2023 Annual Compliance Monitoring
&
Operational Performance Report

Reporting Period January 1 – December 31, 2023

Cameco Fuel Manufacturing Inc.
Operating Licence
FFL-3641.0/2043

200 Dorset Street East
Port Hope, Ontario
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Submitted to:
The Canadian Nuclear Safety Commission
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Submitted on March 31, 2024

Executive Summary

Cameco Corporation (Cameco) is a major supplier of uranium processing services required to produce nuclear fuel for the generation of safe, clean, and reliable electricity around the world. Cameco's Fuel Services Division (FSD) is comprised of the Blind River Refinery (BRR), the Port Hope Conversion Facility (PHCF), Cameco Fuel Manufacturing Inc. (CFM) and a divisional head office located in Port Hope, Ontario.

CFM operates a Class 1B nuclear facility in Port Hope, Ontario under Canadian Nuclear Safety Commission (CNSC) fuel facility operating licence FFL-3641.0/2043 employing approximately 130 workers. In addition, approximately 120 employees work at a metal manufacturing plant located in Cobourg, Ontario, which does not handle uranium products. CFM is licensed to produce nuclear fuel bundles using uranium dioxide (UO_2); those fuel bundles are primarily used in domestic CANDU reactors. On February 17, 2022, CFM was granted a 1 year licence, FFL-3641.00/2023 which was in effect until February 28, 2023, and on January 18, 2023 CFM was granted a twenty year licence, starting on March 1, 2023, FFL-3641.00/2043, after a licensing hearing on November 23, 2022.

Cameco is committed to the safe, clean, and reliable operations of all of its facilities and continually strives to improve safety performance and processes to ensure the safety of its employees, local residents, and the environment. Corporate policies and programs, including the Safety, Health, Environment and Quality (SHEQ) policy provide guidance and direction for the development of site-based programs and procedures that are defined in CFM's Management Systems Program Manual (CFM-MS).

In 2023, CFM continued to be included in Cameco's registration of the ISO14001:2015 Environmental Management System. CFM has a Safety Analysis Report (SAR) that documents the detailed safety analysis carried out for the facility. The SAR describes the hazards, preventative measures, and mitigating controls associated as well as summarizes major assessments with the licensed activities at CFM.

At CFM, changes to the physical design of equipment, processes, and the facility with the potential to impact safety are evaluated using the internal change and design control process from project planning through to completion of the project. This process is used to help identify potential impacts to safety, health, and the environment. In 2023, CFM continued to use the electronic Management of Change (MOC) format to evaluate design and change control projects. There were no modifications undertaken in 2023 that required written approval from the Commission, or a person authorized by the Commission during the year.

CFM maintains a number of programs, plans and procedures in the areas of health and safety, radiation protection, environment protection, emergency response, fire protection, waste management, and training. As a result of these programs, plans and procedures, CFM's

operations have maintained radiation exposures and environmental emissions well below regulatory limits.

For various radiological and environmental parameters, CFM has established internal action levels, accepted by the CNSC, that may be indicative of a potential loss of control for that specific parameter. These action levels serve as an early warning of a condition that warrants further investigation. In 2023, there were no action level exceedances in the radiological or environmental monitoring program.

CFM maintains a comprehensive uranium inventory system to demonstrate compliance with safeguard requirements. In 2023, periodic audits of this inventory system were conducted jointly by the International Atomic Energy Agency (IAEA) and the CNSC. All audits were completed to the satisfaction of both regulatory bodies.

The scope of transportation activities at CFM includes the transport of Class 7 radioactive materials outlined in the *Transportation of Dangerous Goods Act SOR/2008-34*. There were no reportable transportation events involving CFM produced material in 2023.

Cameco works to build and sustain the trust of local residents by acting as a responsible corporate citizen in the communities in which it operates. A key element of building and sustaining that trust is a commitment to provide those in the community with accurate and transparent reporting of environmental practices and performance. Cameco continued its strategic approach to community outreach in 2023 with the continuation of newsletters. In 2023 Cameco continued to expand the use of social media into the overall communication strategy.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 General Introduction

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CFM operates a Class 1B nuclear facility in Port Hope, Ontario under Canadian Nuclear Safety Commission (CNSC) fuel facility operating licence FFL-3641.00/2043 that is valid until February 28, 2043. The Port Hope facility employs approximately 130 workers. In addition, approximately 120 employees work at a metal manufacturing facility located in Cobourg, Ontario, which does not handle uranium products. CFM (Figure 1) is located at 200 Dorset Street East in the Municipality of Port Hope, Ontario and operates a fuel manufacturing facility. The facility is currently licensed to produce nuclear fuel bundles using uranium dioxide (UO_2) primarily for domestic CANDU reactors. The licence also provides continued authorization to process, and store depleted and enriched UO_2.

On February 17, 2022, CFM was granted a 1-year licence, FFL-3641.00/2023, that was valid until February 28, 2023. On January 18, 2023 CFM was granted a 20 year licence beginning March 1, 2023 until February 28, 2043, FFL-3641.00/2043. This licence application requested an increase to the production limit from 125 Megagrams (Mg) of UO_2 as pellets during any calendar month to 1,650 tonnes of uranium (tU) as uranium dioxide (UO2) pellets annually. This change from a monthly production limit to an annual limit in tonnes allows for variation in production from month to month.

Figure 1 - Cameco Fuel Manufacturing (Port Hope)

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 its employees, local residents and the environment.

CFM maintains the required programs, plans and procedures in the areas of health and safety, radiation protection, environmental protection, emergency response, fire protection, waste management, and training.

As a result of these actions, CFM maintained radiation exposures to the workforce well below dose limits. Environmental emissions and public radiation exposures are being controlled to levels that are below regulatory limits.

The submission of this report fulfills the licence condition outlined in Section 2.2 in the fuel facility operating licence FFL-3641.00/2023 and the Licence Condition 3.2: *Reporting Requirements* of FFL-3641.00/2043. CFM's annual report is structured according to *REGDOC-3.1.2, Reporting Requirements, Volume I: Non-Power Reactor Class I Facilities and Uranium Mines and Mills*. The purpose of this report is to summarize operating performance and provide a summary of the Safety and Control Areas for the calendar year of 2023 to demonstrate that CFM has met the regulatory requirements of the *Nuclear Safety and Control Act* (*NSCA*).

Cameco is committed to reducing the frequency and significance of all events at site, including loss of primary containment (LOPC) events. Therefore, most events ranked level two or higher are investigated and resulting actions are tracked through Cameco's Incident Reporting System (CIRS).

Action levels are referenced in the Licence Conditions Handbook (LCH) under the Radiation Protection section for worker dose and the Environmental Protection section for emissions. There were no action level exceedances in the radiation protection or environmental protection program in 2023.

In addition to the CNSC, CFM is regulated by other federal and provincial agencies, such as the Ontario Ministry of the Environment, Conservation and Parks, Environment and Climate Change Canada, Employment and Social Development Canada, and Transport Canada. CFM is compliant with applicable federal, provincial, and municipal regulations.

The acronyms in the following table are used in this report.

Table 1

Acronyms Used in This Report	
Acronym	**Description**
AACQ	Provincial Ambient Air Quality Criteria
ACGIH	American Conference of Governmental Industrial Hygienists
ACL	Administrative Control Limit
ALARA	As Low As Reasonably Achievable
BRR	Blind River Refinery
Bq	Becquerel
CAM	Continuous Air Monitor
Cameco	Cameco Corporation
CFM	Cameco Fuel Manufacturing Inc.
CIRS	Cameco Incident Reporting System
CFM-MS	Cameco Fuel Manufacturing-Management System document
CCM	Contaminated Combustible Material
CCME	Canadian Council of Ministers of the Environment
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Safety Association

DRL	Derived Release Limit
EBRL	Exposure Based Release Limits
E/OH&S	Environmental Occupational Health & Safety
ERA	Environmental Risk Assessment
ERAP	Emergency Response Assistance Plan
FHA	Fire Hazard Analysis
FPP	Fire Protection Program
FSD	Fuel Services Division
g	Gram
HPP	Hazard Prevention Program
hr	Hour
IAEA	International Atomic Energy Agency
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
JHSC	Joint Health & Safety Committee
kg	Kilogram
KPI	Key Performance Indicator
L	Litre
LCH	Licence Conditions Handbook
Mg	megagram
m^3	cubic metres
µg	micrograms
µSv	microsievert
mSv	millisievert
MECP	Ministry of the Environment Conservation and Parks
MOC	Management of Change
CFM-NC	Nuclear Criticality Safety Program Manual
NEW	Nuclear Energy Worker
NDR	National Dose Registry

NFPA	National Fire Protection Agency
OSLD	Optically Stimulated Luminescence Dosimeters
PDP	Preliminary Decommissioning Program
PHCF	Port Hope Conversion Facility
PHFES	Port Hope Fire and Emergency Services
PM	Preventative Maintenance
PP2	Powder Preparation and Powder Receiving Area
PPE	Personal Protection Equipment
PSSR	Pre Start Safety Reviews
QA	Quality Assurance
RP	Radiation Protection
SAR	Safety Analysis Report
SAT	Systematic Approach to Training
SCA	Safety and Control Area
SCI	Site Condition Inspection
SHEQ	Safety/Health/Environment & Quality
STAR	Stop Think Act Review
TLD	Thermo Luminescent Dosimeters
TED	Total Effective Dose
TRIR	Total Recordable Injury Rate
TSP	Total Suspended Particulate
UO2	Uranium Dioxide
yr	Year

1.2 Facility Operation

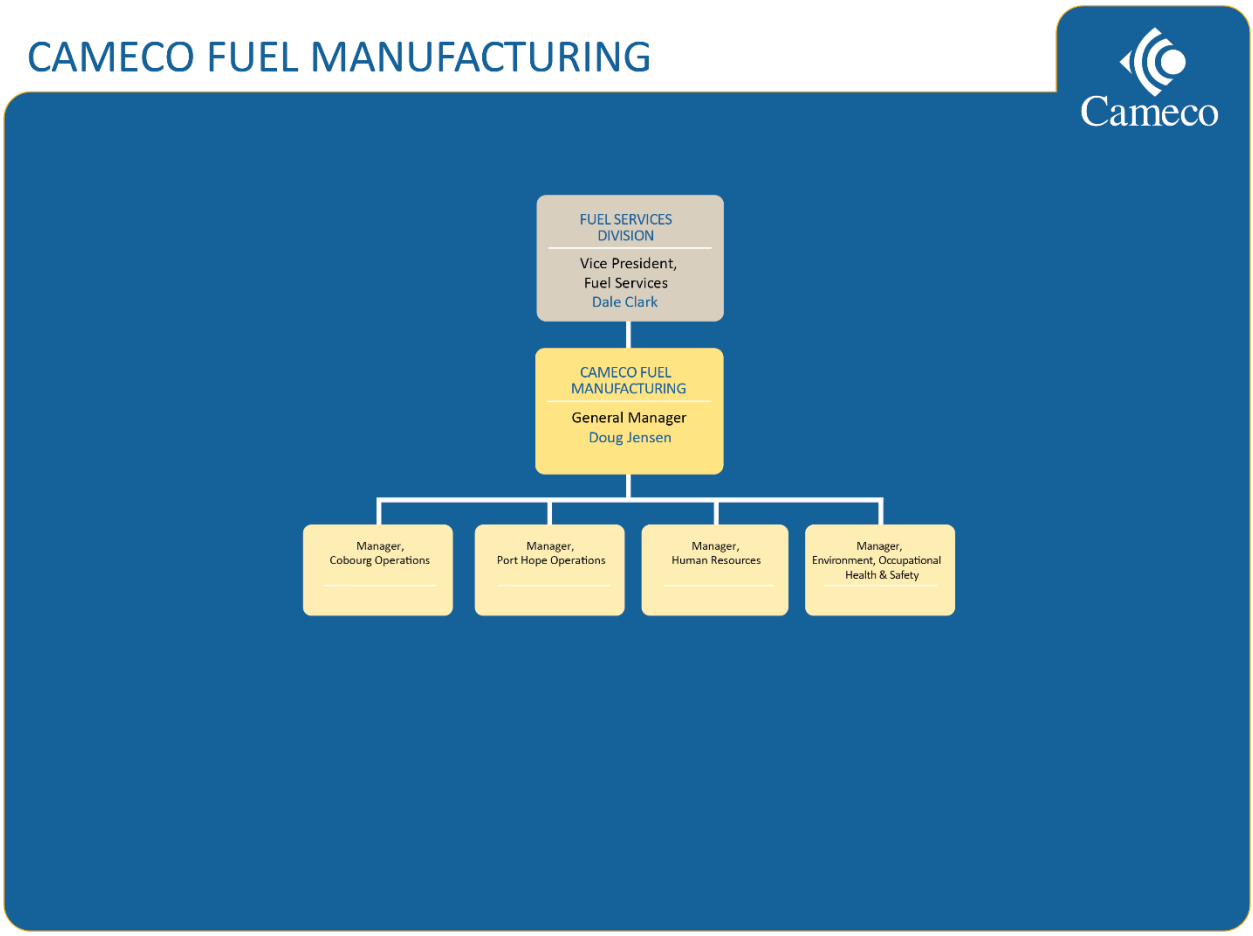
Cameco continues to strive for operational excellence at all of its facilities through consistent application of management systems to ensure that they operate in a safe, clean, and reliable manner. Corporate policies and programs, including Safety, Health, Environment and Quality (SHEQ) provide guidance and direction for all site-based programs and procedures that define the site management system.

The General Manager at CFM has overall accountability for safely operating and maintaining the facility. The responsibilities for supporting programs and procedures have been delegated among the management team at CFM and their respective personnel. All members of the site's management team are accountable for their roles and responsibilities.

In 2023 there were no changes in management positions at CFM's Port Hope facility. The organization chart for the management structure in place in 2023 is provided in Figure 2.

In 2023 the Manager, Environment/Occupational Health, and Safety (E/OH&S) was the primary site radiation safety officer reporting directly to the General Manager. This position was responsible for the radiation and environmental protection programs in place at the Port Hope facility.

Figure 2: CFM 2023 Organizational Chart



In 2023, CFM continued to be included in Cameco's registration of the ISO14001:2015 Environmental Management System.

CFM is issued a Licence Conditions Handbook (LCH) by the CNSC. This handbook establishes, in a consolidated document, the compliance framework related to the CFM licence. The LCH outlines CNSC expectations by defining the licensing basis, explaining the regulatory context related to each licence condition, and identifying the verification criteria for each licence condition. On August 31, 2023 an updated LCH was issued by the CNSC to reflect the changes in the 20 year licence, FFL-3641.00/2043.

CFM also has a Facility Licensing Manual (FLM) that describes the commitment by CFM to operate a safe and efficient nuclear facility which meets the requirements of the CNSC. The FLM was updated in the fourth quarter of 2023 to incorporate items discussed in the licence Record of Decision as well to align with the in the LCH.

CFM schedules and conducts internal audits to assess the organization's level of conformance to management systems. In addition, independent third-party experts

conduct compliance audits in the areas of health, safety, environment, and radiation protection to help ensure that CFM continues to meet all applicable legal requirements. Cameco's corporate office also performs periodic audits of the site management systems programs to ensure the site complies with corporate expectations.

Changes to the physical design of equipment, processes, and the facility with the potential to impact safety are evaluated using an internal change and design control process from project planning through to project completion. This process is used to help identify potential impacts to radiation protection, the environment, health and safety, security, and fire protection.

CFM underwent two planned shutdown events during the course of the year to conduct maintenance and project activities.

