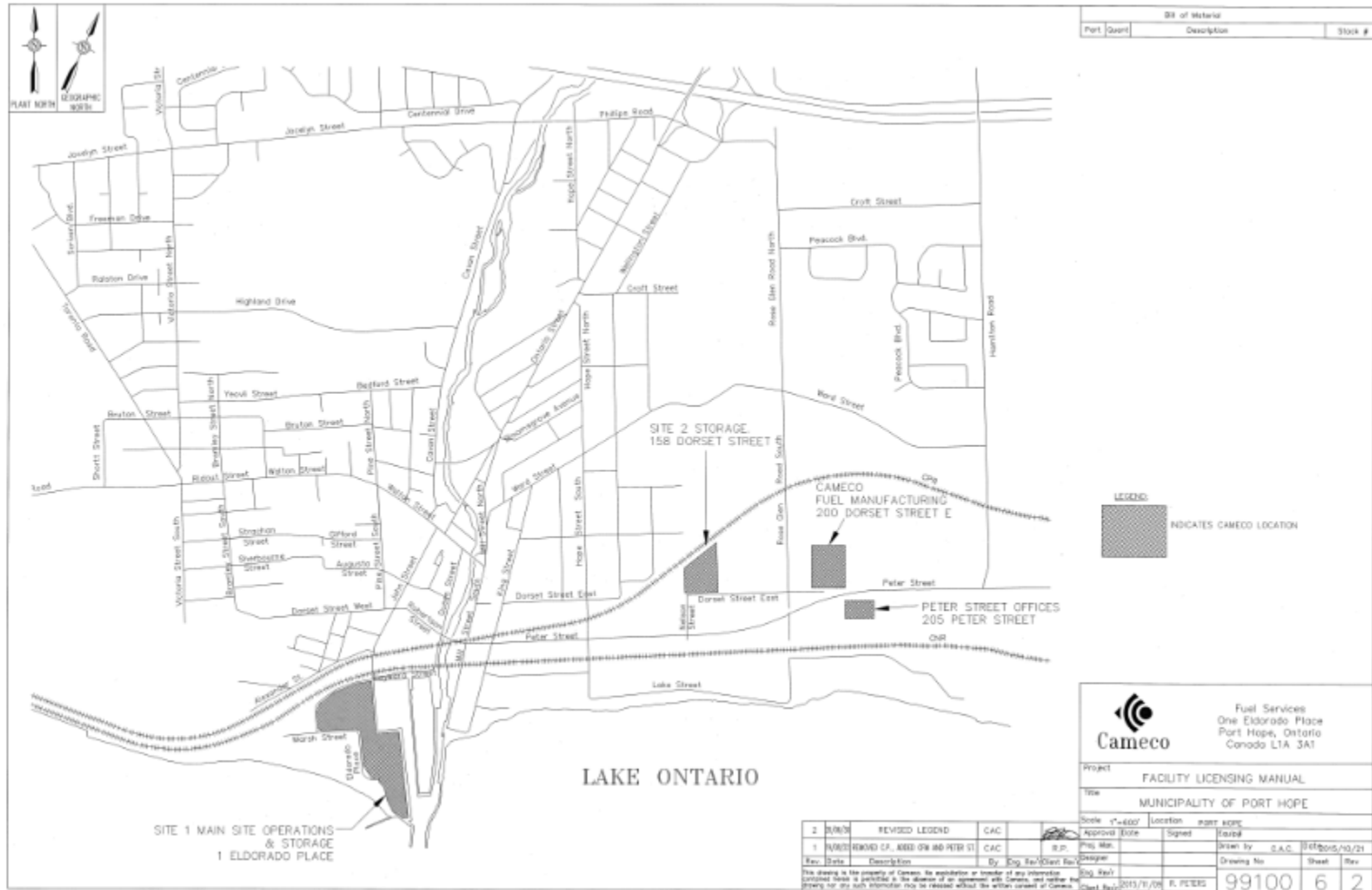
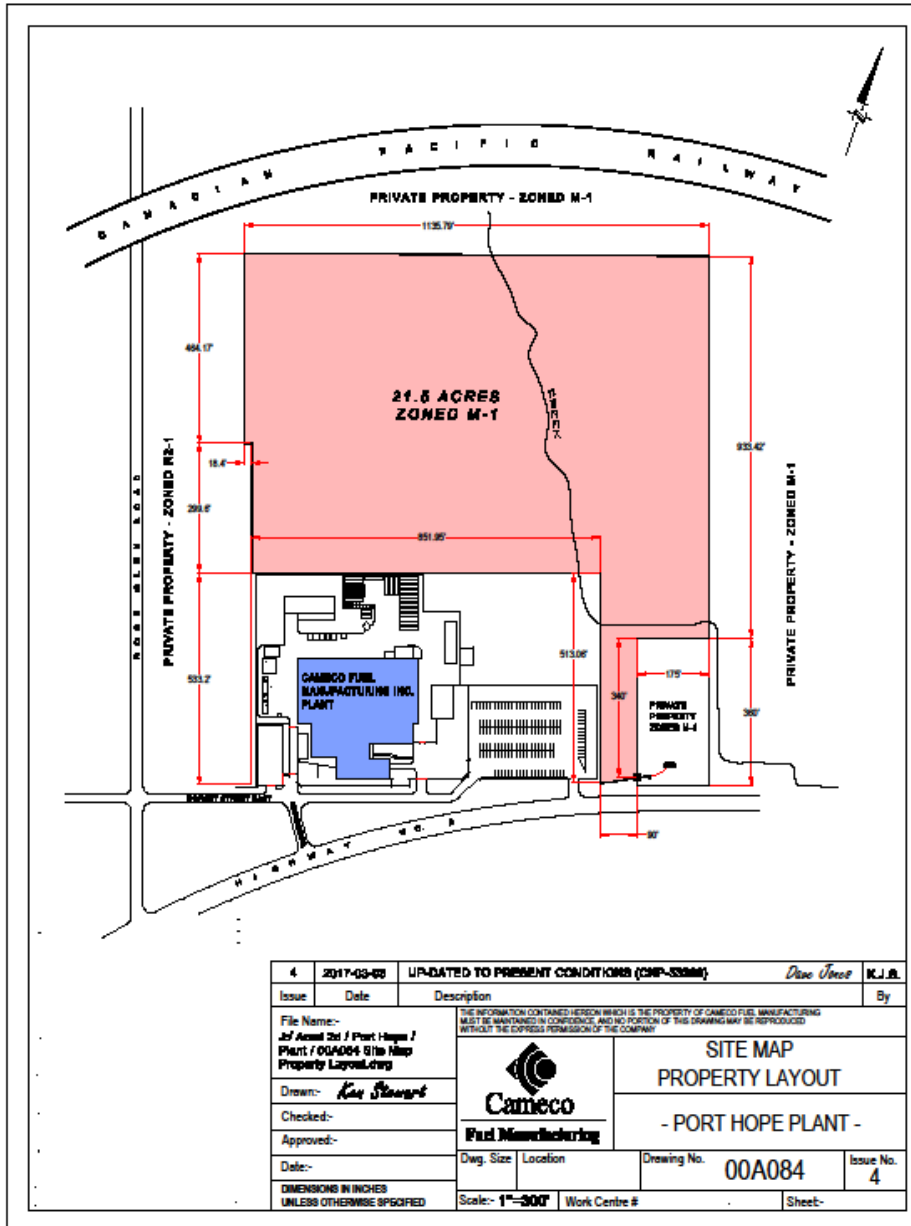


Figure 2 – Aerial View of Cameco Fuel Manufacturing

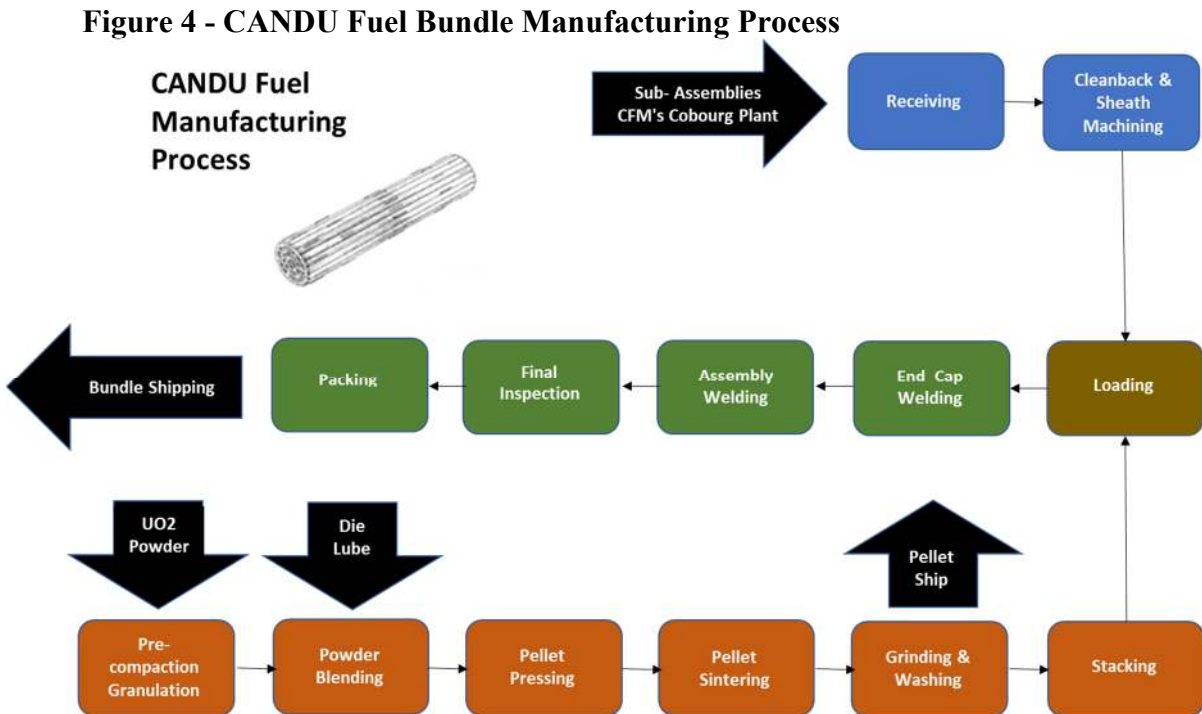


Figure 3 – Cameco Fuel Manufacturing Property Layout



2.3 Processes and Materials

A simplified block diagram of the fuel fabrication process is provided in Figure 4. CFM has a licensed capacity of 125 Megagrams (Mg) of Uranium Dioxide (UO₂) as pellets during any calendar month.



Note: Intermediate products at various stages of the manufacturing process are, at times and dependent upon market conditions, packaged and sold to other nuclear fuel producers.

2.3.1 UO₂ Pellet Operations

UO₂ (natural or depleted) is received in drums and transferred into processing vessels and, along with any recycled material that might need to be added to it, is subjected to pre-compaction, granulation and blending operations in order to condition the powder for the pellet pressing operation. The conditioning is performed by conventional powder processing techniques. The conditioned powder is then transferred in its processing container to the pellet pressing operation.

Using conventional tablet presses, the conditioned powder is compressed within a die cavity to produce a cylindrical pellet compact of the appropriate size. The pressed pellet compact is of relatively low density and friable under severe handling conditions until it is passed through an electrically heated sintering furnace within a hydrogen atmosphere. This operation reduces the pellet compact to stoichiometric

UO₂ composition and converts the pellet's physical form to a hard, high density, non-friable ceramic pellet.

Sintered pellets are ground using a through feed, conventional centreless grinders to produce a cylindrical part that conforms to the specification requirements for diameter and surface finish. Ground pellets then are washed, dried and inspected. Pellets may be packed into shipping containers for shipment to customers or stacked end to end to create pellet stacks of appropriate length for bundle assembly operations.

2.3.2 Bundle Assembly Operations

The stacks of UO₂ pellets are inserted into zirconium tube subassemblies received from CFM's Cobourg facility. A zirconium alloy end cap is resistance welded to each end of the subassembly tube containing a stack of fuel pellets. Prior to welding the endcaps, the ambient air around the pellets within the tube is purged with helium and the resistance weld hermetically seals the fuel element.