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. As a result of these actions, CFM's operations have maintained radiation exposures well below regulatory limits. Environmental emissions are being controlled to levels that are a fraction of the regulatory limits, and public radiation exposures are well below the established limits.

The performance of the facility in 2023 demonstrates that CFM is qualified to carry out the activities permitted under the operating licence. CFM is committed to take all reasonable precautions to protect the environment and the health and safety of employees and the public, to maintain the security of the facility and the nuclear substances associated with the facility as well as the necessary measures to facilitate Canada's compliance with international safeguard obligations.

1.3 Production or Utilization

CFM's operating licence at the beginning of 2023 permitted the production of up to 125 Mg of UO_2 as pellets, during any calendar month. On October 4, 2021, CFM formally applied to renew its operating licence for a 20 year period. This licence application requested an increase to the production limit to an annual quantity of 1,650 tonnes of uranium (tU) as uranium dioxide (UO_2) fuel pellets. This change from a monthly production limit in Mg to an annual limit in tonnes allows for variation in production from month to month. This change was accepted by the CNSC; the licence was granted by the Commission and came into effect on March 1, 2023.

Production rates for 2023 were within both the monthly limit for the months where the old licence was in effect as well as within the annual limit. Detailed plant production information is considered "confidential" and is submitted to CNSC staff on an annual basis under a separate cover.

1.4 Facility Modification

In 2023, there were no modifications undertaken that required written approval from the Commission or a person authorized by the Commission. Several projects, both capital and expense were planned or implemented in 2023. Additional information on the projects completed in 2023 are provided in 2.2.1 Physical Design section of this report. Overall, the electronic MOC process continues to be a better means to track the flow of the design change steps and work is ongoing to make improvements to the process.

The LCH references core CFM documents that form the licensing basis of the facility in each safety and control area. In 2023, there were eleven documents that were updated and required to be submitted to the CNSC:

- Emergency Response Plan (MSP 30-02), version #6
- Preventative Maintenance Procedure (AP 018), version #9
- Pressure Retaining Components Procedure (MSP 27-16), version #4
- Waste Management Plan (CFM EP-02), version #3
- Change and Design Control Procedure (MSP 13-02), version #23
- Fire Protection Program (MSP 30-07), version #6
- Fire Safety Plan procedure (MSP 30-03), version #7
- Preventative Maintenance Procedure (AP 018), version #10
- Facility Licensing Manual (FLM), version #12
- Management Systems Manual (CFM-MS), version #6
- Environmental Protection Manual (CFM-EP), version #6

2. SAFETY AND CONTROL AREAS

2.1 Management

2.1.1 Management System

This safety and control area covers the framework which establishes the processes and programs required to ensure that the organization achieves its safety objectives, continuously monitors its performance against these objectives, and fosters a healthy safety culture.

CFM's Management Systems Program Manual (CFM-MS) is designed to meet the requirements of *CSA N286-12 Management System Requirements for Nuclear Facilities* for a quality program. The CFM-MS provides the controls to ensure all processes are conducted in a safe manner and that processes applying to licensed activities are conducted in accordance with applicable CNSC quality and other regulatory requirements.

The application of management system requirements is scaled according to the complexity and hazard potential of a particular activity. There were no significant changes to the Management Systems Program in 2023. The CFM-MS was revised in 2023 to include the addition of the methods used to promote safety culture, clarify implementation and commissioning terminology, document the MOC process with commissioning activities, and include references to the Preliminary Decommissioning Plan and Financial Guarantee. A section was also added to document the approach for identification and management of business risks.

Other management system documents were updated in 2023 as part of the ongoing continual improvement of the management system. Those updates were:

- Emergency and Security Management Program Manual – CFM ES was updated to remove references to NFPA 801 which has been superseded. As well, further clarification was added with respect to transportation emergencies.
- Facility Licensing Manual – CFM FLM was updated to reflect the items noted in the record of decision for 2023 relicensing including the 20 year term and production limit increase.

A site management review meeting is held annually to review the suitability, adequacy, and effectiveness of the management system at CFM. The site programs and procedures that support the policy and ensure conformance to both Cameco and CNSC requirements are reviewed in adequate detail to demonstrate effectiveness. The review is conducted in alignment with of the SCAs contained within the CNSC regulatory framework outlined in CFM's LCH. The 2023 annual site management review meeting was held on March 5, 2024 during which a review of the suitability, adequacy, and effectiveness of the

management system at CFM was completed. The site management systems, which cover all site programs, were reviewed and sufficient information was provided to demonstrate effectiveness.

The review determined that CFM's management systems continue to be effective in providing an appropriate level of management direction for the facility. Opportunities for continual improvement are identified and acted upon. As such, CFM is positioned to effectively manage operational risks and needs while continuing to improve.

Improvements were identified for continued work to clarify expectations through improved procedures and training material, continued responsiveness to employee identified and data driven SHEQ improvements, increased supervisor oversight for procedural compliance, and continuing to stabilize equipment reliability.

Internal audits performed in 2023 identified findings, non-conformances, and opportunities for improvement. Appropriate corrective or improvement actions are put in place to address identified opportunities. These audits provide evidence of an effectively implemented management systems.

Overall, the conclusion of Cameco management is that the CFM Management System program manuals (CFM-MS - Management Systems Program Manual N286, CFM-QA - Quality Assurance Management System, QA 002 - Nuclear Quality Assurance Manual, FSD-PGR-EMS-001 FSD Environmental Management System) and the various plans and procedures detailed in the licensing basis of the facility outlined in the Licence Conditions Handbook (LCH) are adequate, suitable, and effective for the following reasons:

- Adequate – The identified Management System Programs fully meet the requirements of all the standards required by our customers and regulatory organizations.
- Suitable – The CFM-QA (N299.1) and QA-002 (N285) quality programs capture the needs of our customers, including our regulatory customers. The Quality Manual QA 002 is a separate manual required by our customers who require ASME code work. There are several common procedures and work instructions that apply to both programs, and these are referenced in the manuals as required.
- Effective – The internal and external audits are identifying non-conformances and opportunities for improvement; the results are showing that these two programs are effectively implemented.

It was concluded that the CFM Management Systems, adhere to the requirements of the N286, N299.1 and N285.0 standards, as well as the CFM License Conditions as outlined in the LCH and are suitable, adequate, and effective.

Engagement of all teams at CFM in continual improvement for all 4 Cameco pillars of success continued in 2023. Sources of continual improvement activity included:

- Daily huddle meetings. The daily huddle meetings continued with a hybrid in-person/Microsoft Teams approach at CFM Port Hope and remained entirely virtual via Microsoft Teams for CFM Cobourg. The huddle continued to involve all departments in a review of the previous day's performance and the identification and implementation of improvement activities, including attention given to communicating decisions to those affected.
- Monthly Performance Review. CFM continued with a standardized approach to a monthly review of business performance to identify performance gaps and improvement opportunities in 2 venues:
    - Continual Improvement review. Supervisors and support staff review opportunities for improvement within the areas of quality, production and maintenance system performance and areas for improvement are identified.
    - Monthly Operating Review. The extended leadership team meet monthly to review performance to operational objectives, report on analysis of those results as well as other themes of importance. Themes covered in 2023 included:
        - Gender equality
        - Sexual harassment in the workplace
        - Corporate safety alerts
        - Addiction drivers
- Kaizen (Green) Cards. CFM continued to target participation of all employees in at least one continual improvement activity in their work area. Improvements could be suggested via the CFM Newspaper process, via the local supervisor led continual improvement meetings, or data driven via the Daily Huddle or Monthly Continual Improvement Review. A total of 198 employees (81%) participated in at least one improvement activity in 2023. In total, 582 improvement activities took place. Although this continues to be strong utilization of the tool, there is a continued downward trend in participation; adjustments to the approach are planned in 2024 due to some perceived fatigue with the process.
- Implementation of SHEQ ergonomic standard: CFM completed its implementation of a new ergonomic program late in 2022. The focus of the ergonomic program is on the design stage of new equipment as well as performing ergonomic assessments on high ergonomic risk job tasks. Ergonomic assessments continued into 2023 with reports completed by a third-party consultant. Action items were developed to address identified ergonomic risks.

The last safety culture assessment at CFM was completed in 2021. Overall, when comparing to the 2016 assessment, progress has been made in improving the safety culture. The assessment indicates that the previous focus areas surrounding clarity of expectations regarding safety standards and improving what was noted in some groups as an 'overly negative' culture have improved. Areas of focus that have been identified in the assessment include improving communications of all types, continuing to simplify the structure of the management system, improving change management practices, and implementing diversity and inclusion improvements.

In support of taking deliberate action to improve safety culture, the following initiatives were advanced in 2023.

- A consulting company was engaged to evaluate internal and operational communications practices at CFM and compare them to industry best practices. The consultant provided recommendations on what actions could be taken to improve communication. CFM has begun implementing improvements with additional work continuing into 2024.
- Work continued on the simplification of the safety and health management system. Program level documents were published for confined space, industrial hygiene, hazardous energy, tools and machinery and materials handling. These are in addition to previously published programs for medical services and the safety and health committee. CFM's MDS system was re-organized to align the lower tier work instruction documents within these categories.
- The development of materials in support of a Systematic Approach to Training continued on a risk priority basis. The scope of this work includes integrating shop floor instruction documents with the training materials in order to further clarify responsibilities and expectations. A steering team has been formed to direct priorities and ensure standardization of format as this work is completed.
- CFM's Diversity, Equity, and Inclusion (DE&I) Committee implemented improvements throughout 2023. This was in addition to the corporation's committees work aimed at reinforcing openness, inclusion, and a safe space at CFM where everyone can contribute. These included the implementation of inclusion moments into each monthly safety meeting, standardizing the dispensers of menstrual products in all bathrooms, the implementation of two gender neutral bathrooms in Cobourg, the sharing of inclusion moments/learnings with the leadership team, and continued improvements in the use of gender-neutral language. The senior leadership team also attended an experiential learning opportunity at Trent University's First People's House of Learning that allowed

participants to learn and understand the timeline of colonialism in Canada and its effects on Indigenous peoples.

- Respectful workplace training was updated and delivered to all CFM personnel in 2023. In addition, and in response to an issue raised with the corporate Safety Leadership Group late in the year regarding harassment in the workplace, several real CFM scenarios were reviewed and discussed among the extended leadership team.

There were no organizational changes in 2023 or changes in the roles and responsibilities that would affect the facility, prescribed information, or nuclear substances.

In 2023, CFM continued to be included in Cameco's registration to the ISO 14001:2015 Environmental Management System, which is an internationally recognized standard for quality and environmental management through the corporate certificate. Being a part of the corporate certificate provides consistency among the Cameco sites with specific cost benefits being realized, reduction in audit frequencies, and better corporate program oversight.

All documents that support the licensed activities are subject to the site document control process. Documents that support the licensed activities are maintained in electronic format on a database available to all site personnel. This includes, but is not limited to, procedures for operating and maintaining the facility, as well as environmental, health and safety, radiation protection and quality assurance documentation. A listing of management program documents that were revised in 2023 with a summary for the reason for the revision is provided below:

- Emergency Response plan (MSP 30-02), version #6 - Updated to reference RAVE Alert as replacement for Rapid Notify and added reference to Pre-Incident Plan – Port Hope form.
- Preventative Maintenance procedure (AP 018), version #9 - Updated periodic audit section to be conducted every five years and updated work order verification section to include electronic confirmation. Definitions for all work order types was provided and the reference to use of the online form.
- Pressure Retaining Components Procedure (MSP 27-16), version #4 – Added references to the specific Maintenace Task Instructions (MTI's).
- Waste Management Plan (CFM EP-02), version #3 – General revision and updated to include requirements in *REGDOC-2.11.1 Waste Management, Volume I: Management of Radioactive Waste.*
- Change and Design Control procedure (MSP 13-02), version #23 – The scope and definition of change was revised. Additionally, definitions were added for Layout

Change, Process, and Process Change. Also, there was clarification added for software and programming changes and AP 004 was added to the references.

- Fire Protection Program (MSP 30-07), version #6 – Revision required to update the National Fire Code and National Building Code to reference the 2015 versions as well as revise section 7.3 Housekeeping and Control of Combustibles, Transient Materials, and Waste to include purchasing of non-combustible options.
- Fire Safety Plan procedure (MSP 30-03), version #7 - Updated information along with responsibilities and references.
- Preventative Maintenance procedure (AP 018), version #10 - Updated to provide clarification on the final step for signing off work tasks along with updated references and titles.
- Facility Licensing Manual (FLM), version #12 – Updated to incorporate items discussed in the Record of Decision for CFM's licence FFL-3641.00/2043. The changes include: an update to reflect the current licence, documents from the licence application, new text regarding dose to the lens of the eye from the Radiation Protection Regulation, new environmental licence limits and changes to the public dose calculations. Other updates were made in the Financial Guarantee, Public Information Program and Radiation Protection to reflect changes from the licence renewal and licence format.
- Management Systems manual (CFM-MS), version #6 – Updated to include the addition of the method to promote safety culture, clarification with implementation and commissioning, documenting the MOC process with commissioning activities, and including references to the Preliminary Decommissioning plan and Financial Guarantee. A section was also added to document the approach for identification and management of business risks.
- Environmental Protection manual (CFM-EP), version #6 – Updated to replace Derived Release Limits with Exposure Based Release Limits (EBRL) as referenced in the operating licence (FFL-3641.00/2043), remove reference to Health Physics database, update to reflect continuous monitoring of stacks, update aquatic monitoring program, update references, and update some of the figures in the document. This document requires additional revision and will be resubmitted in 2024.

In 2023, CFM submitted the *2022 Annual Review Report Metals in Groundwater and Surface Water*, and the *2022 Annual Review Report Volatile Organic Compounds in Groundwater and Surface Water*. Additionally, the CNSC updated and released Revision 0 of the *Licence Conditions Handbook* (LCH) in support of the licence FFL-3641.00/2043.

As part of the management system program, CFM scheduled and conducted internal audits in 2023 to assess the level of conformance to these management systems. In 2023, there were two internal audits conducted by Cameco Corporation and by CFM. The audits focused on N299.1 Management Systems, Health and Safety Program, Contractor Management, Training, and Emergency Preparedness and Response. Findings, opportunities for improvement and areas of concern from all audits are entered into CIRS to ensure that they are reviewed by site management and processed accordingly.

There were seven external audits or inspections completed in 2023. After being reviewed, all audit findings are entered into CIRS where corrective actions or activities can be assigned, and their progress tracked.

The following is a list of the external audits conducted in 2023:

- Compliance Inspection focusing on Management Systems SCA conducted by CNSC staff.
- Compliance Inspection focusing on the Emergency Management and Fire Protection SCA conducted by CNSC staff.
- Compliance Inspection focusing on Security SCA conducted by CNSC staff.
- Air Emissions Compliance Inspection conducted by Ministry of Environment Conservation and Parks (MECP).
- Annual Facility Condition Inspection conducted by PLC Fire Safety Engineering.
- Annual FSD Internal Dosimetry Program audit conducted by Arcadis Canada.

Further information regarding CFM's auditing process will be submitted under separate confidential correspondence.

The Management System is in place to integrate the requirements for health, safety, environment, security, quality, and finance as described in *CSA Standard N286-12* and in the LCH. Operationally, and as presented to the CFM Board of Directors annually, CFM continues to achieve performance that is in overall compliance with requirements in these areas, including the SCAs and can therefore conclude that the management system is effective at achieving its intended purpose. Resultant improvement actions and opportunities are identified from the annual management review process and are tracked for completion.

2.1.2 Human Performance Management

This safety and control area covers activities that enable effective human performance, through the development and implementation of processes to ensure that there are sufficient numbers of employees in all relevant job areas and that they have the necessary knowledge, skills, and tools to safely carry out the licensed activities.

CFM has a sufficient number of qualified workers as well as the minimum number of responsible people to carry on the licensed activities safely and in accordance with the *NSCA* and its Regulations.

CFM has a number of programs, procedures and processes that establish the framework for a safe work environment and foster a sustainable safety culture. All employees are encouraged to maintain a questioning attitude with respect to health, safety, radiation protection and environmental issues.

The training program at CFM is compliant to the CNSC REGDOC 2.2.2, Personnel Training. In 2023 there was a desire for employees to return to in-person training. The use of Virtual Instructor Led Training continued in some areas where a hybrid model of training was needed. 2023 saw changes to the Training team, with the addition of two new training specialists. Although development of new training paused while the two training specialists were trained, a detailed onboarding plan ensured that both trainers were ready to begin Systematic Approach to Training (SAT) development by the fall of 2023.

The SAT method of training applies a robust, risk-informed system to analyze and track training requirements and develop and deliver appropriate training. The SAT process covers the initial training of employees, routine re-qualification, as well as re-qualification of employees after an extended absence. Records are maintained for all training documentation. CFM documents this system in a site procedure titled "Systematic Approach to Training – Training Plan" (CFM-HR-01) to meet the CNSC Regulatory Document 2.2.2 *Personnel Training*.

Mandatory, legislated, and other job specific training activities were carried out in 2023. This training ensures that all personnel have the level of training related to radiation safety, onsite emergency response, environmental protection, and conventional health and safety, appropriate for their duties. Mandatory, federal, provincial, and Cameco required training is tracked and trended with 97.5% compliance achieved in 2023.CFM also ended the year with a 97.9% completion of 'No Go' courses. The training department continued providing No-Go status updates during the daily huddle meeting.

During the year, sixty-seven employees or contractors were assigned and completed Radiation Protection training. By the end of the year, 100% of active employees were up to date with the training.

At the end of 2023 safety training metrics were at 100% compliance in other training programs such as: Electrical Safety – Non-electrical Worker, and Job Hazard Analysis. Other safety courses such as Fall Protection, Confined Space, and Control of Hazardous Energy (CoHE) had compliance rates slightly below the 95% target with work plan developed to increase compliance early in 2024.

Some improvements in the training program advanced in 2023 include:

- SAT Millwright - full SAT package was developed.
- SAT Emergency Evacuation – full SAT package was developed and rolled out.
- SAT Fire Safety Analysis and Design – analysis for the fire safety program was completed. Design for fire extinguisher, fire safety, and emergency evacuation were all created. The development plan for each will take place in 2024.
- SAT BMS Update – analysis and design has been updated. 90% of work instructions have been updated. Remaining work will be completed early in 2024.
- SAT PP2 package – analysis and design has been updated. 90% of work instructions have been updated with remainder completed early in 2024.

A review of the employee onboarding process was initiated in 2023 and several improvement opportunities were identified for 2024 implementation. One step that has already been implemented is an opportunity for senior leaders to meet new employees and review safety culture fundamentals during their first week of onboarding. In addition, a draft orientation manual for employees will be published in 2024. Work will continue to integrate and update the New Employee checklist and the Employee Transfer forms during the second half of 2024.

CFM complies with Part III of the *Canada Labour Code* as it defines the maximum hours of work for all employees on-site. In addition, CFM has committed to the CNSC that a minimum complement of employees will be available to respond to emergency situations.

Cameco has a range of programs in place to ensure that employees are fit for duty. These programs and procedures cover human resource matters such as a program for alcohol and substance abuse, mental health assistance, violence in the workplace, respectful workplace as well as addressing more general health matters such as routine medical surveillance and radiation protection monitoring.

Updated documents (procedures, work instructions, etc.) flow through a Document Review Record (DRR) process. Any document that is identified as impacting an employee's tasks is electronically routed through this process for the employee's review

and signature. The process documents the changes to the document and that the employee has reviewed the document. The process also allows for feedback from the reviewer to the document owner.

There are no CNSC certified positions at CFM; however, CFM does employ trade staff such as electricians, millwrights, and process technicians (instrumentation technicians). Personnel movement at CFM in 2023 supported the organization's position of developing people and providing opportunities for career growth within CFM and Cameco. The operational reliability organization was re-aligned to provide better service to both CFM facilities in alignment with the technical services organizations. A position of Lead Technologist, Maintenance Systems and Reliability for CFM Port Hope was created. Supporting this position, a Technologist, Maintenance Systems and Reliability position in Port Hope was created. Two production supervisors transferred to roles at PHCF. Both positions were filled internally by existing personnel. The positions vacated were the Inventory Control Analysis and a Production Supervisor. These positions were filled with new employees in 2024. Full transition is expected to take place in the first quarter of 2024.

CFM continues to enhance communication between facility management and employees as this is critical to sustaining a positive safety culture. To support communication with employees and contractors, several methods are utilized to ensure critical/important information is delivered in a timely fashion. Critical/important information may include topics of industrial safety, radiation safety, environmental protection, quality performance, production and project plans, management systems, etc.

CFM Training continued to provide support to employees and long-term contractors on training, qualifications, and requalification at CFM. Through a continuous improvement mindset and attention to course completion, the compliance results for 2023 continued to strengthen throughout the year demonstrating the effectiveness of the program.

2.1.3 Operating Performance

This safety and control area includes an overall review of the conduct of the licensed activities and the activities that enable effective facility performance.

In 2023, CFM continued to operate in a manner that supports safe, clean, and reliable production and in compliance with applicable acts and regulations.

Production rates for 2023 were within license limits. Detailed plant production information is considered "proprietary" and is submitted to CNSC staff on an annual basis under a separate cover.

For a three-week period in July of 2023, the facility underwent a planned shutdowns to complete maintenance and project work and to conduct uranium physical inventory activities (in support of CNSC/IAEA requirements). The facility also shut down for a one week period in December to complete planned maintenance and project work.

Supportive communities' objectives include not only activities related to the local community support, but also broader support for our industry through ensuring that the quality of product that produced meets customer expectations. Operational performance in this area was generally at target.

Operational environmental performance was driven lower by four reportable spill events at CFM in 2023; although all were minor in nature, the number of events was higher than previous years. Also, of note in reducing environmental risks, the aging groundwater treatment system at the site was replaced and operating late in 2023.

The incidents were posted to Cameco's web site and can be viewed using the following hyperlink.

Environment & Safety - Fuel Manufacturing: Port Hope & Cobourg - Fuel Services - Businesses - Cameco

On March 22nd, CFM became aware of a groundwater pumping well maintenance hole that was discharging groundwater intermittently onto CFM's parking lot surface. The site implemented a process to capture the surcharging effluent during the time that the repair work on the system was completed.

On May 30th, CFM staff were moving skidded drums containing legacy contaminated material for processing and noticed discolouration of the ground in a location where a skid of four drums had been stored. Health physics (HP) personnel were notified; a survey of the area in question determined that the ground surface was contaminated above the outdoor criteria. The top two inches of the surface in the area was removed and the area was resurveyed to confirm that the activity level of the affected area was below the

outdoor storage area criteria. Soil samples were taken at five locations within the area at the base of the shallow excavation as well as the center location at a depth of one foot below grade. Uranium results were below the MECP soil standard (Table 3 Standards) for industrial site use of 33 µg/g. The area was then backfilled with granular fill.

On July 3rd, during normal security site inspection rounds an abnormal condition was noted on the nitrogen evaporator. When the condition was investigated it was determined that liquid nitrogen was dripping from the evaporator. Liquid nitrogen evaporates quickly under atmospheric conditions and did not impact the concrete pad. The system was shut down and the supplier repaired the system by replacing a gasket.

On October 17th, CFM became aware of an oil leak from a fork truck onto the paved area. The leak occurred while moving empty fuel pallets to the fuel storage warehouse. The operator noticed an oil leak from the rear of the lift truck and upon retracing the route, hydraulic fluid was noted outdoors on the pavement for the driving path including over a storm drain grate. The spill was cleaned up using absorbent material in the storm drain as well as the paved area.

The reportable incidents were thoroughly investigated with corrective action plans developed. There was no risk to the public related to any of these incidents. There was no impact to the environment resulting from these events, the health and safety of persons was maintained as was the maintenance of national and international security. Each incident is reviewed against Cameco's severity matrix and is entered into its incident reporting system to document the investigation and corrective actions. Cameco is confident that through the corrective actions implemented, the review of the incidents that occurred and robust management systems CFM will continue to operate in a safe, clean, and reliable manner.

Overall, CFM's Operational Performance remains effective. CFM continued to meet customer requirements safely and at expected quality levels. Continual improvement activities continue to focus on reducing internal defect levels and improving equipment performance. CFM continues to maintain the implemented management system and programs for the safe and effective operation of the facility.

2.2 Safety Analysis

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

To operate in a safe, clean, and reliable manner, CFM utilizes various programs and procedures including the Safety Analysis Report (SAR), Fire Hazard Assessment (FHA), environmental aspects registry, chemical hazards, and other assessments.

The design, construction, operation, and maintenance 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 and has been systematically reviewed and documented from several perspectives.

CFM has a Safety Analysis Report (SAR) that documents the hazards, preventative measures and mitigating controls associated with the licensed activities at the facility. This report summarizes major assessments for the facility and is updated to incorporate facility changes and improvements since the last version. As part of CFM's Port Hope re-licensing activities, the safety analysis for the facility is updated approximately every five years. The most recent SAR was accepted by the CNSC in July of 2021 and is due for revision in 2026. Since then, Regulatory Document 2.4.4 *Safety Analysis for Class 1B Nuclear Facilities* (RegDoc 2.4.4) was published in October 2022. As part of the CNSC's request to Cameco in July of 2023 to meet the requirements of RegDoc 2.4.4, a Gap Analysis for the three Ontario sites was completed at the end of 2023 with commitments to update CFM's SAR in its next scheduled update in May of 2026.

This safety report is periodically reviewed to ensure it captures changing conditions in the facility's operation. This includes:

- assessing incidents that have occurred at the facility against the report to confirm the response of safety systems
- assessing all design changes, including those initiated as a result of an incident or accident
- assessing the results of supporting studies and reports
- reviewing the credible accident scenarios and predictive modelling

CFM also manages a Safety Risk register in accordance with corporate practices. The Safety Risk register applies to both CFM facilities and is a hazard-based risk register (versus a process-based register) that reviews all trigger/threats for all health and safety

hazards (e.g., injury from fall, workplace violence, hazardous energy, contact with objects etc.). For each hazard, each trigger is ranked for likelihood and consequence giving the inherent (un-mitigated) risk. Credits are applied based upon protective controls (passive or active) to identify if the control reduces likelihood or consequence. Each control is ranked according to the corporate Risk Management Standard. After ranked controls are applied to the hazard, a residual (mitigated) risk is generated. The initial matrix was developed in 2020 with CFM and corporate SHEQ subject matter experts. Any residual risk that is greater than twenty would be eligible for Cameco's Enterprise Risk Management system. No hazards at CFM's two facilities have been shown to have a residual risk greater than twenty. The next step will be to put evaluations in place for the controls to ensure that they are still available and performing as required.

Other Safety Analysis initiatives include the following:

- A corporate initiative was undertaken to reduce ergonomic related injuries by putting an objective of completing five ergonomic assessments in 2023. To meet this objective, CFM developed a plan to identify tasks requiring a physical demands analysis (PDA) and an ergonomic risk assessment (ERA). Priority was given to areas that have been identified as high risk, either through risk assessments or ergonomic based injuries. A certified third party performed all PDA's and ERA's and provided reports which are entered into CIRS, and recommendations noted with corrective actions or activities assigned. CFM exceeded the corporate objective by completing seven assessments in 2023.
- Two new regulatory documents have been identified by the CNSC which CFM has been asked to align with as part of its licensing basis. CSA N393 has been committed to be fully implemented in 2024 while updates for RegDoc 2.4.4 will be performed in 2026.
- The CoHE improvement team continued to meet regularly to find ways to improve application of the current CoHE program and to provide clarity for those who have questions. The 2023 summer shutdown once again included a "town hall" type meeting with employees to go over updated CoHE procedures and the expectations regarding lockout/tagout. The updated CoHE corporate standard was adopted into practice at CFM and CoHE refresher training was performed for all affected employees.
- A sound level survey was conducted after the installation of the temporary bundle washer in Port Hope to determine the level of exposure to employees for this new piece of equipment. Sound levels during the survey were at threshold values due to running equipment and the use of compressed air. As a result, the area was

identified as a mandatory hearing protection area when the equipment was running.

- Late in 2022 and into 2023 a project to realign site safety documentation was undertaken. The purpose of the project is to create program level documentation for supervisors and managers and work instructions for end-users. A total of seven Safety Health Programs (SHP) documents have been published and a variety of Health Safety Instructions (HSI) documents have been revised to focus on content needed by end-users.
- CFM continued to perform safety audits/inspections and implement recommendations through its corrective action process. Job Task Observations (JTOs) were completed at a rate of 100% overall throughout the year while 98% of all required layered inspections were completed.

The facility has a nuclear criticality program, accepted by the CNSC, to address the handling and processing of enriched uranium. The Nuclear Criticality Safety Program Manual (NCSPM) meets the requirements outlined in the CNSC regulatory document *RD-327 Nuclear Criticality Safety*. There were no processing activities of enriched material conducted on site in 2023. Quantities of enriched material onsite is provided in the plant production letter under a separate confidential letter.

The physical improvements implemented in 2023 did not alter or affect the overall design basis for the facility and therefore, the design basis remains valid. As required by its operating licence, CFM is subject to third party reviews for verification of the requirements under the current edition of the *National Building Code*, the *National Fire Code*, and *CSA N393 "Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances"* for all modifications. There were four changes to equipment in which third party reviews were submitted to the CNSC in 2023. The changes included:

- installation of Lexan shield above the blender,
- modification of drum turnover,
- modification of powder prep area, and
- modification of PP2/CSA sprinkler system.

For each modification the reviewer determined that CFM was in compliance with the requirements of the applicable codes and standards. There was one recommendation in the third-party review for the Lexan shield installation, which was satisfactorily dispositioned by CFM, after which the area was deemed to be in compliance.

CFM is maintaining an effective safety analysis program that identifies and assesses hazards and risks, including new and unforeseen risks not initially considered, on an ongoing basis. CFM maintains a current Safety Analysis Report and Safety Risk List that considers the hazards associated with CFM's facilities. These analyses are a systematic

evaluation of the potential hazards associated with the specific activities and considers effectiveness of preventative measures and strategies in reducing hazard effects.

This risk assessment supports the development and setting of site objectives and targets, as well as the development of preventive and protective measures for personnel and operations.

2.2.1 Physical Design

This safety and control area relates to activities that impact on the ability of systems, structures, and components to meet and maintain their design basis, given new information arising over time and considering changes in the external environment.

As part of Cameco's budgeting process for capital expenditures, plant improvements related to physical design are identified and prioritized.

Design requirements impact all life cycle phases of CFM facilities, from site selection, construction, operation and through to decommissioning. To ensure ongoing effectiveness of all systems, structures, and components essential to the safe operations at CFM, changes to the physical design of equipment, processes and the facility are managed through the Change and Design Control program (MSP 13-02 - Change and Design Control). The procedure was updated in 2023 in which the scope and definition of change was revised. Additionally, definitions were added for Layout Change, Process, and Process Change. Also, there was clarification added for software and programming changes and AP 004 Control of Machine Based Software was added to the references.

These identified systems, structural, and component changes are subjected to a graded approach to the application of CFM's management systems; considering design inputs / requirements such as, but not limited to, regulatory, functional, performance, operational, safety, environmental and quality considerations, and stakeholder impact.