After verification of the quality of the weld, individual fuel elements are assembled into a fixture that holds them in the required configuration while the zirconium alloy end plates are permanently attached to the element ends by resistance welding to create fuel bundles. Completed bundles are inspected via a series of non-destruction visual and dimensional tests. Accepted bundles are placed into an approved shipping container, and then moved to a secured storage area to await shipment.

2.3.3 Pre-Press and Granulate Process

CFM also processes UO₂ powder through the pre-press and granulate (PP&G) process for the Port Hope Conversion Facility (PHCF). The PP&G UO₂ is required to meet specific customer specifications. This involves receiving the UO₂ in drums and pre-compacting it and granulating it in CFM's powder processing equipment and repackaging it for return to PHCF.

2.3.4 Enriched Uranium Operations

CFM maintains a reduced scope Nuclear Criticality Safety Program in order to process custom orders for enriched UO₂ powders for research and special projects. CFM currently possesses a small quantity of fissionable materials (up to 80% of the appropriate smallest critical mass) as per the LCH.

2.3.5 Nuclear Substances and Radiation Devices

CFM maintains an inventory of sealed sources and tracks and reports their transfer as required by REGDOC 2.12.3: *Security of Nuclear Substances: Sealed Sources and Category I, II, and III Nuclear Material, Version 2*.

2.4 Public Information Program

The objective of the FSD Public Information Program (PIP) is to ensure local target audiences with an interest in Cameco's FSD CNSC-licensed facilities are informed on a timely basis about operations, activities, and potential effects on the environment and the health and safety of persons, and thereby build the trust and support of stakeholders. This includes a commitment to and protocol for ongoing, timely communication of information related to the licensed facilities during the licence periods. As a publicly traded company, Cameco must comply with strict disclosure requirements under securities laws both in Canada and the United States. These requirements may affect the content and timing of information releases to the public.

The PIP is designed to fulfill the requirements of the CNSC's REGDOC 3.2.1, *Public Information and Disclosure*.

2.4.1 Public Engagement Strategies

Cameco's overall public engagement process is guided by best practices garnered over decades of experience. These strategies are:

- Open Channels for Communication
 - Cameco will engage with target audiences through a variety of channels with the goal of building understanding and acting upon concerns.
- Clear and Uncomplicated Communications
 - Deliver fact-based, uncomplicated, and clear communications through the creation of communication materials to help ensure audiences can effectively build their understanding of the information.
- Adaptive Communications
 - Adapt communications to the target audiences and address/support any topics/issues identified through polling.

2.4.2 Target Audiences

The primary audience for the PIP include the following in Port Hope:

- Employees
- Local community residents in Ward 1 and Ward 2 Port Hope, including those neighbouring CFM and PHCF;
- Local schools
- Municipal Council and staff;
- Local business organizations, such as the Chambers of Commerce and other relevant industry associations;
- Special interest groups;
- Local non-governmental organizations; charities and community groups;
- Past intervenors;
- Local media; and
- Indigenous Groups
 - Mississaugas of Scugog Island First Nation
 - Hiawatha First Nation
 - Alderville First Nation
 - Curve Lake First Nation

There are no First Nations communities located within the MPH. Two First Nations communities, Hiawatha First Nation and Alderville First Nation, are located just north of Port Hope.

Cameco considers other groups and members of the general public to be the secondary audience, and include the following in Port Hope:

- Northumberland County residents, businesses and community groups/organizations
- Other interested persons/groups/organizations
- Indigenous Groups
 - Chippewas of Beausoleil First Nation
 - Chippewas of Georgina Island First Nation
 - Chippewas of Rama First Nation
 - Mohawks of the Bay of Quinte
 - Métis Nation of Ontario Region 7

2.4.3 Engagement Mechanisms

Cameco uses the following tools to reach its primary and secondary audiences and provide information to the public.

- Website

- In addition to its corporate website (www.cameco.com), Cameco maintains a dedicated community website (www.camecofuel.com) to broadly communicate information about its Ontario operations.
- Social media
 - Cameco uses social media to provide news and information about Cameco's activities in Ontario, promote community events and engagement activities and drive traffic to Cameco's website. Cameco's social media channels are Facebook, Twitter, LinkedIn and Instagram.
- Advertising
 - Cameco uses radio, print and online advertising to support its communication initiatives in Ontario. Advertising is typically used to promote upcoming events and to deliver key messages.
- Media Relations
 - Requests for information from news media regarding Ontario operations are handled through FSD in Port Hope. Cameco monitors news coverage of its operations and the nuclear industry generally on an ongoing basis through subscriptions to media monitoring services as well as search-engine monitoring of news coverage undertaken by Cameco staff.
- Public Inquiries
 - Cameco aims to respond to inquiries in a timely manner and to provide access for subject matter experts when needed.
 - Cameco has a variety of mechanisms in its PIP to provide target audiences with opportunities to comment or ask questions about its CNSC licensed Ontario operations as well as for Cameco to respond to issues raised. These include but are not limited to:
 - Social media channels
 - Public inquiry number (905.800.2020)
 - Email inquiry on camecofuel.com (cameco_ontario@cameco.com)
 - Cameco leadership and subject matter experts at community or Cameco-led events/activities
 - Cameco technical liaison contact information provided to CNSC staff for intervenor/public inquiries

2.4.4 Information Products

Cameco makes the following information available to all members of the public through its corporate and/or community websites.

- Technical Reports and Licensing Documentation

- Summaries of significant reports supporting the licensing basis of the facilities are available on the dedicated community website, including environmental risk assessment, derived release limit assessment, safety report and preliminary decommissioning plans.
- Documents supporting licensing activities and other select reports are also available to the public on the community website.
- Quarterly and Annual Compliance Reports
 - Quarterly Monitoring and Operational Performance Reports and Annual Compliance Reports are posted on camecofuel.com. The respective reports are also sent to the MPH, Mississaugas of Scugog Island First Nation, Hiawatha First Nation, Alderville First Nation, and Curve Lake First Nation.
 - The quarterly environmental monitoring results are also provided to the MPH council.
- Videos
 - Cameco may choose to develop and deploy videos to help highlight various aspects of its operations and/or community activities. These videos may be utilized on its website and/or social media or used at off-site events.
- Printed Material
 - Print material is available for all visitors to Cameco facilities and made available at off-site information sessions. Other information products are made available through the community website, which is promoted through online, social media, print and / or radio advertisements.
- Information Boards
 - Cameco may choose to use information boards to help highlight various aspects of its operations and community investment activities. These boards may be deployed at community or Cameco-led events.

Additional information may be requested at any time through the public inquiry options described above.

2.4.5 Indigenous Engagement

Cameco is committed to provide opportunities to engage with First Nation and Métis communities regarding its operations in Ontario.

Cameco provides its Quarterly Compliance Monitoring and Operational Performance Report and Annual Compliance Report to the Mississaugas of Scugog Island First Nation, Hiawatha First Nation, Alderville First Nation, and Curve Lake First Nation.

Cameco has also identified Indigenous groups in its secondary target audience. Efforts to engage with these groups will include:

- Issuing an annual letter/email to determine interest in further engagement including meetings and/or facility tours.
- Informing of any licensing activities.
- As with any interested party, Cameco will review and respond accordingly to any request from an interested Indigenous group.

There are no changes to the activities described in the licence application from current licensed activities. As such, there are no new impacts to the environment nor the potential for new adverse impacts on an Indigenous group's asserted or established Indigenous and/or treaty rights. Letters are being sent to the Indigenous groups identified in section 2.4.2 to advise of the submission of the licence application and invite their participation in the process.

2.5 Financial Guarantee

CFM has a Preliminary Decommissioning Plan (PDP), which was prepared based on guidance provided in CSA N294.0-09 *Decommissioning of facilities containing nuclear substances*. The plan outlines the general requirements for returning the site to the status of unrestricted use and outlines the controls required for the protection of the environment during the decommissioning process. The PDP forms the basis for the financial guarantee as per CNSC regulatory document G-206 *Financial Guarantee for the Decommissioning of Licensed Activities*. The approved financial guarantee for \$21 million was approved by the Commission during the previous licensing proceedings and is maintained in the form of irrevocable letter of credit.

The PDP and associated cost estimate is currently under review and will be submitted to CNSC staff by March 31, 2021. Any proposed changes to the amount of the financial guarantee must be approved by the Commission in the licence renewal hearing, Cameco will secure an irrevocable letter of credit to cover the full amount required by the updated cost estimate.

2.6 Nuclear Liability Insurance

Cameco maintains the required nuclear liability insurance for CFM.

3.0 SITE PERFORMANCE OVERVIEW

This section describes operational highlights and improvement initiatives during the current licence period (Q1 2012 – Q4 2020).

3.1 Performance in the Current Licence Period

Cameco is committed to the safe, clean and reliable operation of all of its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees and local residents. CFM maintains the required programs, plans and procedures in the areas of health and safety, radiation protection, environment, emergency response, fire protection, waste management, and training. CFM's operations have maintained employee radiation exposures well below the regulatory dose limits. Environmental emissions and public radiation exposures are controlled to levels that are a fraction of the regulatory limits.

In its annual performance reports to the Commission, CNSC staff has rated CFM's performance as Satisfactory in all SCAs each year of the current licence period. Routine inspections by CNSC staff continue to confirm that CFM is in overall compliance with the CNSC regulatory and licensing requirements. Notices of non-conformance and recommendations made by CNSC inspectors and specialists are reviewed and used to strengthen existing programs and controls to ensure that safety, security and the environment are not compromised.

Cameco is committed to continuous improvement at all of its operations. In the current licence period, CFM has enhanced its effective site programs to align with new and/or updated CSA standards and new REGDOCs. Requirements from more than 20 standards and REGDOCs have been incorporated into site programs since 2012.

3.2 Facility Operation and Physical Design

Throughout the licence period, CFM operated routinely with no major operating problems. CFM shuts down annually in the summer for scheduled maintenance work and employee vacation time.

Modifications to the facility during the current licence period included:

- relocation of:
 - change rooms,
 - production office areas
 - bundle manufacturing system
- installation of new:
 - powder receiving and preparation area
 - stacking cell
 - pellet grinding, washing and drying area
 - waste treatment services

All of these activities were carried out utilizing the internal change and design control process. None of these activities required written approval from the Commission or a person authorized by the Commission.

3.3 Radiation Protection

The well-established radiation protection program at CFM has been demonstrated to be effective in the prevention of unreasonable risk to the health and safety of workers. The total effective dose (TED) for all employees is shown in Table 1 which are well below the annual regulatory limit set out in the *Radiation Protection Regulations* of 50 mSv/yr.

Table 1 Total Effective Dose in Current Licence Period

2012 - 2019 Total Effective Dose				
Year	Number of Individuals	Minimum Dose (mSv)	Average Dose (mSv)	Maximum Dose (mSv)
2012	365	0	0.7	6.0
2013	330	0	0.7	8.6
2014	317	0	1.3	8.5
2015	336	0	1.2	12.6
2016	278	0	1.0	7.8
2017	270	0	0.7	6.4
2018	267	0	1.1	8.0
2019	256	0	1.1	8.4

The five-year regulatory limit of 100 mSv established in the *Radiation Protection Regulations* applies to unique five-year periods. The periods relevant to the current licence period extend from January 1, 2011 to December 31, 2015 and January 1, 2016 to December 31, 2021. For the January 2011 to December 2015 period, the maximum TED for a single individual for all five years was 36.2 mSv. Up to December 2019 of the January 2016 to December 2020 period, the TED for the highest individual was 24.9 mSv. The 2020 results will be reported March 31, 2021.

3.4 Conventional Health and Safety

CFM has a strong occupational health and safety program with a strong commitment to safety. The focus on safety is demonstrated by the achievement of 5 years without a lost time injury in 2020.

3.5 Environmental Protection

CFM controls and monitors all releases of nuclear and hazardous materials from the facility. Effluent and environmental monitoring is described in the Environmental Protection Program (EPP). During the current licence period, environmental action levels

were exceeded four times: sanitary sewer in 2014 and 2018, stack emissions in 2016 and fenceline gamma in 2017. These instances were reported to CNSC staff, investigated by CFM and corrective actions were taken. There was no impact on the public or the environment as a result of these instances.