CFM continued to use the electronic Management of Change (MoC) process in 2023 and continues to track compliance with the system requirements. Subject Matter Expert questionnaires and reference documents were updated throughout the year to incorporate any new or changes to the existing regulatory requirements, standards, internal Cameco, and CFM procedural changes, etc., as well as to account for any organizational changes. Overall, the electronic process continues to be a better means to track the flow of the design change steps and continues to be improved upon.

Once designs are established and approved, equipment and services that are required to permit construction of the design are procured through supply chain management. Activities include but are not limited to, procurement documentation, specification development, vendor selection, receipt and inspection, and storage of items.

Improvements to the facility completed in 2023 include the following:

- Roll Compactor Work Platform - This will allow for an easier and safer way to conduct work for maintenance. This work was planned in 2023 and will be completed in early 2024.

- Bundle Wash Process - This work was originally planned to replace the aging washer; however, the equipment was needed on a more urgent basis to clean product affected by the release of fire suppression chemicals. A new bundle washer was installed in a separate location in the facility for processing the affected fuel.
- Remove Lathe and Install New Metallurgical Laboratory Equipment - This project was initiated and completed to remove legacy equipment that was no longer compliant with current standards, relocate items, and install a new microscope to assist with lab work.
- Ramp for Accessibility- This work involved the installation of a ramp to allow for appropriate accessibility and offer an alternative to climbing the front stairs if unable to hold the handrail, which has been a source of injuries.
- Real Time Heat Stress Monitors – The project included the installation of automated real time heat stress monitors and eliminated the requirement for workers to manual track temperature and humidity measurements.
- Waste Treatment Pit Sump Swing Gate- This work included the installation of a new gate to address safety concerns when needing to access the pit sump for cleaning.

The physical improvements did not alter or affect the overall design basis for the facility therefore, the design basis was valid and maintained in 2023. The requirement in *REG DOC 3.1.2* requesting a description of validation activities and the results of the validation for any major changes is not applicable at CFM, as there were no major changes.

CFM has a contractual arrangement with the provincial Technical Standards and Safety Authority to ensure that oversight of pressure retaining components and systems continue to be carried out by a third-party expert.

CFM has implemented and is maintaining a design control process that effectively ensures design outputs are reviewed, verified, and validated against the design inputs and performance requirements. CFM ensures that the design inputs selected for safety, performance and dependability of the design item are achieved.

2.2.2 Fitness for Service

This safety and control area covers activities that impact the physical conditions of systems, structures, and components to ensure that they remain effective over time. This includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

CFM has programs and procedures that ensure that the facility is operated in a safe, clean, and reliable manner.

CFM has an established Planned Maintenance (PM) program as defined in site documentation. All tasks are initiated and documented through the site work notification system. In 2023, CFM continued to utilize SAP for all planned maintenance. Maintenance plans are issued, reviewed, and updated periodically to ensure the routines developed continue to be effective and adequate. Key Performance Indicators (KPIs) are in place to monitor the effectiveness of the program. Testing and verification activities are integrated into the preventive maintenance strategy for systems, structures, and components.

The asset management program accounts for aging of equipment through a number of processes designed to detect early warning signs and to prescribe rehabilitation programs or proactive replacement strategies. The effectiveness of the program is measured by the same means as the overall maintenance program.

Fire protection systems are tested according to an established schedule as outlined in the Fire Protection Program. Third-party reviews are conducted to confirm that required tests and inspections are completed and these review reports are submitted to the CNSC. In 2023 there was four projects that required a third party review to be submitted to the CNSC.

CFM's operations continued to operate in a safe and compliant manner in 2023 while meeting all customer commitments. Continual improvement within the Fitness for Service Safety Control area is contained within the Operational Reliability Improvement plan. This plan was established early in 2020 based on the results of an Operational Reliability Self-Assessment that was completed at CFM by the Cameco Asset Management and Reliability team together with Fuel Services Division site representatives in October of 2019. The next Self-Assessment was originally planned for 2023 but has been delayed to 2024 due to resource constraints.

Regular progress reviews continued at the site as well as at the divisional level. Eight out of twenty-one continuous improvement actions planned to be completed in 2023 or carried over from the previous years have been completed. The delay for the remaining

continual improvement actions was primarily driven by lack of resources due to employee changes and assignments to different positions/priorities.

The KPI's related to Fitness for Service in 2023 included:

1. Continually Improve Overall Equipment Effectiveness (OEE) – CFM leverages the major constituent parts of OEE (equipment uptime and quality performance) in its KPI's and problem solving program and the data for these metrics is more straightforward; however, data challenges continue to prevent CFM from utilizing it to drive business improvement.
2. Improve Efficiency and Effectiveness of Maintenance Activities – The results in 2023 were lower compared to 2022. This was primarily driven by resources constraints in 2023. Contracted preventive maintenance (PM) activities remain the largest opportunity for improvement of this KPI due to strict scheduling requirements. There are also still some reported data discrepancies in the dashboard.

The target completion rate for PM compliance for 2023 was 90% and the completion rate achieved was 64%. The results in 2023 were lower compared to the previous two years. This was primarily driven by available staffing resources in the Port Hope facility.

The PM Schedule Compliance target was 90% with a value of 79% achieved in 2023. Schedule Compliance was comparable to 2022 (80%). The most negative impact affecting the overall weekly schedule compliance KPI for the year are the summer shutdowns due to the different nature of work compared to regular day to day activities. Currently CFM is investigating the removal of summer shutdown work from regular reporting and identifying some other more meaningful performance measures for that work.

Overall CFM's Fitness for Service program remains effective. CFM continues to identify and implement opportunities for improvement to the Operational Reliability program.

Equipment Effectiveness was effective in achieving performance comparable to industry best practices in all aspects of its operation while reducing operating costs. The main challenges in 2023 were related to some isolated technical staffing shortages.

The maintenance, surveillance, and in-service inspection and testing programs continue to be managed effectively at CFM. All safety significant systems continue to operate without serious incident and improvement to overall fitness for service programs. All maintenance programs incorporate strategies for assessing the ongoing effectiveness of equipment, including detecting and deleterious effects of aging.

2.3 Core Control Processes

2.3.1 Radiation Protection

This safety and control area covers the implementation of a radiation protection program, in accordance with the *Radiation Protection Regulations*. The program must ensure that contamination and radiation doses are monitored and controlled.

CFM has an extensive Radiation Safety Program in place to meet the requirements of the *Nuclear and Safety Control Act* and the *Radiation Protection Regulations* and to ensure exposures are kept to levels As Low As Reasonably Achievable (ALARA). The program includes the following components:

- external radiation dosimetry – personal monitoring,
- internal dosimetry – urine analysis and lung counting program,
- workplace air sampling program,
- respirator program,
- contamination surveys; and
- gamma surveys.

The CNSC regulatory limits for total effective dose for Nuclear Energy Workers (NEWs) are 50 millisievert (mSv) per year and no more than 100 mSv over specified five-year periods.

For various radiological parameters, CFM has established action levels, accepted by the CNSC, that may be indicative of a potential loss of control for that specific parameter. Action levels pertaining to radiation protection are listed in the Radiation Protection section of CFM's LCH. These action levels serve as an early warning of a condition that warrants further investigation. A result above an action level is investigated and remedial actions taken if necessary.

Radiation protection objectives and targets are established jointly by members of the site management team and site specialists to ensure there is agreement, commitment and awareness of these objectives and targets across all areas of the operation. These objectives and targets can address, among other things, worker dose reduction initiatives and other projects which examine ways to reduce airborne uranium concentrations. The status of these objectives and targets are reviewed by the site management team through KPIs and resources are allocated as required to achieve the targets.

Some of the radiological improvement activities in 2023 included:

- Improved performance of continuous air monitors by reducing the number of alarms by 5% over the 2022 average. This was achieved by obtaining a better

understanding of detector failure modes and quicker deployment of replacement CAMHeads.

- Upgraded to new alpha counter and operating system. Full commissioning of the new counter is expected early in 2024.
- Planned project for public dose reduction. Design work was completed in 2023 with the decision to add a shield wall on the north and west side of the Fuel Storage Building. Installation of the wall is to commence in 2024.
- Continued collection and review of dose rate data through Optically Stimulated Luminescent Dosimeters (OSLDs) posted throughout the facility.
- Continued oversight for compliance to hand and foot monitoring requirement as well as urine submissions.

Procedural reviews related to radiation protection that were made in 2023 include the following:

- HSI-056 CAM head Alarms – Updated to simplify steps and updated document format.
- HSI-060 CAM head Amber Alarm – Updated to remove requirements for Security and replaced "person contacted" to supervisor throughout the document.
- HSI-102 Responding to CAM head Alarm Activation & UO_2 Powder Loss of Primary Containment – Revise for documentation requirements if no personnel are working in the area during an alarm.

CFM is committed to the ALARA concept and is continually identifying and implementing radiation protection improvements. The success of the above initiatives and programs are measured against set ALARA targets.

CFM's performance in 2023 regarding the ALARA targets is summarized below:

- Maintain employee radiation exposures to ALARA levels or below:
  - Average whole body dose for all NEWs was below the public dose limit of 1 mSv which is considered in the region of ALARA.
  - Individual total effective dose ALARA target for 2023 was maintained at 9.5 mSv/year as a maximum dose to an individual. This goal was achieved in 2023 as the maximum total effective dose for the year was 7.2 mSv.
  - Maximum Whole Body dose in 2023 was lower than previous years.
  - Average Skin Dose in 2023 was lower than previous years except 2022.

  - Average internal dose was lower than previous years.
  - Average Effective Dose was lower than the previous years.
  - Maximum Effective Dose was lower than previous years except for 2020.
  - Urine results for employees in the program, continued to be low in 2023 with all routine sample results below the screening level.
- Achieve 98% compliance to Urine Analysis schedule:
  - Urine sample submissions in 2023 were above the target with 99.4% of samples submitted.
- Other ALARA initiatives:
  - Completed ALARA assessments to determine the impact to extremity dose from the bundle inspection, washing, and repack project. Each employee assigned to the project underwent an assessment to determine the impact to the individual's extremity dose. Employees were also provided ring dosimeters to wear during the project to assess the potential dose accrued. All employees received similar extremity dose to the dose received for their normal work activities. Therefore, the extremity dose for all employees continued to be estimated. The activity related to washing and repacking bundles was completed in the fourth quarter.
  - Installed additional extraction in the powder receiving area to assist with reducing airborne contamination while re-packing drum liners for return to PHCF. Full commissioning of the extraction will be completed in 2024.
  - Reduced airborne uranium at manual pellet grinders through mist collector air extraction balancing. The project included the installation of gauges with a set range to maintain the flow of water which reduced the amount of mist generated.

As part of CFM's audit program, several audits and inspections related to radiation protection were conducted which included legal and regulatory compliance audits as well as procedural use and adherence inspections. Any issues identified during these audits are documented in the CIRS system and appropriate corrective actions were taken.

Radiation Protection training, which was developed using the Systematic Approach to Training framework, continued to be provided virtually. During the year, sixty-seven employees or contractors were assigned and completed the training. By the end of the year, 100% of active employees were up to date with the training.

In 2023, radiation monitoring instrumentation was maintained as per regular calibration and maintenance schedules. The hardware in the portal monitors was upgraded in 2023 to extend the lifespan of this equipment.

There were no lost, damaged, or compromised dosimeters that required a dose assessment in 2023. There were also no reportable radiological incidents in 2023.

Inventory of sealed and unsealed sources that are used or possessed on-site are referenced in the radioisotope source work instructions. The inventory completed in 2023 determined the sources are in a state of safe operation and pose no undue risk to workers.

Radiological initiatives planned for 2024 include:

- Commission alpha counter for air sampling system (part of CFM's plan to maintain current and upgrade from planned obsolete equipment).
- Review and identify possible process improvements for monitoring and releasing Zone 2 waste.
- Installation of a Shield Wall to reduce fence line dose at the critical receptor.
- Maintain or reduce radiation dose levels.
- Implement improvements that will reduce exposure to radioactive materials.

Full deployment of CAMHead technology in the Pelleting Area is creating a more proactive response to uranium in air events. In 2023 a better understanding of the functionality and failure detection of the CAMHeads resulted in fewer false events.

Employees enrolled in the urine analysis program continued to see low uranium in urine results in 2023 with no employees above the screening level of 2 µgU/litre. Doses remained low in 2023 with only three employees' effective dose greater than 5 mSv. Additionally, there were no action level exceedances in the radiation protection program. The radiation protection results, improvements, and lack of nonconformances demonstrate that the Radiation Protection Program remains effective.

Dosimetry

At CFM, all employees and contractors working more than eighty hours per year are considered NEWs and are provided dedicated dosimeters to measure external radiation exposure. CFM uses Landauer's OSLD's to monitor whole body, skin, and eye dose. Dosimeters are changed monthly for production related employees and quarterly for all other employees. Landauer, a licensed dosimetry service provider, sends the dosimeter results to the National Dose Registry (NDR) and provides a copy to CFM.

CFM assesses internal dose using lung counting from Cameco's licensed internal dosimetry service. The internal dose program applies to CFM employees who are in direct contact with open uranium dioxide for more than 500 hours per year working in the

Pelleting Area. These employees undergo a direct in-vivo (lung counting) measurement twice per year, with campaigns running six months apart. Internal dose for other employees is prorated based on the number of hours that individual worked in the Pelleting Area throughout the reporting year and the average dose from the measured group. For employees and contractors that worked less than eighty hours per year in the Pelleting Area an internal dose is considered insignificant and is not assigned.

In 2023 there were no exceedances of CFM's radiation protection action levels.

The following tables and graphs summarize the 2023 annual dose results for employees:

- whole body dose.
- skin dose.
- eye dose.
- extremity dose.
- urine analysis results.
- internal dose; and
- total effective dose.

Whole Body Dose

The action levels for whole body dose for NEWs are 1.6 mSv per month for production staff and 1.0 mSv per quarter for support staff and contractors. The monthly action level applies to NEWs who are monitored on a monthly basis (primarily production employees). The quarterly action level pertains to NEWs who are monitored on a quarterly basis (i.e., office staff, contractors, etc.). These individuals receive lower radiation exposure and therefore a lower action level has been established. Additionally, all individuals that were assigned personal dosimeters and classified as non-NEW received no measurable whole body dose in 2023.

Table 2 and Figure 3 display the distribution, in 1 mSv increments, of whole body dose for all NEWs in 2023. Note that figures with ranges on the horizontal axis identify results that are greater than or equal to the first number and less than the second value. For example, 1 – 2 on the horizontal axis in Figure 3 means all results in that range are greater than or equal to 1 mSv ($\geq$ 1 mSv) and less than 2 mSv (< 2 mSv).

As can be seen from the table and figure, 82.5% of employee external whole body doses in 2023 were 1 mSv or less, with all employee's whole body doses less than 5 mSv (100%). Distribution results for 2023 were different when compared to those in 2022 with less NEWs in the 0-1 mSv range and more NEWs in the remaining bins. As was the case in 2022 there were also no individual's doses greater than 5 mSv in 2023.