In addition, during the licence period, the EPP and supporting documents were updated to incorporate requirements from the CSA N288 suite of environmental standards, including those for derived release limits, environmental monitoring, effluent monitoring and development of action levels.

3.6 Public Information and Community Engagement

Cameco has a mature PIP to provide relevant information to the community on how activities at CFM affect the environment and the health and safety of employees and the community. The program is dynamic and utilizes traditional radio and print media, community-based activities, as well as web-based and social media to communicate with the public.

Cameco maintains a dedicated community website (www.camecofuel.com) to broadly communicate information about its Ontario operations. The site provides information about Cameco's PHCF, CFM and Blind River Refinery (BRR) facilities, environmental programs, and community involvement. Documents supporting licensing activities, compliance reports, and other select reports or technical summaries are also available to the public on the community website.

Cameco is committed to providing information to interested Indigenous groups and proactively reaches out to provide information or extend invitations to Cameco initiatives.

Over the past decade, Cameco has retained outside expertise to measure public opinion in Port Hope to help determine the effectiveness of its PIP. The annual public opinion polling has consistently demonstrated a continued high level (~90%) of community support for Cameco's continued operations in Port Hope.

4.0 SAFETY AND CONTROL AREAS

4.1 Management System

The management system program at CFM 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. The Management System Program Manual (CFM-MS) meets the requirements of CSA N286-12 (R2017): *Management System Requirements for Nuclear Facilities* and REGDOC 2.1.1: *Management System*.

The management system is based on the following principles, which are described in more detail in CFM-MS and applied in a graded manner commensurate with risk.

- Safety is the paramount consideration guiding decisions and actions;
- The business is defined, planned and controlled;
- The organization is defined and understood;
- Risks are identified and managed;
- Resources, generally captured as financial, human and infrastructure, are identified and managed;
- Communication is necessary and must be effective to achieve our business objectives;
- Information is identified and managed;
- Work is identified and managed;
- Problems are identified, assessed for significance and resolved as appropriate to the significance;
- Changes are identified and controlled;
- Assessments are performed;
- Experience is sought, shared and used;
- The management system is continually improved; and
- Corporate oversight is defined and performed to ensure the management system meets the business needs.

CFM-MS 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 CFM. However, CFM's top management remains accountable to ensure the requirements of this program are met.

An annual site management review is held with site, divisional and corporate leadership to review the suitability, adequacy, and effectiveness of corporate Safety, Health, Environment and Quality (SHEQ) policy and site programs and procedures to ensure conformance to both Cameco and CNSC requirements. These reviews include assessing opportunities for improvement and the need for changes to site programs, including objectives and targets. Actions are assigned and tracked in the Cameco Incident Reporting System (CIRS).

4.1.1 Organizational Structure

The organizational structures of FSD and CFM are shown in Figures 5 and 6. The Vice-President, FSD, directs the operation of and maintains corporate responsibility for CFM. The General Manager, CFM, has the responsibility of operating the facility in accordance with the corporate policies, principles and operating budgets approved by the company's board of directors. To facilitate administrative control within the facility, employees have been organized into a number of departments. Production and service-oriented departments have been segregated, but all departments report to the general manager.

Designated personnel are responsible for all operations within their departments which must be carried out in a manner consistent with company policies, programs, plans and procedures. In accordance with Section 15 of the GNSCR, the persons who have authority to act for CFM in dealings with the Commission, and the name and position titles of the persons who are responsible for the management and control of the licensed activities are documented in writing and provided to CNSC staff. *

*Cameco letter – Persons Having Authority to Act for CFM in Dealings with the CNSC – April 17, 2020.

Figure 5 - Organizational Structure – Fuel Services Division and Corporate that Support CFM

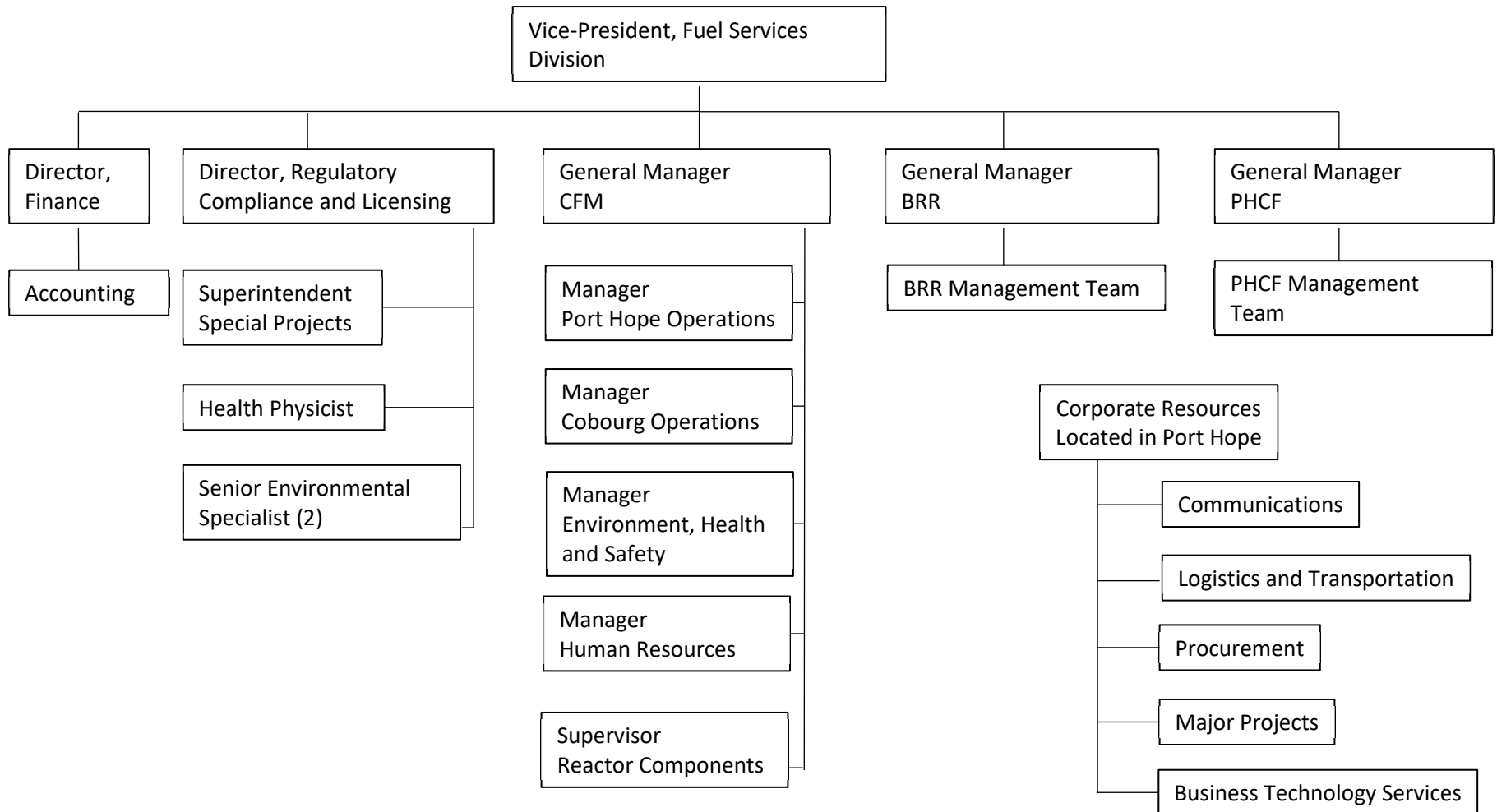
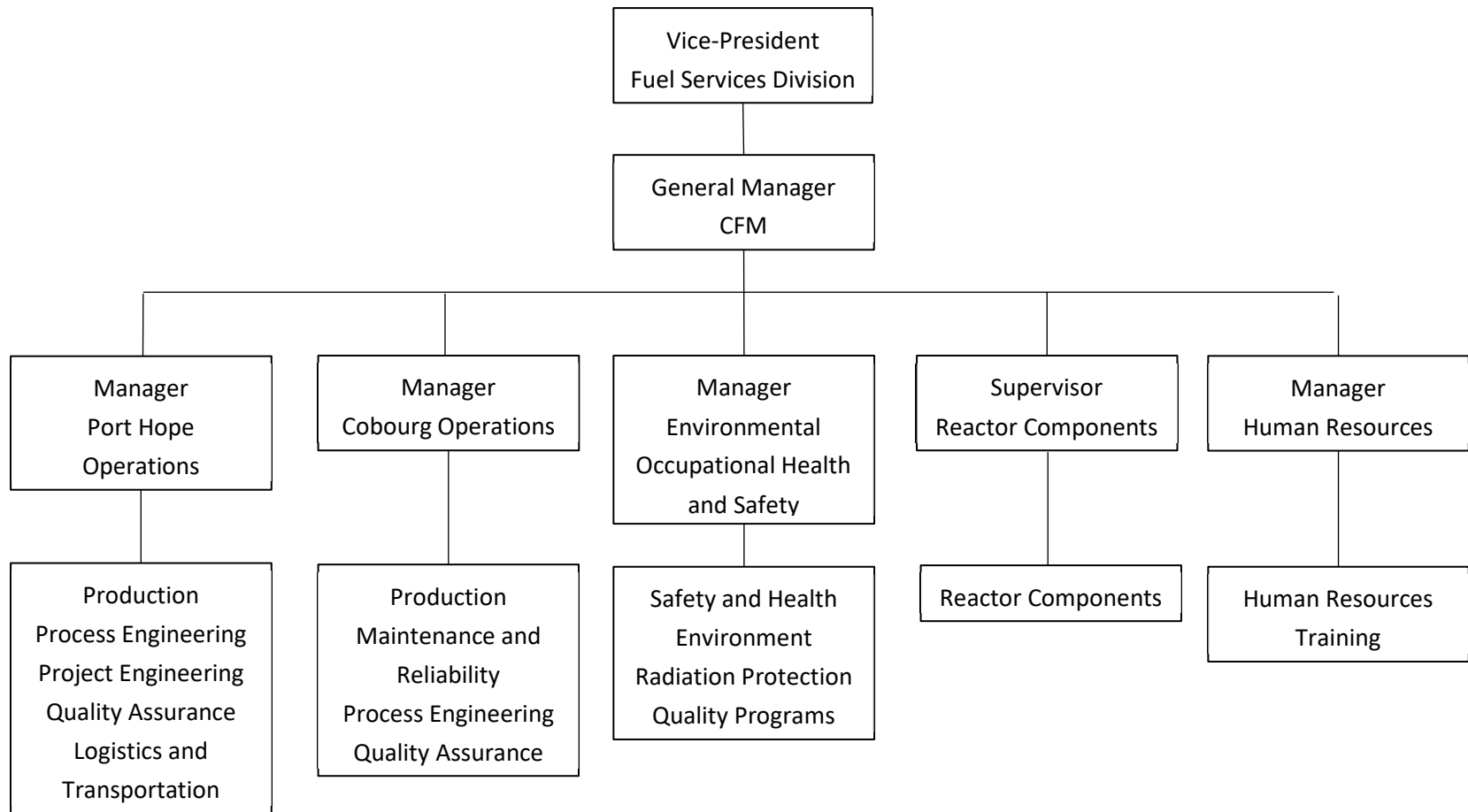


Figure 6 - CFM Organizational Structure



4.1.2 Safety, Health, Environment and Quality (SHEQ) Policy

Consistent with its vision, values and measures of success, Cameco emphasizes that the health and safety of workers and the public, protection of the environment, and quality of its processes are the highest corporate priorities during all stages of its activities, which include exploration, development, operations, restoration, decommissioning and reclamation. As such, Cameco is striving to be a world class performer in all aspects of our business through a strong safety culture, environmental leadership, operational excellence and our commitment to the following:

- Preventing injury, ill health, and pollution;
- Fulfilling compliance obligations;
- Keeping risks at levels as low as reasonably achievable, taking into account economic and societal factors;
- Ensuring quality of processes, products, and services; and
- Continually improving our overall performance.

These commitments are reflected in the SHEQ policy which is publicly available on the Cameco website (www.cameco.com). These commitments are approved and supported by Cameco's board of directors. The officers, senior management and all employees are accountable for the performance of their jobs in compliance with this policy and all relevant legislation.

4.1.3 Safety Culture

Cameco's corporate focus on its management system through governance, quality and safety culture drives accountability and oversight at all operations. Divisional oversight and collaboration are enhancing the FSD safety culture through consistency, management system enhancements and/or divisional program development, to improve safety and environmental performance.

Cameco conducts safety culture surveys (also called safety culture assessments) approximately every five years at all FSD sites. These surveys gauge the perception of employees in relation to safety culture in a scientifically meaningful way. From these surveys/assessments action plans are developed in areas where opportunities for improvement are identified. Action plans are entered into CIRS for tracking and follow-up. The most recent safety culture assessments were completed in 2013 and 2018.

The CFM and FSD leadership teams are committed to enhancing a sustainable safety culture and will continue to work diligently to ensure that all employees remain engaged to the extent possible.

4.2 Human Performance Management

CFM maintains processes to support human performance in its operations. Aspects of human factors have been considered in the development and continual improvement of site management system programs, work instructions, engineering, and operations activities, change control and the corrective action process.

Work instructions and operating documents are developed in consideration of the physical interaction of people and the production plant equipment or systems. Various risk assessment tools are used as part of continual improvement, project design and implementation and change control to identify and control error-likely situations.

4.2.1 Training Program

The CFM training program describes the processes in place for a Systematic Approach to Training (SAT). The Systematic Approach to Training-Training Plan, CFM-HR-01, meets the requirements of REGDOC 2.2.2, *Personnel Training, Version 2*. Operation of CFM requires both professional and non-professional workers for which on-the-job training is required. CFM also has training programs for specific areas such as emergency response, radiation safety, environment and health and safety. The goal of training is to develop and maintain a competent work force.

The Cameco training plan:

- Ensures employees are competent on the basis of appropriate education, skills, experience and behaviour(s);
- Provides a means of measuring, monitoring and improving the capability of employees to meet organizational objectives;
- Ensures all training is as efficient and effective as possible;
- Provides a continuous improvement mechanism for the training program.

CFM provides training to meet legislative and internal company requirements to ensure that employees have adequate knowledge and skills to fulfill their roles and responsibilities. Employee training plans identify initial and continual qualification requirements of positions. Training plans include position specific, site specific, corporate, progression, and role specific requirements where applicable.

4.3 Operating Performance

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 an inventory of nuclear substances possessed under the licensee's operating licence.

The FLM provides an overview of all the programs in place at CFM to ensure that it operates in a safe manner. The performance of these programs is regularly assessed to assure the site management that these programs are implemented, adequate and effective. Corporate personnel perform audits of the site management programs on a regular basis to verify that site performance meets both corporate requirements and complies with all applicable regulatory requirements.

4.3.1 Operating Limits

Operating limits are defined in the licensing basis upon which the Commission rendered their decision to renew CFM's operating licence in 2012. The current licensed capacity is 125 Megagrams (Mg) of UO₂ as pellets during any calendar month.

Environmental release limits and radiation protection limits are established to ensure the protection of workers, the public and the environment. Radiation protection limits are set out in the *Radiation Protection Regulations* and documented in the Radiation Protection Program, CFM-RP. Environmental release limits are documented in the Environmental Protection Program, CFM-EP and further discussed in Section 4.9.

Radioisotope sources are used at the facility. The Radioisotope Source Control Procedure, HSI-048 describes the inventory of sealed sources, and tracking and reporting requirements in accordance with REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2.

4.3.2 Operating Plan

For the proposed licence period of one year, there are no changes to CFM production plans, annual targets are based on customer orders.

4.3.3 Reporting Requirements

CFM reports information to the Commission as required under the NSCA, its regulations, and REGDOC- 3.1.2 *Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*.

Quarterly compliance reports and an annual compliance and performance report are submitted to CNSC staff as per the LCH. These reports are available to the public on the FSD community website (www.camecofuel.com).

Non-routine reporting includes incidents related to facility operations, action level exceedances and environmental releases and other events as defined in sections 29-32 of the GNSCR, section 27 of the NSCA, REGDOC-2.12.3 and the LCH. All non-routine reporting is included in the quarterly and annual reports. As per the Public Disclosure Protocol for Ontario Operations, the following events are also posted to the FSD community website:

- unusual operational events at our facilities that may have off-site consequences or that would be of interest to our target audience.
- environmental event that triggers a notification to the CNSC under section 29 of the GNSCR.
- summaries of non-routine environmental incidents that are required to be reported to the Ontario Spills Action Centre.

4.3.4 Regulated Activities

CFM is federally regulated by the CNSC as a Class 1B nuclear facility. However, CFM is also regulated by other government agencies through statute, regulation, permit, approval and/or licence. Table 2 provides a list of key regulatory authorities along with an overview of the key activities they regulate as they pertain to CFM.

Table 2: Agencies with Jurisdiction over CFM Operations

Agency	Activities Under Jurisdiction
Environment and Climate Change Canada (ECCC)	National Pollutant Release Inventory, halocarbons, spills reporting, deleterious substances enforcement under the <i>Fisheries Act</i>
Ministry of the Environment, Conservation and Parks (MECP)	Discharges to air and associated approvals, Permit to Take Water for groundwater wells and spills reporting
Municipality of Port Hope	By-laws related to noise, and sanitary sewer discharges
Department of Employment and Social Development Canada (ESDC)	Industrial Relations (Part I), Occupational Health and Safety (Part II), and Standard Hours, Wages, Vacations and Holidays (Part III) as issued through the Canada Labour Code
Ontario Ministry of Labour (MOL)	Contractors at the facility may fall under provincial health and safety regulation
Ontario Technical Standards and Safety Authority (TSSA)	Regulate boiler and pressure vessels and associated piping
Transport Canada	Transportation of dangerous goods (TDG) and emergency response assistance plan (ERAP)

4.4 Safety Analysis

The design, construction and operation of CFM is intended to eliminate or minimize to the extent possible the potential of radiological, chemical or other physical hazard to facility personnel, the environment and the general public. This is accomplished not by a single approach but rather by a defense-in-depth approach. The hazards, preventative measures and mitigating controls associated with the licensed activities at CFM have been systematically reviewed and documented from several perspectives, including but not limited to the following assessments:

- CFM Safety Analysis Report (SAR)
- Fire Hazard Analysis
- Environmental Risk Assessment
- Derived Release Limit
- Spill Prevention and Contingency Plan
- Environmental Aspects Registry

4.4.1 Safety Analysis Report

CFM has used a Process Hazard Analysis (PHA) methodology to systematically identify and analyze hazards associated with its operations. Hazard categorization is performed on a “per process” basis in order to evaluate potential hazards and establish their consequence and probability of occurrence. In addition, a listing of safety equipment and systems for mitigating each hazard was prepared. From these, a Safety Analysis Report (SAR) was generated which describes the conditions, safe boundaries, and hazard controls that ensure operational safety. The SAR is used to show, for all systems including systems that could be hazardous to the worker, public, and/or the environment, that adequate safety systems are in place to prevent unreasonable risk to persons and the environment. The SAR includes an analysis of the probable worst-case release event. The SAR is currently under revision and the new version will be submitted to CNSC staff for review and acceptance in May 2021.

The SAR contains technical detailed information that is considered confidential and proprietary and includes controlled nuclear technology and is not publicly available. A technical summary of the updated SAR will be available on Cameco’s community website once accepted by CNSC staff.

4.5 Physical Design

CFM is required to have a program for physical design of the facility to assess the ability of structures, systems and components to meet and maintain their design basis given new information arising over time and manage changes to ensure that safety is maintained.

4.5.1 Facility Design

Site details are provided in Section 2.2. The licensed areas is secured by a metal fence that encloses the entire perimeter.

Modifications to the facility are made in accordance with the *National Building Code of Canada, 2015*, the *National Fire Code of Canada, 2015* and *National Fire Protection Association, CSA N393, Fire protection for facilities that process, handle, or store nuclear substances*.

4.5.2 Facility and Process Changes

CFM's Change Control, MSP 13-02 describes the process used to identify and manage changes at site in a manner appropriate to the type and significance of the change. The change control review process involves subject matter experts and identifies potential implications with respect to operability, health and safety and the environment, including any regulatory and/or code implications.

4.5.3 Third Party Review for Fire Protection

Modifications for which the initial assessment indicates a potential impact on fire protection design basis, goals, or criteria shall be subject to a qualified third-party review as per CSA N393. All third-party reviews are conducted by qualified persons from organizations whose management and financial operations are independent of the design organization. All third-party fire reviews are submitted to CNSC staff as required by the licence and LCH.

4.5.4 Pressure Boundary Program

As required by its operating licence, CFM maintains an agreement with an Authorized Inspection Agency (AIA) for the registration, inspection and other activities related to pressure systems. The AIA is the Technical Standards and Safety Authority (TSSA) for CFM.

4.6 Fitness for Service

CFM is required to have a program for maintenance of the facility and a program for periodic inspection and testing for the facility. This area includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

4.6.1 Maintenance Program

CFM has an established preventative maintenance program as described in the Preventative Maintenance Execution Management, AP 018. All preventative maintenance work is initiated and documented through the work notification system in SAP. The site

maintenance program ensures that equipment functions as designed, remains 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.

4.6.2 Periodic Inspection and Testing for Fire Protection Systems

Fire protection systems are tested according to an established schedule developed using the National Building Code and 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*.

4.7 Radiation Protection

Radiation protection measures are in place to minimize and control the potential for radiation exposure to both employees and members of the public arising from the operation of CFM. This exposure is due to the alpha, beta and gamma radiation emitted from the depleted, natural and enriched uranium compounds received and processed at the facility. Exposure can be from beta or gamma radiation outside the body, or alpha, beta or gamma radiation from inside the body as a result of inhalation, ingestion or absorption through the skin of uranium bearing materials.

This section will focus on radiation exposure for workers at the facility. Radiation exposure for the public is discussed as part of the Environmental Protection SCA in Section 4.9.

4.7.1 Radiation Protection Program

The Radiation Protection Program, CFM-RP describes how CFM meets the requirements of the *Radiation Protection Regulations* and ensures that contamination levels and radiation doses received by individuals are monitored, controlled and maintained As Low As Reasonably Achievable (ALARA).

CFM-RP describes written procedures used to ensure that radiation exposures and doses are kept ALARA, social and economic factors taken into account. This is accomplished by various means; employee training and awareness, the use of specialized handling and personal protective equipment, the development of specialized procedures and monitoring methods, and by having a system in place to develop, implement and monitor the effectiveness of their efforts.

Radiation exposure for employees is monitored through a comprehensive dosimetry program that includes internal and external dosimetry monitoring. FSD maintains a dosimetry services licence issued by the CNSC for the urine analysis and lung counting programs.

4.7.2 Potential Radiological Hazards

Radiation hazards at CFM are primarily associated with natural, depleted and enriched uranium. The hazards associated with natural uranium are of greater concern due to the quantities processed. Working in the presence of uranium, internal exposure can result from inhalation, ingestion or contamination of an open wound. The primary hazards are chemical damage to the kidney, radiation dose to the bone, and radiation dose to the lung. CFM-RP further details the dose implications of uranium compounds found at CFM.

4.7.3 In-Plant Monitoring

Regular gamma surveys of the plant and storage areas are performed and areas with dose rates above 25 $\mu\text{Sv/h}$ are posted. This posting informs workers that the time spent in this area should be minimized.

Uranium in air is monitored using an in-plant air sampling system. The air sampling results from these stations provide an indication of air quality, and the performance of engineering controls. This data is used to determine whether respiratory protection is required.

In addition to the in-plant air sampling system, CFM has continuous air monitoring systems in the areas where powder is handled. These units operate continuously and are set to alarm when uranium concentrations approach levels requiring respiratory protection.