Table 2

2023 Whole Body Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 1	82.5
1 – 2	9.2
2 – 3	4.2
3 – 4	2.9
4 – 5	1.3
> 5	0.0

Figure 3

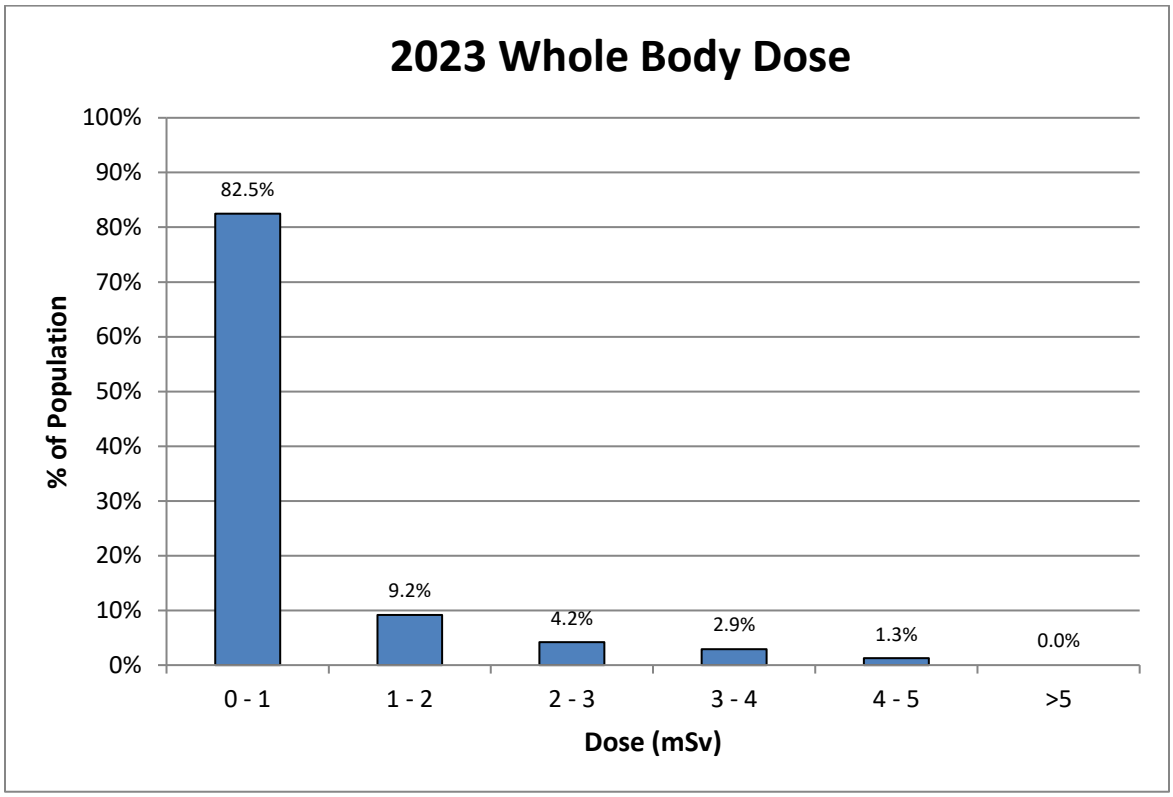


Table 3 shows the annual NEW whole body dose results for three work groups: employees in operations; employees in administration and/or support roles; and outside contractors/visitors. The highest exposures are from the operations work group, consisting of production, maintenance, and quality personnel. The average dose for all NEWs was 0.5 mSv in 2023 and the maximum individual external whole body dose was 4.3 mSv.

Table 3

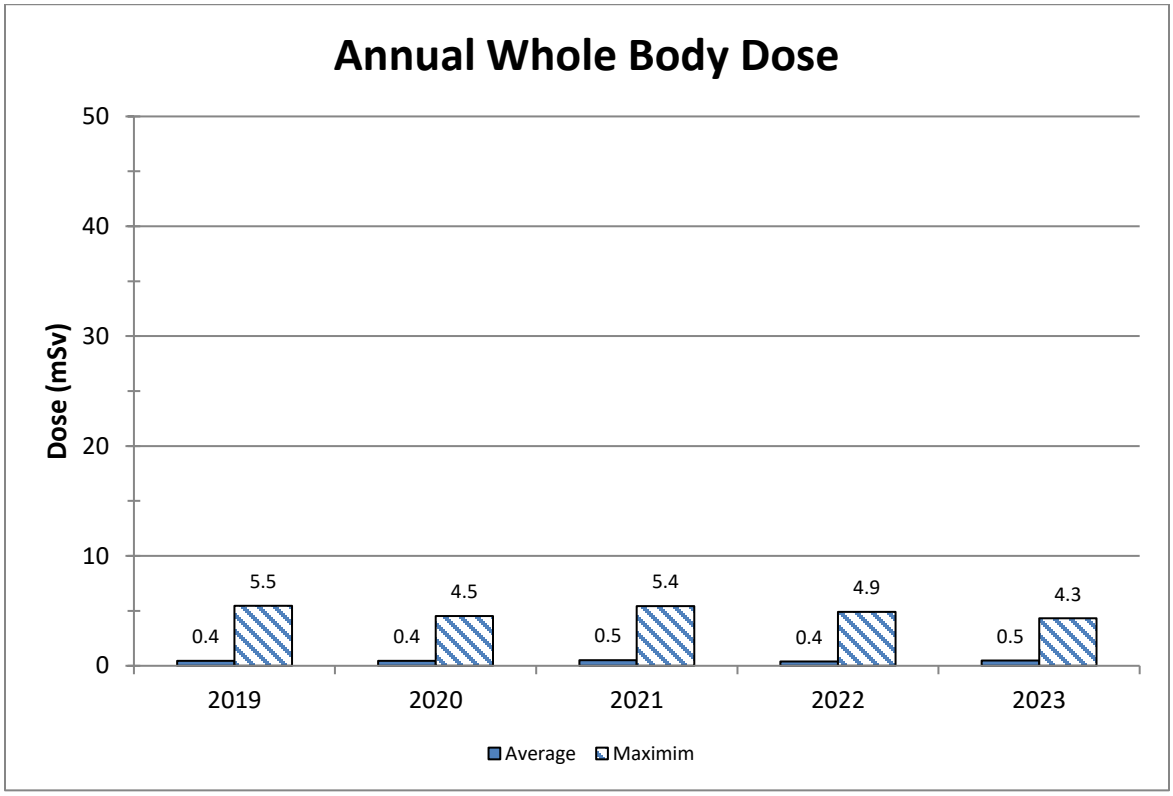
2023 Annual Whole Body Dose				
Work Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	118	0.9	0.0	4.3
Administration / Support	106	0.0	0.0	1.1
Contractors/Visitors	16	0.0	0.0	0.1

Table 4 and Figure 4 show the annual average, minimum, and maximum individual external whole body exposure for all NEWs from 2019 – 2023. The average dose in 2023 was similar to previous years other than 2020 and 2022 which were lower. The maximum dose was lower than previous years. Average and maximum dose can be impacted by numerous conditions such as the number of people, overtime, work tasks, etc. The individual with the maximum whole body dose is an operator in the Pelleting Area; and is the same individual with the maximum dose in 2022.

Table 4

2019 – 2023 Whole Body Dose				
Year	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
2019	256	0.4	0.0	5.5
2020	247	0.4	0.0	4.5
2021	217	0.5	0.0	5.4
2022	241	0.4	0.0	4.9
2023	240	0.5	0.0	4.3

Figure 4



Skin Dose

The CNSC regulatory limit for skin dose to NEWs is 500 mSv per year. CFM's action levels are 20 mSv per month and 5 mSv per quarter. The action level for skin dose was not exceeded in 2023.

Table 5 shows the annual NEW skin dose results for three work groups: employees in operations; employees in administration and/or support roles; and outside contractors/visitors. The highest exposures are from the operations work group, consisting of production, maintenance, and quality personnel. The maximum skin dose in 2023 for a production employee was 48.6 mSv (9.7% of annual limit). The average dose for all NEWs in 2023 was 3.1 mSv. In 2023, all individuals that were assigned dosimeters and classified as non-NEW received no measurable skin dose.

Table 5

2023 Annual Skin Dose				
Work Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	118	6.3	0.0	48.6
Administration / Support	106	0.1	0.0	1.8
Contractors/Visitors	16	0.0	0.0	0.1

Table 6 and Figure 5 display the distribution of skin dose received by NEWs in 10 mSv increments at CFM in 2023. The majority of NEWs received a skin dose below 10 mSv (87.5%) with no employee exposures above 50 mSv. The distribution in 2023 had a lower number of NEWs less than 10 mSv and more NEWs in the higher bins than 2022.

Table 6

2023 Skin Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 10	87.5
10 – 20	6.7
20 – 30	3.8
30 – 40	1.7
40 – 50	0.4
> 50	0.0

Figure 5

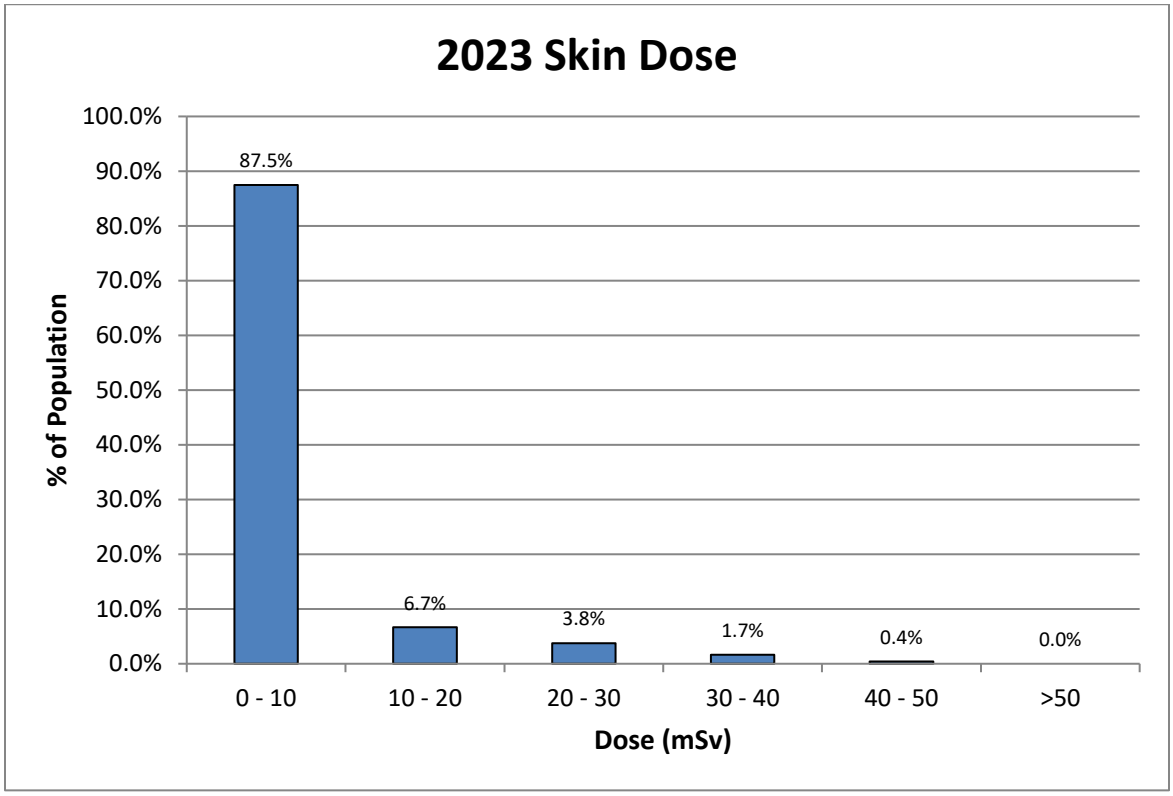
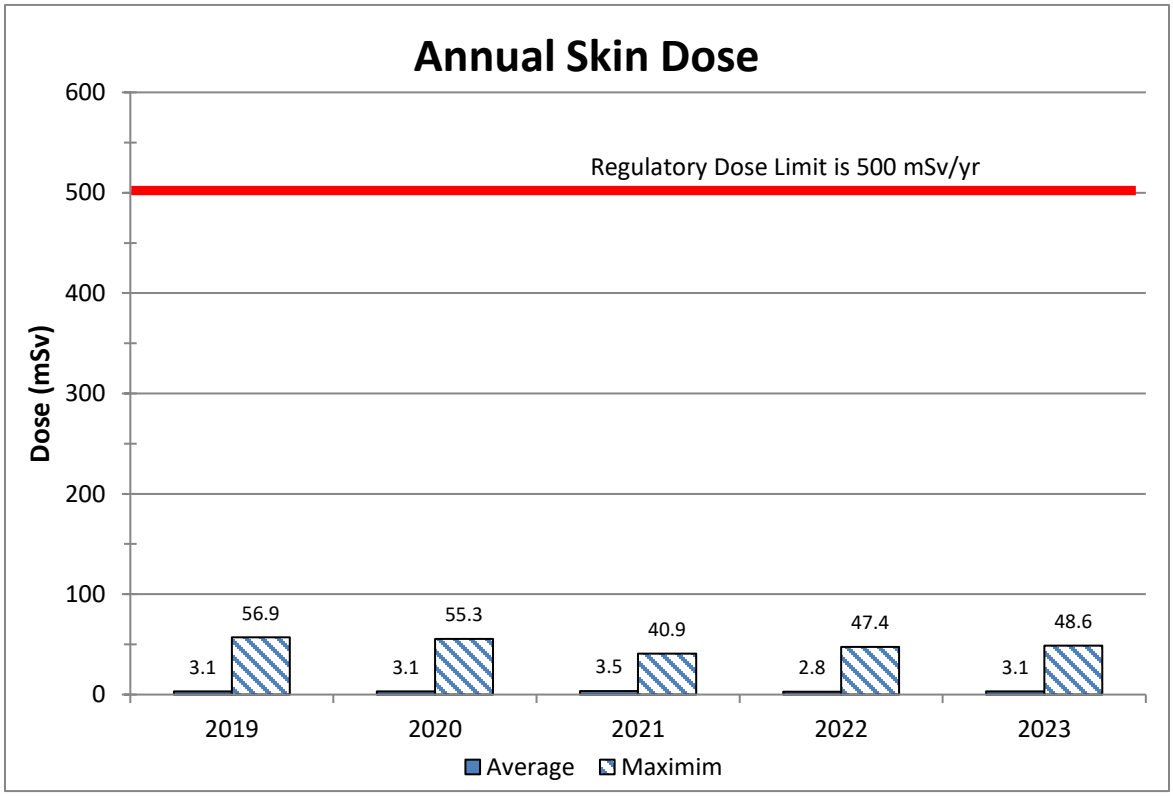


Table 7 and Figure 6 present the employee annual average, minimum, and maximum individual skin exposure for the five-year period from 2019 – 2023. The average skin dose in 2023 was the same as or lower than the previous years, except 2022. The maximum skin dose was lower in 2023 than previous years except for 2021 and 2022. Average and maximum dose can be impacted by numerous conditions such as the number of NEWs onsite, overtime, etc. The employee with the maximum skin dose was a Pelleting Area employee and is not the same employee with the maximum whole body dose in 2023.

Table 7

2019 – 2023 Skin Dose				
Year	Number of Individuals	Average Dose (mSv)	Minimum Dose (mSv)	Maximum Dose (mSv)
2019	256	3.1	0.0	56.9
2020	247	3.1	0.0	55.3
2021	217	3.5	0.0	40.9
2022	241	2.8	0.0	47.4
2023	240	3.1	0.0	48.6

Figure 6



Eye Dose

Starting on January 1, 2021 the CNSC regulatory dose limit to the lens of the eye for NEW's is 50 mSv per year. Prior to this, the regulatory dose limit to the lens of eye was 150 mSv. In 2022, CFM set a monthly interim action level of 6.0 mSv and a quarterly interim action level of 12.0 mSv. The interim action levels were approved by the CNSC in July 2022. There were no exceedances of these action level in 2023. In 2023, all individuals that were assigned visitor dosimeters and classified as non-NEWs received no measurable eye dose.