4.7.4 Nuclear Energy Workers

Employees or contractors that have a reasonable probability of receiving a radiation dose greater than 1 mSv are designated as Nuclear Energy Workers (NEWs). As required by the *Radiation Protection Regulations*, all NEWs are notified in writing of this designation, the risks associated with radiation that they may be exposed to in the course of their work and the applicable effective and equivalent dose limits. Female NEWs are also notified in writing of their rights related to pregnancy and breast feeding, including the benefits of notifying Cameco, as soon as they are aware of their pregnancy or planning to breast feed.

All NEWs receive training in radiation safety when first hired or returning to work after an extended absence. Regular refresher training is completed on a set frequency.

4.7.5 Personal Dosimetry

The annual dose assignment of NEW’s working at CFM consists of both external and internal dosimetry inputs. The annual total effective dose is the sum of a worker’s whole body dose as measured by dosimeter badges plus their dose from their lung burden. Dose from uranium in urine may be assigned for significant uptakes of uranium. Each of the three components of the personal dosimetry program is described below.

4.7.6 External Dosimetry

Individually assigned dosimeters are used to determine external dose as both deep-dose equivalent and shallow-dose equivalent exposure from external sources of radiation. The external dosimetry service for Cameco is provided through a CNSC approved external dosimetry service provider. Action levels for external dosimetry are shown in Table 3. These action levels are also referenced in CFM-RP and in the appropriate radiation protection procedures. Extremity dose measurements are also performed using ring-type dosimeters that are processed in the same manner as the conventional dosimeters.

Table 3 Action Levels for External Dosimetry

External Dosimetry Parameter	Frequency	Regulatory Action Level (mSv)
Whole Body Exposure	Monthly - NEW	1.6
	Quarterly - NEW	1.0
	Quarterly – non-NEW	0.2
Skin Exposure	Monthly - NEW	20.0
	Quarterly - NEW	5.0
	Quarterly – non-NEW	2.0
Extremity Exposure	Quarterly – NEW	55.0

4.7.7 Internal Dosimetry

FSD holds a licence from the CNSC that authorizes Cameco to provide internal dosimetry services to PHCF, BRR and CFM. Additional information regarding this program may be found in FSD’s Technical Basis Document (TBD).

Internal dose is assessed and assigned through two programs – urine analysis and lung counting. When assigning dose through the urine analysis program, it is assumed that the exposure was to a fast (soluble) uranium material which is not present at CFM. When a dose is assigned due to a lung burden, it is assumed that slow (insoluble) uranium material is present for CFM workers.

4.7.8 Urine Analysis

Because of the solubility of the form of uranium present at CFM, lung counting will capture all internal doses as there is very little uranium present in the urine for low intakes. However, urine analysis samples can be used to screen for potential kidney toxicity, for an indication of upset or unusual conditions and for the dose assessment of abnormal intakes together with lung counting results. CFM-RP and site procedures describes which employees are required to submit routine urine samples for the analysis of uranium. Non-routine urine samples can be provided by any individual at any time. The action level for Urine Analysis is shown in Table 4.

Table 4 Action Level for Urinalysis

Frequency	Action Level
Bi-Weekly Pre shift (Cameco Employees)	10 µg U/L

4.7.9 Lung Counting

The dose assessment of uranium in lung is performed using a germanium detector-based lung counting system. A group-counting technique is used for dose assignment where all employees in a similar work group are assigned an average internal dose. This method involves creating appropriate groupings of individuals based on similar exposure potential and measuring and assessing each individual's spectrum, taking detection criteria and physical conditions (e.g., individual chest wall thickness) into account.

The frequency of lung counting of NEWs is based on the work group to which the employee belongs and is described in CFM-RP. Individuals who are not lung counted such as administrative support staff and contractors have internal dose based on lung exposure determined through prorating the average dose from the production group.

Individuals with lung count results above the detection criteria are assigned an individual dose and this dose is not included in the group average. Dose from lung counting is assigned annually as part of their annual dose report. Individuals with a lung burden above the detection criteria are informed of their assigned dose as soon as possible after completion of all required lung counts. The action level for dose due to lung burden has been set at 5 mSv/year.

4.7.10 Contamination Control

CFM maintains zone control and monitoring programs as described in CFM-RP to identify areas of potential contamination and prevent the spread of radioactive contamination from these areas. The site has been divided into four control zones (1-4) and the possibility of

contamination increases with increasing zone numbers. The effectiveness of the facility zone control program is assessed through floor contamination surveys, swipe sampling and monitoring of employee hands and feet.

4.7.11 Monitoring at the Point of Final Exit

In order to prevent possible contamination of the surrounding environment with radioactive material, materials are monitored prior to being removed from the pelleting area. Items such as contractor equipment leaving the licensed portion of the site are monitored prior to being removed from site.

All vehicles entering the plant are checked in and out by trained security guards. The guards are trained in the use of radiation monitoring equipment.

Portal monitors are installed at the front entrance of CFM. All employees, contractors and visitors are required to use them prior to exiting the facility.

4.7.12 Radioisotope Control

The facility uses a number of radioisotopes that are regulated under the CNSC *Nuclear Substances and Radiation Devices Regulation*. CFM maintains a record of the specific radioisotope sources on site that are present above an exemption quantity, the radioisotope used and the maximum activity of the device as described in HSI-048. These sources are typically used as calibration sources.

4.7.13 Nuclear Criticality Control

The Nuclear Criticality Safety Program Manual (NCSPM) has been developed to guide the generation and implementation of CFM's criticality prevention practices as they pertain to licensing and criticality prevention issues. This document is structured to meet the requirements of REGDOC 2.4.3 Nuclear Criticality Safety.

Where practicable, the design of processing facilities and equipment handling enriched material includes geometric limitations to prevent a criticality accident. A key limitation to prevent a criticality accident is the present limit on the mass of enriched nuclear materials permitted on site at any one time. The NCSPM applies to all CFM equipment and operations that are licensed by the CNSC with respect to the handling of fissile materials.

The manual has been designed into two main categories depending on the potential risk associated with enriched uranium dioxide and criticality. These categories are as follows:

- Partial Scope – this category addresses the issues with handling enriched uranium material with an on-site possession of less than 0.8 smallest critical masses (SCM).

- Full Scope – this category addresses the issues with handling enriched uranium material with an on-site possession of greater than and equal to 0.8 SCMs. This category ensures that the operations with enriched uranium materials such that the upper sub critical limits established in the Nuclear Criticality Safety Program Manual will not be exceeded under both normal and credible abnormal conditions.

4.8 Conventional Health and Safety

This safety and control area covers the implementation of a program to manage non-radiological workplace safety hazards and to protect personnel and equipment. A key element of a safe, clean and reliable operation is a comprehensive and well-established worker protection program which has been in place for many years at CFM. The foundation of the program is based on the NSCA and its regulations as well as Part II of the *Canada Labour Code*.

4.8.1 Conventional Safety Program

The health and safety management program fosters and promotes a strong sustainable safety culture with a safe, healthy and rewarding workplace. Cameco has five key principles that form the framework of how safety is managed. These are:

- safety is our first priority;
- we are all accountable for safety;
- safety is part of everything that we do;
- safety leadership is critical to Cameco Corporation; and
- we are a learning organization.

The health and safety of workers at CFM is ensured through the Safety and Health Program, CFM-HS, which meets the requirements of REGDOC-2.8.1 *Conventional Health and Safety*. Key components of the program include:

- compliance with all safety and health-related legal and regulatory requirements;
- the setting of site safety and health objectives;
- the implementation of corporate safety standards;
- the development and maintenance of a formal hazard recognition, risk assessment and change control processes; and
- the documentation of health and safety significant incidents from the start through to the verification of completion of corrective actions via the CIRS database.

4.8.2 Hazards

CFM is a Class IB nuclear facility. There are radiological hazards associated with the uranium processed at the facility. Chemicals at site include bulk hydrogen as well as

smaller quantities of laboratory chemical, water treatment chemicals and materials used for maintenance activities.

There are also a variety of physical hazards that are monitored and controlled at the site such as heat, lighting, noise, vibration, traffic and extreme weather.

4.8.3 Work Controls

All site personnel have a general awareness of the occupational health and safety hazards that exist at the site and the various means of minimizing these risks. All groups attend regular department safety meetings where employees are encouraged to discuss safety issues or concerns. Safety awareness, training and re-training are done through in-class sessions, safety meetings, and computer-based training depending on the topic.

Hazardous materials are labeled or identified to meet applicable regulations. The proper identification of hazardous materials decreases the likelihood of improper use, handling and disposal, which reduces potential risks and negative consequences.

Work instructions, procedures, and job hazard analysis (JHA) are some of the tools used to identify and control hazards in the workplace.

Personal Protective Equipment (PPE) is provided as necessary and is specified in the work instruction or JHA for the job. All PPE is approved to ensure that the correct PPE is available for each job. Respiratory protection with appropriate respirator cartridges are available for tasks where inhalation of uranium, chemicals and/or dust is possible above specified exposure limits. CFM's use of respiratory protection meets the requirements of CSA Z94.4-11 *Selection, use and care of respirators*.

Personal and area monitoring is performed to assess workplace exposures. These include in-plant uranium in air levels, and urine analysis program for uranium. Monitoring for other parameters (e.g., asbestos, lead in paint, heat, lighting) is performed on an "as needed" basis.

4.8.4 Health and Safety Committee

CFM has a Joint Health and Safety Committee (JHSC) that is implemented and maintained that complies with the legal requirements outlined under Part II of the *Canada Labour Code*.

The intent of the committee is to provide a forum whereby worker and management representatives can come together on a regular basis to identify and resolve health and safety concerns and to work together on preventative-type actions that will improve overall health and safety in the workplace.

4.9 Environmental Protection

CFM is required to have in place a program that identifies, controls and monitors all releases of radioactive and hazardous substances from the facility.

4.9.1 Environmental Protection Program

CFM maintains an EPP that meets the requirements of CNSC REGDOC-2.9.1: *Environmental Protection: Environmental Principles, Assessments and Protection Measures (Version 1.1)*, as well as the following CSA environmental standards:

- CSA N288.1, *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*
- CSA N288.5, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.6, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*
- CSA N288.8, *Establishing and implementing action levels for releases to the environment from nuclear facilities.*

Actions to fully implement CSA N288.7, *Groundwater protection programs at Class I nuclear facilities and uranium mines and mills* will be completed with the submission of the annual groundwater and surface water monitoring reports on March 31, 2021.

The FSD Environmental Management System, FSD-PGR-EMS-001 (EMS) describes the higher tier program elements that meet the requirements of the ISO 14001 standard and applicable CSA N288 series standards. The site EPP, CFM-EP describes site-specific aspects associated with the environmental sampling that is carried out in support of the EMS and the Environmental Risk Assessment (ERA). This monitoring data is then compared to applicable action levels and limits to ensure operations remain in compliance with applicable regulations and license limits.

4.9.2 Environment Risk Assessment

CFM maintains an ERA in accordance with the requirements of CSA N286.6: *Environment Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*. The 2016 ERA found there were no undue risks to the environment or to human health as a result of CFM operations. A summary and a redacted version of the ERA are available on the Cameco community website. In accordance with N288.6-12, a review of the ERA is currently underway to determine whether current conditions are consistent with the conclusions reached in 2016. This is expected to be submitted to CNSC staff in March 2021.

4.9.3 Environmental Regulation

Airborne and liquid effluent discharge quality is defined and regulated by federal and provincial regulators. For Cameco, the main federal regulatory agencies are the CNSC and ECCC. Provincial regulation is by the Ontario MECP. The acts (and associated regulations) enforced by these agencies include the *NSCA, Canadian Environmental Protection Act, 1999, Fisheries Act, Ontario Water Resources Act* and the *Environmental Protection Act*. CFM must also comply with applicable municipal bylaws.

CFM currently maintains the following approvals from the MECP:

- Permit to Take Water (PTTW) for groundwater takings
- Environmental Compliance Approval (ECA) – air

4.9.4 Airborne Emission Program

The primary air emissions associated with CFM operations is uranium. These contaminant emissions are measured using source monitoring and/or estimated using emission calculations based on emission rates established in the Emission Summary and Dispersion Modelling Report (ESDM).