Table 8 and Figure 7 display the distribution, in 5 mSv increments, of the calculated dose to the eye for all NEWs in 2023. The calculated eye dose for the majority of NEWs was below 5 mSv (87.9%) with very few employees above 20 mSv (less than 1%). The distribution in 2023 has changed when compared to 2022 with less NEWs in the lower bin, there were more NEWs in the 10-15 mSv and 15-20 mSv range in 2023.

Table 8

2023 Eye Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 5	87.9
5 – 10	6.3
10 – 15	3.8
15 – 20	1.7
> 20	0.4

Figure 7

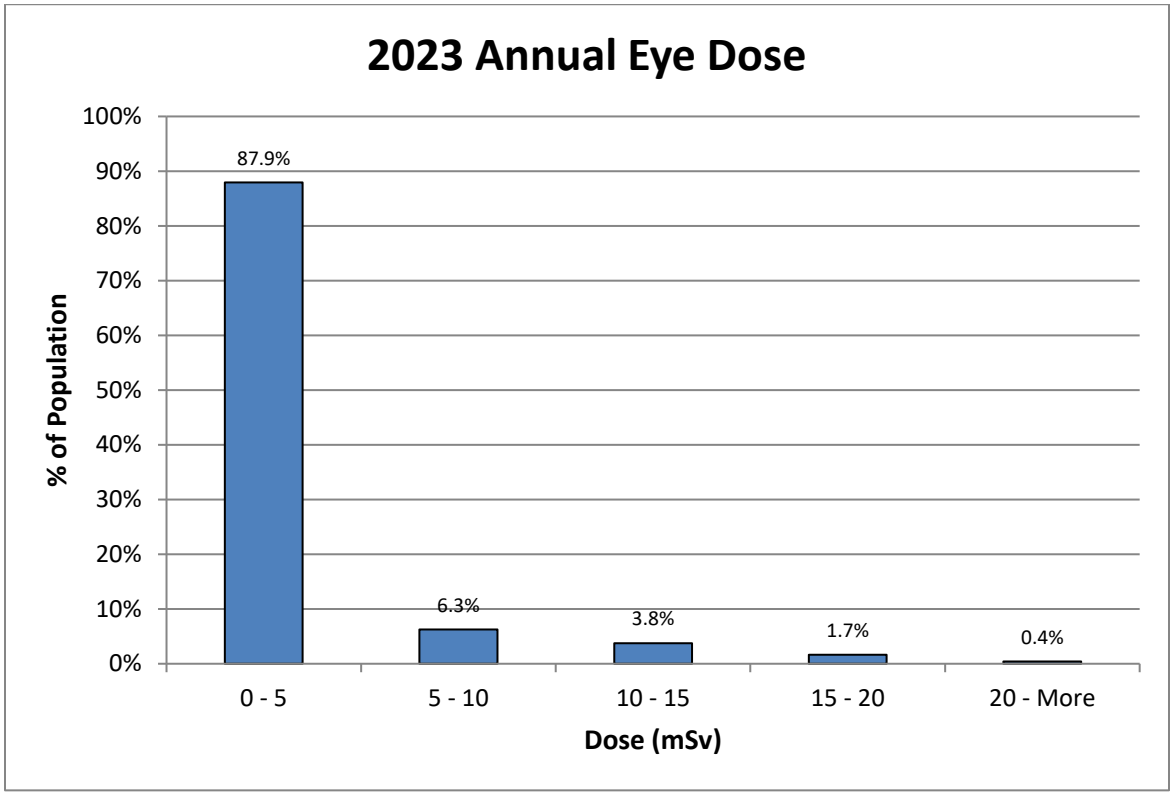


Table 9 shows the annual NEW eye dose results for three work groups: employees in operations; employees in administration, and/or support roles; and outside contractors/visitors. The highest doses are from the operations work group, consisting of production, maintenance, and quality personnel. In 2023, the average eye dose for all NEWs was 1.6 mSv and the maximum annual eye dose for production employees was 22.3 mSv.

Table 9

2023 Annual Eye Dose				
Work Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	118	3.3	0.0	22.3
Administration / Support	106	0.0	0.0	1.2
Contractors/Visitors	16	0.0	0.0	0.1

Table 10 and Figure 8 presents the employee average, minimum, and maximum eye dose for the five year period from 2013 – 2023. The maximum eye dose in 2023 was similar

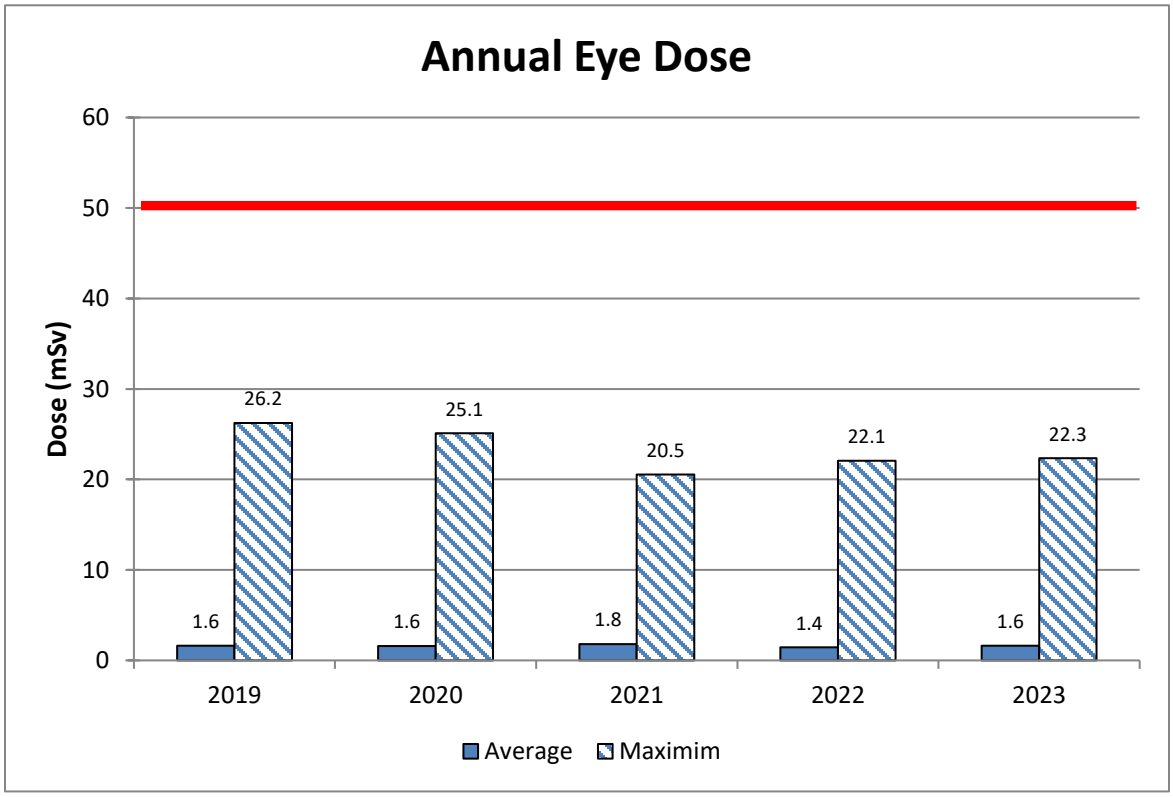
to the dose in 2022, higher than the dose in 2021 and lower than earlier years. In 2023, the individual with the highest dose was a Pelleting Area employee and was the same individual with the maximum skin dose.

Table 10

2019 – 2023 Eye Dose				
Year	Number of Individuals	Average Dose (mSv)	Minimum Dose (mSv)	Maximum Dose (mSv)
2019	256	1.6	0.0	26.2
2020	247	1.6	0.0	25.1
2021	217	1.8	0.0	20.5
2022	241	1.4	0.0	22.1
2023	240	1.6	0.0	22.3

*Regulatory dose limit from 2019-2020 was 150 mSv/yr and from 2021-2023 the limit is 50 mSv/yr.

Figure 8



Extremity Dose

The CNSC regulatory limit for extremity dose to NEWs is 500 mSv per year. The action level for CFM is 55 mSv per quarter.

In 2021, CFM began an assessment for the extremity dose to align with the *Radiation Protection Regulations (RPR)* issued in 2020. Specifically, section 8 of the RPR adds the requirement to use a licensed dosimetry service for equivalent doses to the skin, hands, and feet if the annual dose would be over 50 mSv. In order to determine if doses were above this level employees were asked to wear extremity rings continuously for a set period. A review of the doses identified all NEWs were below the 50 mSv criteria and did not require dose to be assigned from a licensed dosimetry service provider.

Beginning in 2022 the quarterly extremity dose was estimated using historic data. The first, second and fourth quarter of 2022 was similar to the second quarter of 2021 and was the quarter most representative as NEWs wore their rings for the entire quarter. The third quarter of 2023 was estimated using the data from the third quarter of 2021 since employees wore the dosimeters for the entire quarter as well as the plant was shut down for three weeks in July for both years. The extremity dose for 2023 was estimated by summing the quarterly averages and the maximum results.

If there is a change in processing techniques or work configurations that would impact extremity dose, then an assessment is required to determine if the 50 mSv/yr criteria would be exceeded. Changes to equipment or processes are captured through CFM's Management of Change (MoC) process. In 2023, there was one project that required an assessment of the impact to extremity dose. In the third and fourth quarter of 2023, a bundle inspection, washing, and repacking project was required as a result of a fire suppression system discharge that occurred while performing maintenance activities on the system. Each employee assigned to the project underwent an assessment to determine the impact to the individual's extremity dose. Employees' time was limited for job tasks that were in higher extremity dose areas associated with the bundle wash project. Employees were also provided ring dosimeters to wear during the project to assess the potential dose accrued. In 2023, a total of twenty-two employees had assessments performed to determine the time the employee was able to work on the project and not increase the extremity dose that would have been received from their normal duties. All employees received similar extremity dose from their normal work activities. Therefore, the extremity dose does not need to be adjusted for 2023. The project was completed in the fourth quarter.

As the data was estimated for 2023 there is no distribution available. Table 11 and Figure 9 show the estimated annual average, minimum, and maximum extremity dose for all

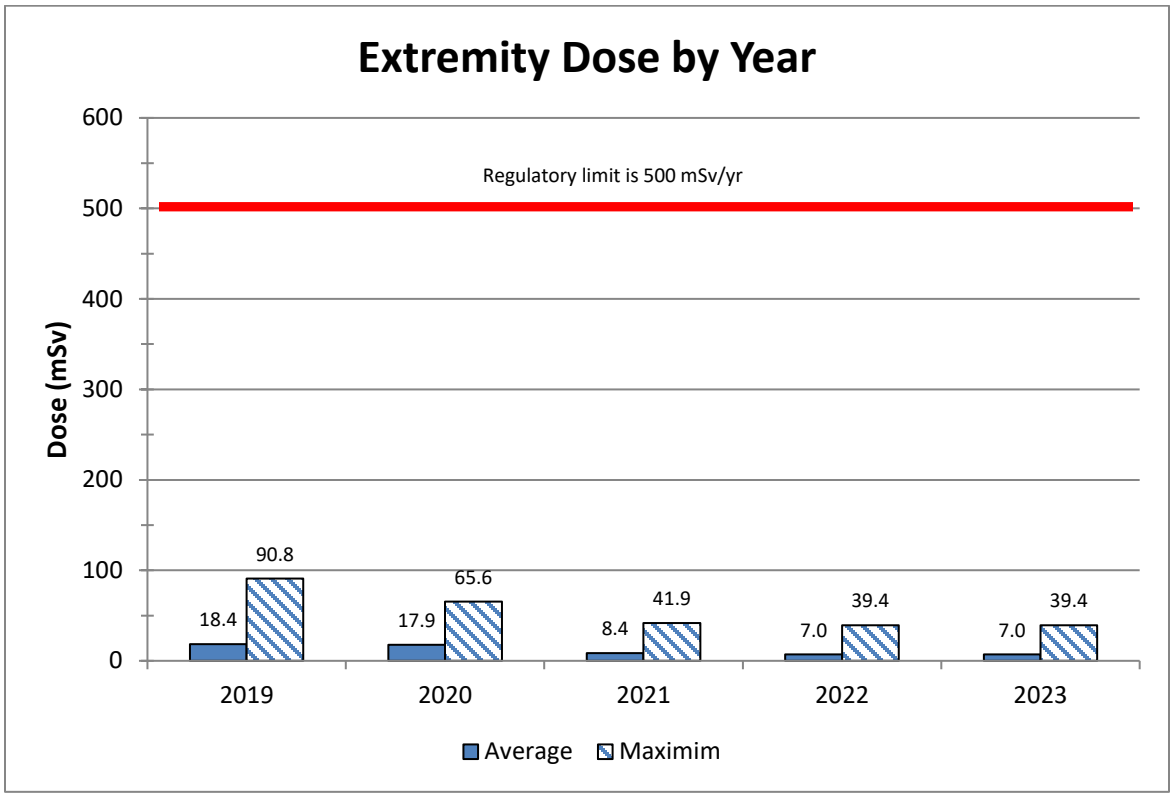
NEWs enrolled in the extremity program from 2019 – 2023. Using the data from 2021, the average extremity dose in 2023 is estimated to be 7.0 mSv and the estimated maximum dose in 2023 was 39.4 mSv. As this is an estimated dose based on historical data there is no one NEW that represents the maximum dose; however, historically the group that represents that highest extremity dose at CFM is a NEW from the Pelleting Area Inspectors.

The average and maximum dose in 2023, 2022 and 2021 were lower than the dose in previous years. This is due to the information gathered during the 2021 extremity dose assessment demonstrating that the method of wearing rings for one week and extrapolating dose for the quarter was overestimating the actual dose. In 2021 dose was calculated using this old method for the first quarter only. In 2022 and 2023, the dose was estimated using data obtained when employees wore the dosimeters continuously in 2021. The chart illustrates that the maximum annual dose received by an individual in 2023 is well below the regulatory limit and below the requirement to use a licensed dosimetry service provider (i.e., 50 mSv/yr).

Table 11

2019 – 2023 Extremity Dose				
Year	Number of Individuals	Average Dose (mSv)	Minimum Dose (mSv)	Maximum Dose (mSv)
2019	85	18.4	2.8	90.8
2020	85	17.9	3.4	65.6
2021	83	8.4	0.0	41.9
2022	-	7.0	0.0	39.4
2023	-	7.0	0.0	39.4

Figure 9



Urine Analysis

CFM collects routine bi-weekly urine samples from NEW's who work in the Pelleting Area. The samples are sent to Cameco's PHCF, which is part of a licensed dosimetry service that analyzes urine samples for uranium content. The action level for NEWs that participate in the internal dosimetry program is 10 µg/L uranium concentration for a routine sample. In 2023, there were no exceedances of the urine analysis action level.

Table 12 provides the distribution, in 2 µg/L increments, for the urine analysis results in 2023. Of the 1667 routine urine samples analyzed during the year, no routine sample results were above 2.0 µg/L. The maximum routine sample result collected in 2023 was 1.8 µg/L and the annual average was 0.24 µg/L. The average result was lower than previous years except 2022 and the maximum result was lower than previous years except for 2021.

Table 12

2023 Urine Analysis Uranium Concentration Distribution	
Single Sample Range (µg/L)	**Percentage of Individuals (%)**
0 – 2	100
2 – 4	0.0
4 – 6	0.0
6 – 8	0.0
8 – 10	0.0
>10	0.0

Internal Dose

CFM employees are incorporated into the approved and licensed internal dosimetry program for Cameco's FSD.

In 2023, there were no routine urine sample results above the internal administrative level of 4.0 µgU/L for routine samples and no internal dose was assigned to any employees from urine data.

Lung Counting

As part of the licensed FSD internal dosimetry program, Cameco employs the use of a lung counter to measure uranium in the lungs and calculate the associated committed effective dose. Employees who work in the Pelleting Area for more than 500 hours in a year undergo direct in-vivo (lung counting) measurements. The action level for CFM is 5 mSv per year for an annual lung dose.

In 2023, there were no exceedances of the annual lung count action level. A total of 57 employees in the production work group met the criteria and required lung counting. These lung counts were performed in the second/third and fourth quarter of 2023. The remaining NEWs were prorated to obtain an internal dose. This was calculated according to the number of hours the person was physically in the Pelleting Area during the year and the average dose received by the measured group. The internal dose program does not apply to NEWs who worked less than 80 hours in the Pelleting Area. Internal dose is not prorated for these individuals. As per the dosimetry program, lung count measurements above the Decision Level (DL) result in individual dose assessments, rather than an assessment based on the group average. In 2023, one lung count was above the DL and the NEW was assigned a dose in 2023 based on an individual assessment rather than on the group average.

There were a total number of 79 NEWs who were either measured for internal dose by lung counting or were assigned an internal dose by prorating the hours worked in the Pelleting area. The maximum internal dose assigned from lung counting was received by a Pelleting area employee who was assigned an internal dose based on an individual assessment. This individual was not the same person with the maximum whole body dose but is the same employee with the maximum total effective dose.

Table 13 and Figure 10 show the distribution of lung counting doses in 1.0 mSv increments. All NEWs were assigned an internal dose below 4.0 mSv. The majority (87.3%) were assigned a dose between 0 – 1 mSv. This is a decrease from 2022 in which the majority of employees were assigned a dose between 2 – 3 mSv.

Table 13

2023 Internal Dose Distribution (Lung)	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 1	87.3
1 – 2	11.4
2 – 3	0.0
3 – 4	1.3
4 – 5	0.0
>5	0.0

Figure 10

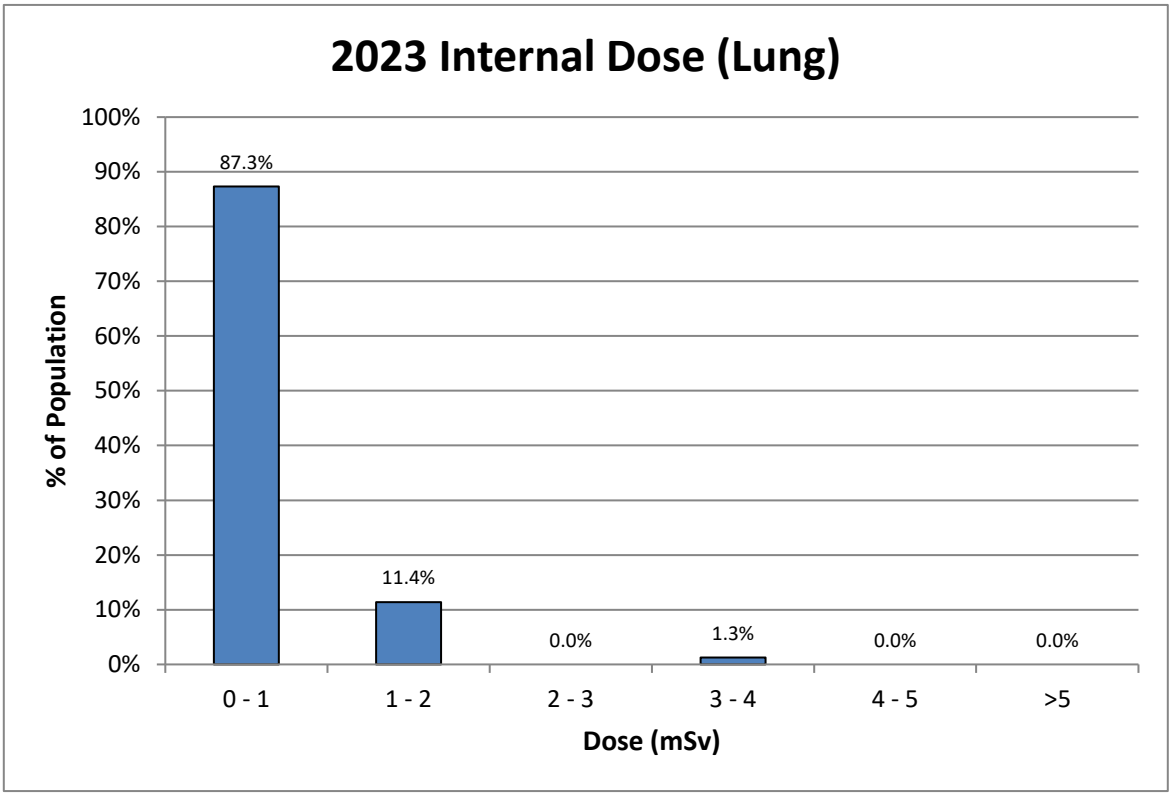


Table 14 shows the annual NEW lung dose results for two work groups: employees in operations; and employees in administration, and/or support roles. There were no outside contractors/visitors enrolled in the lung counting program in 2023 due to the low number of hours worked in the Pelleting Area during the year. The number of individuals in the support group (6) reflect employees that were onsite during the year, worked for more than 80 hours in the Pelleting Area, and are prorated based on the measured group. The majority of the employees in the operations work group (57) have a measured lung dose because they meet the criteria of greater than 500 hours working in the Pelleting Area. The remainder of the operations group (16) include employees who worked in the Pelleting area more than 80 hours and less than 500 hours; therefore, their lung doses were prorated. Therefore, in 2023, there were 57 NEWs assigned doses from the measured group and 22 NEWs with prorated doses. The highest doses are from the operations work group, consisting of production, maintenance, and quality personnel.

Table 14

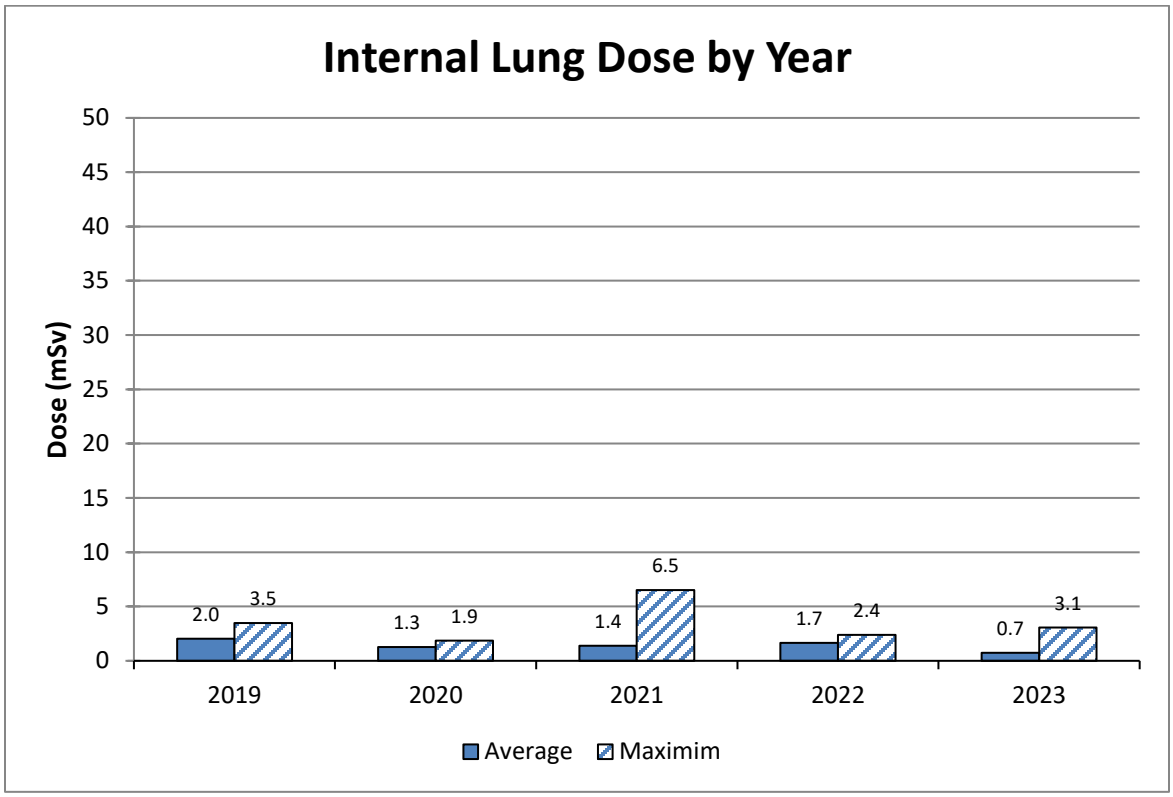
Internal Lung Count Doses 2023				
Dosimetry Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	73	0.8	0.0	3.1
Administration/Support	6	0.1	0.0	0.2

Table 15 and Figure 11 show the annual average, minimum, and maximum lung dose for the NEWs assigned a lung dose from 2019 – 2023. The chart illustrates that the maximum annual internal dose received by an individual is well below the regulatory limit. In 2023, the average lung dose for all NEWs in the internal dosimetry program was 0.7 mSv and the maximum lung dose was 3.1 mSv. The average internal dose for 2023 is lower than previous years. The maximum dose is lower than the maximum doses in 2019 and 2021 whereas the 2023 dose is higher than the maximum doses in 2020 and 2022.

Table 15

2019 – 2023 Lung Dose				
Year	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
2019	81	2.0	0.0	3.5
2020	79	1.3	0.0	1.9
2021	80	1.4	0.0	6.5
2022	75	1.7	0.1	2.4
2023	79	0.7	0.0	3.1

Figure 11



Total Effective Dose

Total effective dose is calculated by adding the whole body external dose measured from OSLDs and the internal dose derived from the lung count program as well as any internal dose assigned from the urine analysis program. The CNSC annual regulatory limits for total effective dose are 50 mSv per year and no more than 100 mSv for specific five year periods.

Table 16 and Figure 12 display the distribution of total effective dose for NEWs in 2023 in 2 mSv increments. The majority of NEWs (87.9%) had a total effective dose of 2 mSv or less, with all NEWs less than 8 mSv. The number of NEWs with a total effective dose less than 2 mSv in 2023 was 8.6% higher than the number in 2022. In 2023 there were less NEWs effective dose in the higher bins than in 2022.

Table 16

2023 Total Effective Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 2	87.9
2 – 4	7.9
4 – 6	3.8
6 – 8	0.4
8 – 10	0.0
> 10	0.0

Figure 12

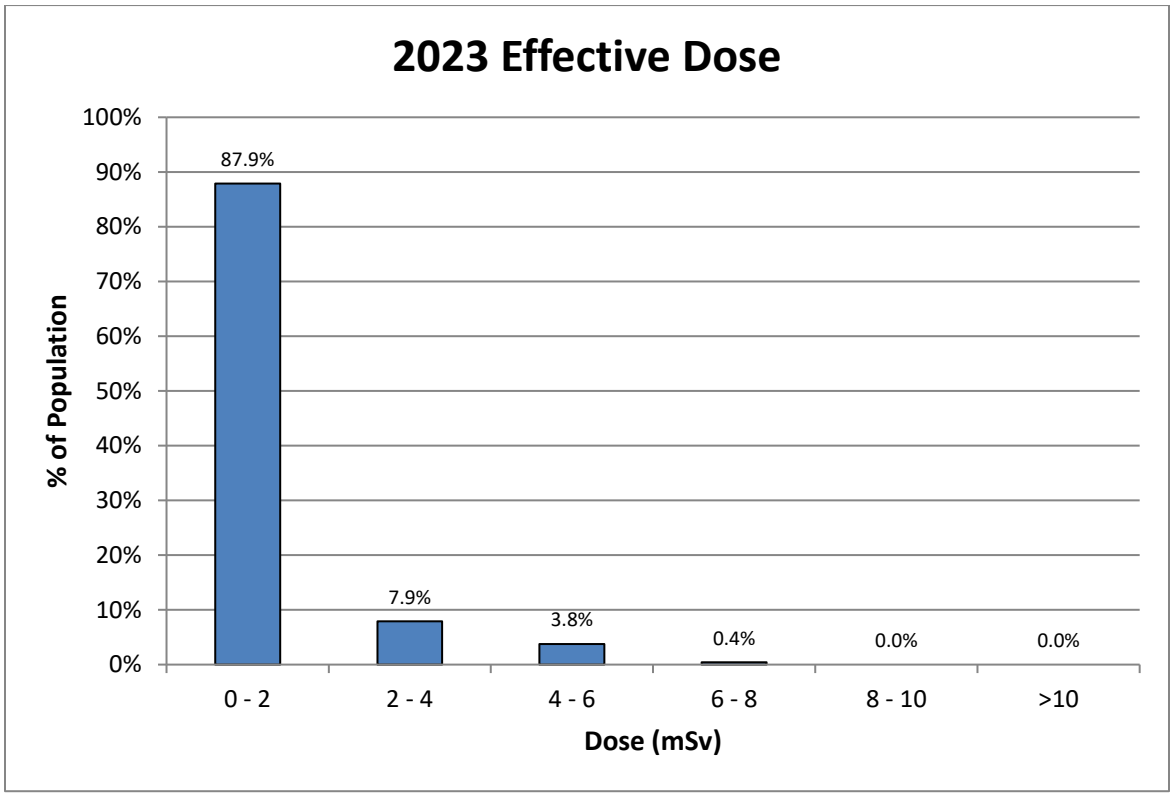


Table 17 shows the annual NEW total effective dose results for three work groups: employees in operations; employees in administration and/or support roles; and outside contractors/visitors. The highest exposures are from the operations work group, consisting of production, maintenance, and quality personnel. The maximum total effective dose for a NEW in 2023 was 7.2 mSv (14% of the annual dose limit), while the average total effective dose was 0.7 mSv.

Table 17

2023 Annual Total Effective Dose (all doses)				
Work Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	118	1.4	0.0	7.2
Administration / Support	106	0.0	0.0	1.1
Contractors/Visitors	16	0.0	0.0	0.1

Cameco measures and assigns dose to all workers with a potential to receive dose and designates workers as NEWs on this potential. Average results are reported using an assignment of a zero dose when the dose was too small to be measured. A measured dose of zero is a legitimate dose and reflects the radiation exposure controls in place at the facility. Table 18 shows the annual NEWs total effective dose results for measurable doses with zero doses removed for the three work groups: employees in operations; employees in administration and/or support roles; and outside contractors/visitors. The average effective dose for measurable doses with zero doses removed, for all NEWs in 2023 was 1.5 mSv.