Source Monitoring

The facility is designed with discrete discharge points along the production line. The airborne effluent monitoring program therefore is designed so that each stack in the production line is monitored when that area of the plant is operating. The details of this program are provided in CFM-EP.

The current air emissions action levels and limits are presented below. No changes are proposed for the 1-year licence renewal.

Table 5 Air Discharge Limits and Action Levels

Source	Parameter	Action Level	Averaging Period	Annual Limit
Process Stack Emissions	Uranium	2 µg/m ³	Daily	14,000 g/year*
Building Ventilation – PP2	Uranium	0.5 g/hr	Daily	
Building Ventilation – All other areas	Uranium	1 g/hr	Daily	

* this limit is based upon 50 uSv dose to the critical receptor (1/20 the Derived Release Limit of 1 mSv to the critical receptor).

Air emissions are also regulated by the MECP under O. Reg. 419/05 *Air Pollution - Local Air Quality*. Site air emissions are documented and compared against point of impingement standards in the site ESDM. The ESDM predicts contaminant concentrations from the facility at the facility fence line and into the community using a developed worst-case emission scenario and an air dispersion model that meets the requirements of O. Reg.

419/05. The ESDM report is updated as required to reflect the most recent air emissions data.

Ambient Monitoring

In support of the source sampling program, an ambient air sampling program has been established to measure the concentration of uranium in the air in the vicinity of the facility. Four high-volume (hi-vol) sampling stations are located inside the perimeter fence line. Soil sampling for uranium in the vicinity of the facility is also done for uranium on a periodic basis. Additional information on ambient monitoring can be found in CFM-EP.

4.9.5 Liquid Emission Program

The waterborne effluent from the CFM facility is discharged to the MPH sanitary sewer system and is monitored in accordance with operating licence requirements. Automatic, composite sampling based on an equal volume/time sampling methodology is used to collect representative samples of the combined discharges to the sanitary sewer from the uranium processing portion of the facility and the groundwater treatment system. An additional output to the sanitary sewer from non-production areas exits on the west side of the facility. The groundwater treatment system inlet and outlet are also sampled twice annually for uranium and VOCs

Table 6: Summary of Liquid Effluent Discharge Limits and Action Levels

Parameter	Regulatory Limit	Action Level
Uranium	475,000 g/year (CNSC)*	0.1 ppm (twice weekly composite)
pH	< 6.0 or > 9.5 (MPH by-law)	≤6.5 or ≥9.0 (twice weekly composite)

* this limit is based upon 50 uSv dose to the critical receptor (1/20 the Derived Release Limit of 1 mSv to the critical receptor).

Groundwater collection is also regulated under a Permit to Take Water (PTTW) from the MECP. Groundwater sampling and groundwater level monitoring is completed semi-annually at numerous monitoring wells and pumping wells within the licensed and unlicensed portions of the CFM property. Semi-annual groundwater sampling and groundwater level monitoring is also completed at monitoring wells on adjacent properties bordering Peter Street. A comprehensive review of the groundwater monitoring is completed and submitted to the CNSC and MECP annually.

The aquatic environmental monitoring program is intended to collect data to monitor stormwater discharges to municipal infrastructure and the Gages Creek tributary, in addition to monitoring surface water quality within the Gages Creek tributary. An environmental consultant collects ambient water samples three times per year from up to nine sampling points beyond the licensed facility.

4.9.6 Terrestrial Monitoring Program

The terrestrial environmental monitoring program is intended to collect data for uranium (as an indicator of all emissions) to assess whether airborne effluent emissions from the CFM are accumulating in soil.

Soil Monitoring

In order to support the periodic review of the ERA, Cameco collects soil samples at 23 monitoring locations at least every 3 years.

Gamma Monitoring

Gamma radiation emissions from the licensed sites can cause radioactive dose to members of the public via external gamma radiation exposure. Fenceline gamma measurements are performed around the facility each month using optically stimulated luminescence (OSL) dosimeters.

4.9.7 Estimated Dose to the 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 of 1 mSv. As part of the periodic review of the DRL, the most exposed receptor locations for each receptor activity are determined to identify the critical receptor. A person located at this receptor, given their proximity to the facility and the theoretical length of time that could be spent at this location, would be expected to receive the highest possible radiation dose that any member of the public could receive.

The DRL for CFM was revised in 2020 and is based on three components: dose to the public from air emissions, dose from water discharges and dose from gamma radiation. For CFM, dose to the public from air and water emissions is a very small fraction of the public dose limit and the gamma component represents virtually all the estimated public dose. The critical receptor is an infant who resides in a nearby end of life care facility and is represented by the environmental dosimeter 12, located on the north fenceline. The dose at this receptor location is used in the calculation of dose to the public. This is a change from the previous DRL and will represent a more conservative estimated dose to the public.

4.9.8 Reporting of Environmental Information

CFM makes information related to the environment and the public available through a variety of methods. Quarterly and annual compliance reports that are submitted to the CNSC are posted to the community website, and a record of spills and other events that may be of interest to the public is also maintained on the website. Cameco also provides

its Quarterly Compliance Monitoring and Operational Performance Report and Annual Compliance Report to interested parties as described in section 3.6. Additional updates are provided to the Municipality when needed.

4.10 Emergency Management and Fire Protection

CFM is required to maintain an emergency preparedness plan and a fire protection program to ensure that licensed activities do not result in an unreasonable risk to the health and safety of persons and the environment.

4.10.1 Emergency Response Plan

The CFM Emergency Response Plan (ERP), MSP 30-02 is compliant with the requirements of REGDOC 2.10.1: *Nuclear Emergency Preparedness and Response*.

4.10.2 Emergency Preparedness and Response Organizations

Depending on type and magnitude of an incident, the site may activate any or all of the following response organizations for the protection of human health, the environment and property: Immediate Responders, Emergency Response Organization (ERO), Local Crisis Management Team, and Corporate Crisis Management Team. Each of these organizations has a manual and/or procedures or guidance documents to ensure that the organizational response to an emergency situation is systematic and meets the regulatory requirements commensurate with the nature of the emergency.

4.10.3 Emergency Response Assistance Plan

Cameco also has an Emergency Response Assistance Plan on file with Transport Canada. This plan has been approved by Transport Canada, pursuant to federal transportation of dangerous goods requirements, and applies to transportation emergencies. Transportation activities related to the shipping and receiving of goods at or from CFM are included in the plan. Cameco reviews and updates the Emergency Response Assistance Plan as required.

4.10.4 Fire Protection Program

The Fire Protection Program (FPP), MSP 30-07 has been developed and implemented to comply with the requirements of the National Fire Code, National Building Code, and with CSA N393-13: *Fire Protection for facilities that process, handle, or store nuclear substances* (CSA N393-13).

The FPP consists of the following main elements: the Fire Hazard Analysis (FHA), the Fire Safety Plan (FSP), MSP 30-03, Pre-incident Plans and related fire safety procedures. These documents are reviewed and updated on a periodic basis by qualified personnel, as required.

Routine inspections and testing of the fire protection system are conducted by or under the direction of Cameco personnel. A system is in place to enable detection and notification of fire. Emergency pull stations are located strategically throughout the facility. Areas with potential fire hazards are equipped with appropriate fire detection and/or suppression systems. Fire safety equipment is maintained with the use of preventive maintenance and periodic inspections.

4.10.5 Fire Hazards Analysis

CFM's FHA meets the requirements of CSA N393-13 and supporting reference materials. The FHA evaluates the impact of fire on the facility and demonstrates that the fire protection objectives can be met under foreseeable fire events. To satisfy this objective, safety significant systems and equipment as well as fire hazards have been identified. An analysis has been made of the potential for a worst-case fire event to impact safety related systems and equipment.

4.10.6 Fire Safety Plan

The FSP is a key element of the site Fire Protection Plan and is intended to be a companion document to the site FHA. While the objective of the FHA of the site buildings is to identify fire hazards and fire protection features intended to meet nuclear and life safety requirements, the objective of the FSP is to define the administrative controls required to maintain fire safe conditions and help the occupants in utilizing life safety features in the buildings, ensure an orderly evacuation at the time of an emergency and provide a maximum degree of flexibility to achieve the necessary fire safety for the buildings. fire safety features required by the FHA.

The following controls are documented in the FSP:

- Fire protection systems;
- Inspection, testing and maintenance program;
- Impairments;
- Fire separations;
- Emergency response plan;
- Emergency organization; and,
- Pre-incident plans.

4.10.7 Emergency or Fire Recovery Plan

The emergency recovery plan will depend on the nature of the emergency situation, i.e., whether the emergency is local (within the plant), external (off-site) or a transportation event. Depending on the situation, the recovery plan may require regulatory review and approval. Recovery plans would be developed to minimize the impact to personnel involved in the clean-up, the environment and the general public. Guidance on what is to be included in a recovery plans is provided in the ERP.

4.11 Waste Management

CFM is required to maintain a waste management program at the facility which covers the internal waste-related programs which form part of the facility's operations up to the point where the waste is removed from the facility. It also covers the planning for decommissioning.

4.11.1 Waste Management Program

The waste management program for CFM is described in the FSD Waste Management Program, FSD-PGR-WM-01, and site Waste Management Program, CFM-EP-02. The program meets the requirements for management of radioactive waste in solid, liquid or gaseous states as defined by 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*.

The waste management activities are conducted with the following objectives:

- 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; and
- To continually evaluate disposal alternatives and new technologies for waste reductions.

4.11.2 Current CFM Waste Streams

Recoverable Uranium Materials

CFM sends natural uranium scrap material to the BRR for recovery of the uranium. This prevents these materials from becoming waste. Depleted scrap material is transferred to PHCF for consolidation of the depleted uranium inventory within Cameco. Enriched scrap material is maintained onsite pending transfer to an appropriate receiving facility.

Conventional Waste

CFM also has processes in place for the collection, storage and disposal of non-contaminated, non-hazardous waste materials such as cardboards, plastics, clean chemical drums and lunchroom refuse. Materials that are sent to conventional landfill or recycling are scanned to ensure they are free of uranium contamination prior to release from the facility.

Contaminated Waste Materials (Radioactive Waste)

Waste materials contaminated with uranium will be stored onsite until appropriately managed.

Contaminated combustible waste materials are sent to BRR for incineration.

Drums containing contaminated solid material are stored in designated areas, pending disposal at an appropriately licensed facility in the United States or decontamination of the material for recycle.

Contaminated equipment and other items are stored in trailers pending further processing prior to uranium recovery and/or disposal at an appropriately permitted facility.

All waste materials will remain in safe, secure storage until acceptable permanent disposal or recycle options have been identified.

Hazardous Waste Materials

Non-contaminated hazardous waste materials are managed and disposed of in accordance with the requirements under the provincial waste management regulation, O. Reg. 347. Cameco maintains a Generator Registration Number for a small number of hazardous waste classes that are registered through the MECP Hazardous Waste Information Network (HWIN). Wherever possible, some hazardous wastes are sent to recyclers for recycling rather than disposal (i.e. fluorescent light tubes, batteries, etc.).

Miscellaneous Contaminated Wastes

Miscellaneous radioactive contaminated wastes that do not have a current processing strategy or disposal outlet will be stored onsite in a safe manner. Radioactive waste that is also hazardous must be disposed of at a facility permitted for both the radioactive and chemical hazards. Any waste materials that are not managed by one of the programs listed will require the development of a specialized plan for disposal or management following the requirements of the FSD Waste Management Program (FSD-PGR-WM-01) and associated documents.

4.11.3 Preliminary Decommissioning Plan

CFM has a Preliminary Decommissioning Plan (PDP), which meets the requirements provided in CSA N294.0-09 *Decommissioning of facilities containing nuclear substances*.

The version being submitted March 2021 will meet the requirements of the 2014 version of the standard. The PDP outlines the general requirements for returning the site to the status of unrestricted use and outlines the controls required for the protection of the environment during the decommissioning process. The PDP forms the basis for the financial guarantee as per CNSC regulatory document G-206 *Financial Guarantee for the Decommissioning of Licensed Activities* discussed in section 2.5. A technical summary of the PDP is available on Cameco's community website.

4.12 Security

CFM maintains a security program to control access to the site of the activity to be licensed and the nuclear substance, prescribed equipment or prescribed information.

4.12.1 Security Plan

CFM's Physical Security Plan, MSP 30-01 presents an overview of the security operations at CFM and identifies the systems and processes in place to meet security program objectives. MSP 30-01 meets the requirements of REGDOC-2.12.3 *Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2*. Accordingly, this document is considered prescribed information and is subject to the requirements of the GNSCR. The objective of the security plan is to ensure safe and secure operation of the facility, by maintaining protection through use of equipment, personnel, and procedures. The CFM Security Plan has continued to evolve in order to meet all regulatory requirements and commitments over the period of the current operating licence.

4.13 Safeguards and Non-Proliferation

CFM is required to have a program in place that ensures all obligations arising from the Canada/International Atomic Energy Agency (IAEA) Safeguards agreement are met. 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.

4.13.1 International Obligations

CFM complies with the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the *Treaty on the Non-Proliferation of Nuclear Weapons*. Safeguards involves inspection and other verification activities undertaken by the IAEA to evaluate compliance with obligations under safeguards agreements with the IAEA.

4.13.2 Inventory and Reporting

CFM complies with REGDOC 2.13.1 *Safeguards and Nuclear Material Accountancy* as described in FSD Safeguards Program (FSD-PGR-SG-01). The facility maintains a natural uranium inventory system in which receipts and shipments are recorded. Monthly inventory reports are distributed to the CNSC that include safeguarded natural uranium as well as the inventory of non-safeguarded material.

CFM completes an annual Physical Inventory Taking (PIT) as part of the safeguards program which is followed by a Physical Inventory Verification (PIV) with the IAEA or a Physical Inventory Taking Evaluation with the CNSC. Short Notice Random Inspections (SNRIs) of the facility are conducted by the IAEA periodically throughout the year to ensure compliance with safeguards obligations.

4.14 Handling, Storing, Packaging and Transport

CFM is required to have a packaging and transport program that meets the requirements set out in the *Packaging and Transport of Nuclear Substances Regulations, 2015* and the *Transportation of Dangerous Goods Regulations*.

4.14.1 Packaging and Transport Program

As described in the FSD Packaging and Transportation Program (FSD-PGR-TRN-001), Cameco maintains corporate standards and site procedures that cover the safe packaging and transport of nuclear substances to and from its licensed facilities. All radioactive materials are transported in a package designed for its' contents. The contents, isotopic level and physical/chemical properties will determine the type of package.

The site has procedures related to the handling, storing, loading, transporting and receipt of nuclear substances and other dangerous goods. Employees are trained in the safe handling, packaging and shipping of dangerous goods commensurate with their responsibilities.

If required by the *Nuclear Non-proliferation Import and Export Control Regulations*, an import or export licence is obtained from the CNSC prior to shipment and corresponding import or export permits are also obtained from Global Affairs Canada.

Other materials such as laboratory samples, other uranium-containing materials, and wastes (conventional, hazardous, radioactive or mixed) are packaged and safety marks applied in accordance with the appropriate regulations.

Appendix 1 – Standards and Guidance Relevant to the Safety and Control Areas

This appendix lists the REGDOCs, standards and other regulatory documents listed in the LCH for the facility. Compliance Verification Criteria (CVC) imply implementation of the requirements of the document as they are used by CNSC staff to verify and oversee CFM’s compliance with the licence conditions. Guidance is non-mandatory information on how CFM may comply with the licence conditions. New revisions to existing CVC or guidance documents or new REGDOCs or standards may be added throughout the term of the licence in accordance with the CNSC regulatory framework.

SCA	Document Title	Document Reference	CVC or Guidance	Status
General	Regulatory Fundamentals	REGDOC-3.5.3 (2018)	Guidance	N/A
Management System	Management System Requirements for Nuclear Facilities	CSA N286-12 (R2017)	CVC	Implemented
	Management System	REGDOC-2.1.1 (2019)	Guidance	N/A
	Commentary on N286-12, Management systems requirements for nuclear facilities	CSA N286.0.1 (2014)	Guidance	N/A
	Safety Culture	REGDOC-2.1.2 (2018)	Guidance	June 1, 2022*
	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	REGDOC-3.1.2 (2018)	CVC	Implemented
	Public Information and Disclosure	REGDOC-3.2.1 (2018)	CVC	Implemented
Human Performance Management	Personnel Training, Version 2	REGDOC-2.2.2 (2016)	CVC	Implemented
	Minimum Staff Complement	REGDOC-2.2.5 (2019)	Guidance	N/A

SCA	Document Title	Document Reference	CVC or Guidance	Status
Operating Performance	Boiler, pressure vessel, and pressure piping code	B51-2014	CVC	B51-2014 Implemented B51-2019 December 31, 2021
	Safety of Nuclear Fuel Cycle Facilities	IAEA SSR-4 (2017)	Guidance	N/A
Safety Analysis	Nuclear Criticality Safety	REGDOC-2.4.3 (2019) GD 327 is implemented	CVC	Implemented
	National Building Code of Canada 2015	NRCC 56190	CVC	Implemented
Physical Design	National Fire Code of Canada 2015	NRCC 56192	CVC	Implemented
	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	CSA N393-13 (R2018)	CVC	Implemented
	General Design Considerations: Human Factors	REGDOC-2.5.1 (2019)	Guidance	N/A
	National Fire Code of Canada 2015	NRCC 56192	CVC	Implemented
Fitness for Service	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	CSA N393-13 (R2018)	CVC	Implemented
	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	REGDOC-3.1.2 (2018)	CVC	Implemented
Radiation Protection	Keeping Radiation Exposures and Doses “As Low As Reasonably Achievable (ALARA)”	CNSC G-129 Rev 1 (2004)	Guidance	N/A
	Developing and Using Action Levels	CNSC G-228 (2001)	Guidance	N/A

SCA	Document Title	Document Reference	CVC or Guidance	Status
Conventional Health and Safety	Selection, use and care of respirators	CSA Z94.4-11	CVC	Z94.4-11 Implemented Z94.4-18 March 31, 2021
	Conventional Health and Safety	REGDOC-2.8.1 (2019)	Guidance	N/A
Environmental Protection	Environmental Protection Policies, Programs and Procedures	CNSC REGDOC 2.9.1 (2013)	CVC	Implemented
	Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills	REGDOC-3.1.2 (2018)	CVC	Implemented
	Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities	CSA N288.1-14 (2014)	CVC	Implemented
	Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	CSA N288.4-10 (R2015)	CVC	Implemented
	Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills	CSA N288.5-11 (R2016)	CVC	Implemented
	Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills	CSA N288.6-12 (R2017)	CVC	Implemented
	Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mines and Mills	CSA N288.7-15 (2015)	CVC	Full Implementation March 31, 2021

SCA	Document Title	Document Reference	CVC or Guidance	Status
	Establishing and implementing action levels for releases to the environment from nuclear facilities	CSA N288.8-17 (2017)	CVC	Implemented
Emergency Management and Fire Protection	Nuclear Emergency Preparedness and Response	REGDOC 2.10.1 (2016)	CVC	Implemented
	National Building Code of Canada 2015	NRCC 56190	CVC	Implemented
	National Fire Code of Canada 2015	NRCC 56192	CVC	Implemented
	Fire Protection for Facilities that Process, Handle or Store Nuclear Substances	CSA N393-13 (R2018)	CVC	Implemented
Waste Management	General Principles for the Management of Radioactive Waste and Irradiated Fuel	CSA N292.0-14 (2014)	CVC	Implemented
	Management of Low- and Intermediate –level Radioactive Waste	CSA N292.3-14 (2014)	CVC	Implemented
	Managing Radioactive Waste	CNSC P-290 (2004)	Guidance	N/A
	Decommissioning of Facilities Containing Nuclear Substances	CSA N294-09 (R2014)	CVC	Implemented
	Decommissioning Planning for Licensed Activities	CNSC G-219 (2000)	Guidance	N/A
	Financial Guarantees Guide for the Decommissioning of Licensed Activities	CNSC G-206 (2000)	Guidance	N/A
Security	Security of Nuclear Substances: Sealed Sources and Category I, II and III Nuclear Material, Version 2	REGDOC-2.12.3 (2019)	CVC	Implemented

SCA	Document Title	Document Reference	CVC or Guidance	Status
Safeguards and Non-Proliferation	Safeguards and Nuclear Material Accountancy	REGDOC-2.13.1 (2018)	CVC	Implemented
Packaging and Transport	Information Incorporated by Reference in Canada's Packaging and Transport of Nuclear Substances Regulations, 2015	REGDOC-2.14.1 (2016)	Guidance	N/A
Facility Specific – Financial Guarantee	Financial Guarantee for the Decommissioning of Licensed Activities	CNSC G-206 (2000)	Guidance	N/A

Appendix 2 – Documents Supporting the Licence Application

CFM has identified the following documents to be relevant to supporting this application for the renewal of its Fuel Facility Operating Licence (FFOL-3632.0/2022)

Document Title	Document Type	Available on Website
Safety, Health, Environment and Quality Policy	Corporate Policy	Yes
Facility Licensing Manual (CFM-FLM)	Site Program	Yes
Management System Program Manual, (CFM-MS)	Site Program	Description in FLM
Systematic Approach to Training Program (CFM-HR-01)	Site Program	Description in FLM
Radiation Protection Program (CFM-RP)	Site Program	Description in FLM
Environmental Protection Program (CFM-EP)	Site Program	Description in FLM
Nuclear Criticality Safety Program Manual	Site Program	Description in FLM
Safety and Health Program, CFM-SH	Site Program	Description in FLM
Fire Protection Program, MSP 30-07	Site Program	Description in FLM
CFM Waste Management Program, CFM-EP-02	Site Program	Description in FLM
Internal Dosimetry Technical Basis Document	Divisional Program	No
Public Information Program, FSD-PGR-PIP-001	Divisional Program	Summary available
FSD Environmental Management System, FSD-PGR-EMS-001	Divisional Program	No
FSD Waste Management Program, FSD-PGR-WM-01	Divisional Program	Summary available
FSD Safeguards Program, FSD-PGR-SG-01	Divisional Program	No
FSD Packaging and Transportation, FSD-PGR-TRN-01	Divisional Program	No
Facility Licensed Area Drawing, 05C144	Site Drawing	A version is available in the FLM
Site Map Property Layout 00A084	Site Drawing	A version is available in the FLM
Radioisotope Source Control, HSI-048	Site Procedure	No



Document Title	Document Type	Available on Website
Change Control, MSP 13-02	Site Procedure	No
Preventative Maintenance Execution Management, AP 018	Site Procedure	No
Authorized Inspection Agency Services Agreement	Procurement Document	No
Security Plan, MSP 30-01	Site Plan	No
Emergency Preparedness Plan and Response Procedure, MSP 30-02	Site Plan	No
Fire Safety Plan, MSP 30-03	Site Plan	No
Environmental Aspects Registry	Site Plan	No
Safety Analysis Report	Supporting Study	Summary Available
Derived Release Limit	Supporting Study	Summary Available
Fire Hazard Analysis	Supporting Study	No
2016 Environmental Risk Assessment	Supporting Study	Yes
Review of Environmental Action Levels to Support the Environmental Protection Program	Supporting Study	No
Preliminary Decommissioning Plan	Supporting Study	Summary Available

Appendix 3 – List of Acronyms Used in the Application

AIA	Authorized Inspection Agency
ALARA	As low as reasonably achievable
BRR	Blind River Refinery
Cameco	Cameco Corporation
CFM	Cameco Fuel Manufacturing Inc.
CIRS	Cameco Incident Reporting System
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
CVC	Compliance Verification Criteria
DRL	Derived Release Limit
ECCC	Environment and Climate Change Canada
ECA	Environmental Compliance Approval
EMS	Environmental Management System
EPP	Environmental Protection Program
ERA	Environmental Risk Assessment
ERO	Emergency Response Organization
ERP	Emergency Response Plan
ESDC	Department of Employment and Social Development Canada
ESDM	Emission Summary and Dispersion Model
FFOL	Fuel Facility Operating Licence
FHA	Fire Hazards Analysis
FLM	Facility Licensing Manual
FPP	Fire Prevention Program
FSD	Fuel Services Division
FSP	Fire Safety Plan
GNSCR	<i>General Nuclear Safety and Control Regulations</i>
Hi-vol	High volume (air monitor)
IAEA	International Atomic Energy Agency
JHSC	Joint Health and Safety Committee
JHA	Job Hazard Analysis
LCH	Licence Conditions Handbook
MECP	Ministry of the Environment, Conservation and Parks
MOL	Ontario Ministry of Labour
mSv	Millisievert

NEW	Nuclear Energy Worker
NSCA	<i>Nuclear Safety and Control Act</i>
NSRDR	<i>Nuclear Substance and Radiation Devices Regulations</i>
O. Reg.	Ontario Regulation
OSL	Optically stimulated luminescence
PDP	Preliminary Decommissioning Plan
PHCF	Port Hope Conversion Facility
PIP	Public Information Program
PIT	Physical Inventory Taking
PIV	Physical Inventory Verification
PPE	Personal Protective Equipment
PTTW	Permit to Take Water
REGDOC	CNSC regulatory document
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SHEQ	Safety, Health, Environment and Quality
SNRI	Short Notice Random Inspection
SAR	Safety Analysis Report
TBD	Technical Basis Document
TED	Total Effective Dose
TSSA	Ontario Technical Standards and Safety Authority
UO ₂	Uranium dioxide
µg	microgram

Appendix 4 – Licence Renewal Application Requirements Matrix

Pursuant to subsection 3 of the General Nuclear Safety and Control Regulations Licences – General Application Requirements

Section 3. the <i>General Nuclear Safety and Control Regulations</i> Licences – General Application Requirements (1) An application for a licence shall contain the following information:	Location in Application or Supporting Document(s)
(a) the applicant’s name and business address;	Sections 1.1 and 1.3
(b) the activity to be licensed and its purpose;	Sections 1.3 and 2.3 Facility Licensing Manual
(c) the name, maximum quantity and form of any nuclear substance to be encompassed by the licence;	Sections 1.3, 2.3 and 2.4
(d) a description of any nuclear facility, prescribed equipment or prescribed information to be encompassed by the licence;	Sections 1.3 and 2.3
(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 Appendix 2
(f) any proposed action level for the purpose of section 6 of the Radiation Protection Regulations;	Sections 4.7.6, 4.7.8, 4.7.9
(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;	Sections 4.7 and 4.12
(h) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear substance, prescribed equipment or prescribed information;	Section 4.12
(i) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;	Sections 4.4, 4.7, 4.9 and 4.11
(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	Sections 4.4 and 4.11

the activity to be licensed, and the proposed method for managing and disposing of that waste;	
(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;	Sections 2.1 and 4.1.1 Supporting Documents - FLM
(l) a description of any proposed financial guarantee relating to the activity to be licensed; and	Sections 2.5 and 4.11.3
(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 FLM and supporting documents referenced in Appendix 2.

Pursuant to subsection 5 of the General Nuclear Safety and Control Regulations: Licences – Application for Renewal of Licence

Subsection 5 of the <i>General Nuclear Safety and Control Regulations</i> – Application for Renewal of Licence	Location in Application or Supporting Document(s)
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	This document and identified supporting documentation.
(b) A statement identifying the changes in the information that was previously submitted.	N/A

Pursuant to subsection 15 of the General Nuclear Safety and Control Regulations: Obligations – Representatives of Applicants and Licensees.

Subsection 15 of the <i>General Nuclear Safety and Control Regulations</i>: Obligations – Representatives of Applicants and Licensees 15. Every applicant for a licence and every licensee shall notify the Commission of	Location in Application or Supporting Document(s)
(a) The persons who have authority to act for them in their dealings with the Commission;	Sections 2.1 and 4.1.1 Supporting Documents - FLM
(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	Sections 2.1 and 4.1.1 Supporting Documents - FLM
(c) Any change in the information referred to in paragraphs (a) and (b), within 15 days after the change occurs.	FLM

Pursuant to subsection 3 of the Class I Nuclear Facilities Regulations: Licence Applications – General Requirements

<p>Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i>: Licence Applications – General Requirements</p> <p>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:</p>	<p>Location in Application or Supporting Document(s)</p>
(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;	Section 2.2 Cameco Fuel Manufacturing Facility Licenced Area Drawing 05C144 Site Map Property Layout Drawing 00A084
(b) Plans showing the location, perimeter, areas, structures and systems of the nuclear facility	Cameco Fuel Manufacturing Facility Licenced Area Drawing 05C144 Site Map Property Layout Drawing 00A084
(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;	CFM Correspondence March 8, 2021
(d) the proposed management system for the activity to be licensed, including measures to promote and support safety culture;	Section 4.1
(d.1) the proposed human performance program for the activity to be licensed, including measures to ensure workers’ fitness for duty.	Section 4.2
(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;	Section 4.4
(f) the proposed worker health and safety policies and procedures;	Section 4.8
(g) the proposed environmental protection policies and procedures;	Section 4.9
(h) the proposed effluent and environmental monitoring programs;	Section 4.9
(i) If the application is in respect of a nuclear facility referred to in paragraph 2(b) of the <i>Nuclear Security Regulations</i> , the information required by section 3 of those Regulations;	Not applicable to CFM

<p align="center">Subsection 3 of the <i>Class I Nuclear Facilities Regulations</i>: Licence Applications – General Requirements</p> <p>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:</p>	<p align="center">Location in Application or Supporting Document(s)</p>
<p>(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</p>	<p>Section 2.4 PIP</p>
<p>(k) the proposed plan for the decommissioning of the nuclear facility or of the site.</p>	<p>Sections 2.5 and 4.11.3 PDP</p>

Pursuant to subsection 6 of the Class I Nuclear Facilities Regulations: Licence Applications – Licence to Operate

Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i>: Licence Applications – Licence to Operate 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:	Location in Application or Supporting Document(s)
(a) a description of the structures at the nuclear facility, including their design and their design operating conditions;	Sections 2.2, 2.3, 4.4, 4.5 and 4.6 Supporting documents – FLM, SAR Detailed information on specific structures and their design and operation was previously submitted to the CNSC (AECB) at the time the structures were commissioned.
(b) a description of the systems and equipment at the nuclear facility, including their design and their design operating conditions;	Sections 2.2, 2.3, 4.4, 4.5 and 4.6 Supporting documents – FLM, SAR Detailed information on specific structures and their design and operation was previously submitted to the CNSC (AECB) at the time the structures were commissioned.
(c) a final safety analysis report demonstrating the adequacy of the design of the nuclear facility;	Section 4.4 Supporting documents – SAR
(d) the proposed measures, policies, methods and procedures for operating and maintaining the nuclear facility;	Sections 4.1, 4.2, 4.3, 4.5, and 4.6
(e) the proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances;	Sections 4.2, 4.3, 4.7, and 4.14
(f) the proposed measures to facilitate Canada’s compliance with any applicable safeguards agreement;	Section 4.13
(g) the proposed commissioning program for the systems and equipment that will be used at the nuclear facility;	Sections 4.1 and 4.5
(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;	Sections 4.4, 4.7 and 4.9

Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i>: Licence Applications – Licence to Operate 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:	Location in Application or Supporting Document(s)
(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;	Sections 4.4 and 4.9
(j) the proposed measures to control releases of nuclear substances and hazardous substances into the environment;	Sections 4.4 and 4.9
(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	Sections 4.4, 4.9 and 4.10
(i) Assist off-site authorities in planning and preparing to limit the effects of an accidental release,	Sections 4.4, 4.9 and 4.10
(ii) Notify off-site authorities of an accidental release or the imminence of an accidental release,	Sections 4.4, 4.9 and 4.10
(iii) Report information to off-site authorities during and after an accidental release,	Sections 4.4, 4.9 and 4.10
(iv) Assist off-site authorities in dealing with the effects of an accidental release, and	Sections 4.4, 4.9 and 4.10
(v) Test the implementation of the measures to prevent or mitigate the effects of an accidental release;	Sections 4.4, 4.9 and 4.10
(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	Section 4.12
(m) The proposed responsibilities of and qualification requirements and training program for workers, including the procedures for the requalification of	Section 4.2

Subsection 6 of the <i>Class I Nuclear Facilities Regulations</i>: Licence Applications – Licence to Operate 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:	Location in Application or Supporting Document(s)
workers; and	
(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.	Section 4.2

Pursuant to Subsection 3 of the Nuclear Substances and Radiation Devices Regulations: Licence Applications – General Requirements

Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations</i>: Licence Applications – General Requirements 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 <i>General Nuclear Safety and Control Regulations</i>:	Location in Application or Supporting Document(s)
(a) the methods, procedures and equipment that will be used to carry on the activity to be licensed;	Sections 2.3, 4.4, 4.7, 4.9 and 4.10
(b) The methods, procedures and equipment that will be used while carrying on the activity to be licensed, or during and following and accident, to	Sections 2.3.3, 4.7 and 4.9
(i) Monitor the release of any radioactive nuclear substance from the site of the activity to be licensed,	
(ii) Detect the presence of and record the radiation dose rate and quantity in bequerels of radioactive nuclear substances at the site of the activity to be licensed,	Sections 2.3, 4.7 and 4.9
(iii) Limit the spread of radioactive contamination within and from the site of the activity to be licensed, and	Sections 2.3, 4.7 and 4.9
(iv) Decontaminate any person, site or equipment contaminated as a result of the activity to be licensed;	Sections 2.3, 4.7 and 4.9
(c) a description of the circumstances in which the decontamination referred to in subparagraph (b)(iv) will be carried out;	Sections 4.4, 4.7, 4.9, 4.10, 4.11
(d) The proposed location of the activity to be licensed, including a description of the site;	Section 2.2 Cameco Fuel Manufacturing Facility Licenced Area Drawing 05C144 Site Map Property Layout Drawing 00A084
(e) The roles, responsibilities, duties, qualifications and experience of workers	Section 4.2
(f) The proposed training program for workers;	Section 4.2

Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations</i>: Licence Applications – General Requirements 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 <i>General Nuclear Safety and Control Regulations</i>:	Location in Application or Supporting Document(s)
(g) The proposed instructions for dealing with accidents, including fires and spills, in which the nuclear substance may be involved;	Sections 4.4, 4.7, 4.9, 4.10
(h) The proposed inspection program for the equipment and systems that will be used to carry on the activity to be licensed;	Sections 4.4, 4.7, 4.9, 4.10
(i) The methods, procedures and equipment that will be used to calibrate radiation survey meters in accordance with these Regulations;	Sections 2.3 and 4.7
(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 €;	Sections 2.3 and 4.7
(k) The methods, procedures and equipment that will be used to conduct the leak tests and surveys required by those Regulations;	Sections 2.3 and 4.7
(l) Where the application is in respect of a nuclear substance that is in an unsealed source and that is to be used in a room , the proposed design of the room;	Sections 2.3 and 4.7
(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;	Sections 2.3 and 4.7
(n) Where the application is in respect of Category I, II or III nuclear material, as defined in section 1 of the <i>Nuclear Security Regulations</i> ,	Not applicable
i. The measures that will be taken to prevent nuclear criticality	
ii. The information required by section 3 or 4 of the <i>Nuclear Security Regulations</i> , as applicable;	
(o) If the applicant will be manufacturing or distributing radiation devices referred to in paragraph 5(1)© 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	Not applicable

Subsection 3 of the <i>Nuclear Substances and Radiation Devices Regulations</i>: Licence Applications – General Requirements 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 <i>General Nuclear Safety and Control Regulations</i>:	Location in Application or Supporting Document(s)
source for its return to the manufacturer	

Pursuant to Part 2 of the Nuclear Security Regulations: Part 1 Security of Nuclear Facilities Listed in Schedule 2 – Licence Applications

Subsection 41 of the <i>Nuclear Security Regulations</i>: Licence Applications – General Requirements	Location in Application or Supporting Document(s)
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 <i>Class I Nuclear Facilities Regulations</i> , a description of the physical protection measures to be taken to ensure compliance with sections 42 to 48.	Application Section 4.12