Table 18

2023 Annual Total Effective Dose (all measurable doses, zero doses removed)				
Work Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
Operations	99	1.7	0.0*	7.2
Administration / Support	14	0.3	0.0*	1.1
Contractors/Visitors	2	0.1	0.0*	0.1

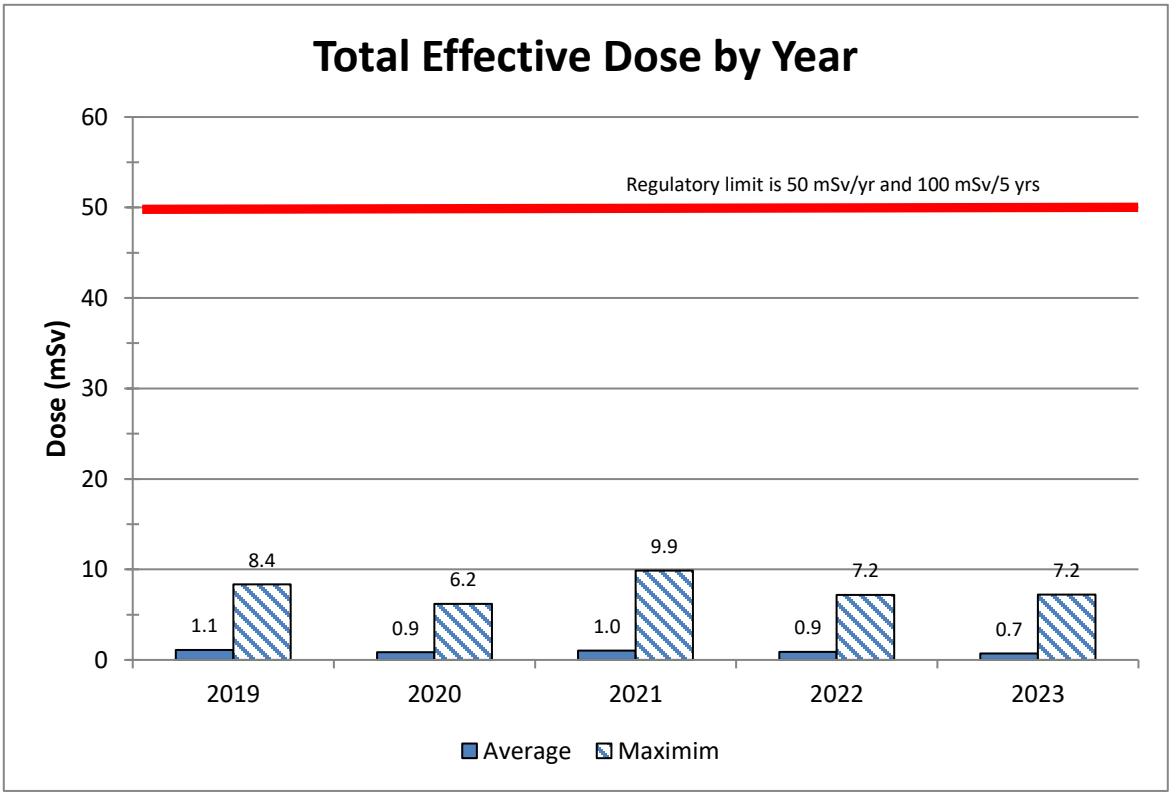
*minimum doses are rounded down to zero (i.e., all were less than 0.05 mSv)

Table 19 and Figure 13 show the employee annual total effective dose results for the period of 2019 – 2023. The average Effective Dose is equal to or lower than previous years. The maximum Effective Dose in 2023 was lower than the effective dose in previous years except 2020. The person with the highest total effective dose was the same individual with the maximum whole body dose and the maximum internal dose. The external whole body dose contributed 58% of the maximum total effective dose with the remaining 42% coming from the internal lung dose.

Table 19

2019 – 2023 Total Effective Dose				
Year	Number of Individuals	Average Dose (mSv)	Minimum Dose (mSv)	Maximum Dose (mSv)
2019	256	1.1	0.0	8.4
2020	247	0.9	0.0	6.2
2021	217	1.0	0.0	9.9
2022	241	0.9	0.0	7.2
2023	240	0.7	0.0	7.2

Figure 13



With respect to the regulatory limit of 100 mSv total effective dose over five years, the highest individual dose for the current five year dosimetry period (January 1, 2021 to December 31, 2026) is 23.7 mSv to a Pelleting Area operator.

The five NEWs with the highest total effective dose in 2023 are provided in Table 20. As indicated in the table, these individuals all work in the Pelleting Area. Four of the five individuals with the highest total effective doses are furnace operators. Individuals

working as furnace operators have historically received the highest external whole body dose. The individual with the highest effective dose is the employee with the lung dose that exceeded the action level. This employee is a general operator in the Pelleting Area. This information is provided to the Joint Health and Safety Committee (JHSC) for review and to discuss opportunities to lower dose.

Table 20

2023 Five Highest Total Effective Dose Individuals			
Occupation	**Whole Body Dose (mSv)**	**Internal Dose (mSv)**	**Total Effective Dose (mSv)**
General Pelleting Area Operator	4.2	3.1	7.2*
Furnace Operator	4.3	0.9	5.3+
Furnace Operator/Floater Repair	3.6	1.5	5.1
Furnace Operator	3.9	0.9	4.8
Furnace Operator/Floater Repair	3.6	0.9	4.5

*Results are 4.15 mSv for Whole Body and 3.06 mSv for Internal Dose with effective dose of 7.21 mSv (rounded down).
+ Results are 4.32 mSv for Whole Body and 0.93 mSv for Internal Dose with Effective Dose of 5.25 mSv (rounded up)

Collective Dose

The collective dose in mSv for each dose component with all assigned doses from 2020 – 2023 is provided in Table 21. The number of employees included in each component is included in brackets next to the dose. The collective dose for Whole Body, Skin and Eye were higher in 2023. The internal and effective collective dose was lower in 2023. The internal collective dose was lower in 2023 due to the lower group average from measured doses (0.7 mSv vs 1.7 mSv) in the lung counting program which also impacts the collective effective dose.

Table 21

2020 – 2023 Collective Doses (mSv)*							
	Whole Body	**Skin**	**Eye**	**Extremity Left**	**Extremity Right**	**Internal Dose**	**Effective Dose**
2020	108.0 (247)	761.9 (247)	394.2 (247)	1489 (83)	1520 (83)	102.1 (80)	210.1 (247)
2021	109.9 (217)	752.3 (217)	392.1 (217)	656.4 (83)	697.9 (83)	111.0 (80)	220.9 (217)
2022	91.3 (241)	678.8 (241)	347.1 (241)	-	-	124.0 (75)	215.3 (241)
2023	111.7 (240)	754.3 (240)	392.6 (240)	-	-	57.4 (79)	169.1 (240)

*CFM began reporting collective doses in 2020
( ) includes the number of employees

Contamination Control

CFM has an extensive contamination control program. The facility is divided into four zones for contamination control purposes. Zone 1 areas are designated as clean areas with no contamination permitted. Food and drink can be consumed in these areas and include the Lunchroom and office areas. Zone 2 areas contain no open sources of radioactivity but have the potential for contamination. These areas include the assembly area, change rooms and the machine shop. Zone 3 areas are the access points to Zone 4. Zone 4 areas contain open sources of radioactivity and include the pelleting area. Consumption of food and drink are restricted in Zones 2, 3, and 4.

Routine contamination monitoring is done in all areas with results provided in Table 22. Of the 2784 readings taken, none exceeded the Administrative Control Limits (ACL) for each zone.

Table 22

2023 Contamination Monitoring Results			
Area	**Total Number of Measurements**	**Administrative Limits (Bq/cm²)**	**Number of Readings Above Internal Limits**
Zone 1	519	0.4	0
Zone 2	759	4.0	0
Zone 3	165	4.0	0
Zone 4	1341	40	0

In-Plant Air

Routine air sampling is conducted at workstations throughout the plant continuously during operations to monitor airborne UO_2 in the work environment. To ensure exposures to airborne uranium are well below the regulatory dose limits, CFM uses an internal Administrative Control Limit (ACL) for any daily air sampling result of 595 µg/m³ (15 Bq/m³) which is less than half the recommended concentration for an 80 hour monitoring period (urine bioassay schedule). The 2000 hour ACL represents an annual monitoring period and has been set at 52 µg/m³ (1.3 Bq/m³).

At CFM, air contamination monitoring is performed via a continuous air sampling system and/or a fixed air sampling system at calibrated sampling locations throughout the facility where uranium dust levels may be present.

A summary of in-plant air sampling results including the area monitors for 2023 is provided in Table 23. Of the 11,485 monitoring results, one result (less than 0.1%) exceeded the 2000 hour ACL with no results exceeding the 80 hour ACL. The past few years have seen a reduction in the in-plant air results with fewer maximum results above the ACL. The average in 2023 was 2 µg U/m³ and the maximum was 88 µg U/m³.

Table 23

2023 Uranium In-plant Air Sampling Results					
Plant Area	**# of Samples**	**Average (µg U/m³)**	**Maximum (µg U/m³)**	**# Samples > ACL 2000 hr**	**# Samples > ACL 80 hr**
Ceramics Room	227	1	5	0	0
Compaction Room	456	2	11	0	0
Load Room	910	1	15	0	0
Pangborn Room	456	3	88	1	0
Pelleting Area	1366	2	15	0	0
UO_2 Grinders	912	3	24	0	0
Waste Treatment	227	4	35	0	0
PP2 Area	2916	2	17	0	0
Dry Waste Treatment	1825	2	13	0	0
Furnace Hall	2160	1	13	0	0
TOTAL	**11485**	**2**	**88**	**1**	**0**

During normal operation, some processes in the Pangborn Room require respiratory protection. Therefore, procedures are in place requiring workers to wear respirators when performing specific job tasks in this area to minimize internal exposure (in addition to local extraction). Local extraction is sufficient in other areas where UO_2 powder is used.

The single result that exceeded the 2000 hour ACL occurred when the Pangborn was being cleaned in the second quarter. The operator did not close both valves, resulting in a release of uranium dioxide powder. The operator was wearing a respirator as required during completion of this task and submitted a non-routine urine sample at the end of the shift. The supervisor ordered signs to be posted on the equipment to remind operators to close both valves when performing this task.

Gamma Surveys

An ongoing ALARA initiative involves posting OSLDs around the pelleting area, the waste treatment area, the PP2 area, as well as the assembly area to determine areas of elevated gamma radiation. The annual average, quarterly minimum, and quarterly maximum result in each location is summarized in Table 24. The results illustrate that the Fuel Storage Area had the highest gamma fields (average of 6.1 µSv/hr). The area is typically not occupied and has signage to notify employees and visitors to limit time spent in the area. The next highest reading (average 5.1 µSv/hr) was in the PP2 powder receiving area. This is expected due to the amount of raw material stored in this area. Employees limit their time in this area as well. All areas of the facility are consistent with the levels seen in previous years.

Table 24

2023 Summary of Quarterly Plant Gamma Readings by Area (µSv/hr)				
Location #	**Area**	**Average Result**	**Minimum Result**	**Maximum Result**
13	Kitting	0.2	0.2	0.3
14	S Stacking	1.1	1.0	1.2
15	Stacking	0.2	0.2	0.2
16	Pelleting Entry	0.6	0.5	0.6
17	Pelleting Lab	0.1	0.1	0.1
18	S Grinding	1.1	1.0	1.2
19	Grinding	0.9	0.9	1.0
20	N Grinding	0.8	0.7	0.9
21	S Wall Pelleting	0.0	0.0	0.0
22	S Furnace	0.4	0.3	0.5
23	Furnace	0.7	0.4	1.0
24	N Furnace	0.1	0.0	0.1
25	SE Wall Furnace	0.4	0.3	0.6
26	E Wall Furnace	0.5	0.4	0.6
27	NE Wall Furnace	0.4	0.4	0.5
28	N Corridor	0.3	0.2	0.6
29	Ceramics Lab	0.2	0.1	0.3
30	R7#1 East Wall	1.6	1.5	1.6
31	PP2 West Wall	0.4	0.1	0.7
32	S Pressing	0.9	0.6	1.1
33	N Pressing	0.7	0.6	0.9
34	Pangborn Room	0.8	0.8	0.9
35	S Waste Treat.	1.5	1.3	2.0
36	N. Waste Treat	0.8	0.6	0.9
37	PP2 Powder Rec. N	1.2	1.1	1.3
38	Powder Receipt	0.3	0.2	0.3
39	U3O8 Add-back	1.2	0.9	1.4
40	S End Cap	0.2	0.1	0.2
41	End Cap	0.3	0.2	0.4
42	N End Cap	0.1	0.1	0.1
43	E Offices	0.0	0.0	0.0
44	S End Plate	0.0	0.0	0.0
45	End Plate	0.0	0.0	0.0
46	N End Plate	0.1	0.0	0.2
47	W Offices	0.0	0.0	0.0
48	S Inspection	0.1	0.1	0.2
49	Inspection	0.2	0.1	0.2
50	N Inspection	1.1	0.7	1.5
51	W Inspection	0.0	0.0	0.0
52	Strapping Bay	0.2	0.2	0.3
53	Packing	0.2	0.1	0.3
54	Fuel Storage Area	6.1	5.6	7.0
55	Graphite East	0.3	0.1	0.5
56	BMS Loading	0.8	0.6	1.0
57	PP2 Receiving	5.1	4.7	5.7
58	PP2 Press R53-1	1.3	1.2	1.6
59	PP2 E. Wall	0.6	0.5	0.8

2.3.2 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. The foundation of the program is based on the *NSCA* and its regulations as well as Part II of the *Canada Labour Code*.

Cameco has five key principles in the area of safety that form the framework for 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.
- We are a learning organization.

CFM manages non-radiological Health and Safety through a comprehensive program as prescribed by the Cameco Health and Safety Management Program. CFM maintains a series of detailed health and safety procedures and instructions, and the safety program is further supported by monthly safety meetings on a wide variety of safety topics, regular safety audits and monthly inspections conducted by employees from all levels of the organization as well as regular safety training. Management is involved throughout the year to ensure the conventional health and safety program remains valid and effective. Regular meetings with the senior leadership team review progress on safety related objectives and KPI's. When targets are overdue or off track, the senior leadership team will take actions to address the concern. In addition, during the annual Management Review, the Conventional Health and Safety program is reviewed by management with various aspects to determine the effectiveness of the program.

CFM's safety program sets out the requirements for management of health and safety aspects of the operation consistent with Cameco's corporate SHEQ policy. Key components of the program include:

- Compliance with all safety and health-related legal and regulatory requirements.
- Setting of site health and safety objectives.
- Implementation of corporate safety standards.
- Development and maintenance of a formal hazard recognition, risk assessment and change control processes; and

- Documentation of health and safety significant incidents from the start through to the verification of completion of corrective actions via the CIRS database.

All program elements are audited at least once every three years. As part of the site internal audit program, audits of the various elements of the health and safety program are done on a routine basis. Any issues identified during these audits are documented in the CIRS database and any necessary corrective actions are tracked, and implementation verified. Further information on Health and Safety audit findings is provided in the Management Systems section of this report.

In 2023, CFM maintained its program of inspections and audits to not only identify potential safety risks, but also to take corrective actions to mitigate those risks to prevent employee injuries. JHSC workplace inspections continued throughout the year. JTO's were reviewed at JHSC meetings to ensure completeness and to verify the adequateness of corrective actions based on any findings of concern. In addition, a quality verification step was added for completed JTO's late in 2023 where the leadership group reviews the completed observation and provides feedback to the observer if required.

Ergonomics remained in the forefront at CFM in 2023 with the development of a plan to prioritize Physical Demands Analysis (PDA's) and Ergonomic Risk Assessments (ERA's) as well as a defined a method to address recommendations made by the certified third-party ergonomist. Ergonomic considerations are a part of the management of change (MoC) process and include an ergonomic consideration in design checklist for projects that have an ergonomic element to them. Employee feedback on ergonomic concerns is included at the design stage for new projects as well as any modifications to existing equipment based on concerns brought forward.

Occupational Health and Safety Monthly Meetings continued in person as well as delivered through email/U-Share in 2023 with attendance or review on Ushare at 97% for all required employees. Monthly safety meetings covered topics such as: Return to Work, Employee Assistance program, Radiation Protection, Workplace Violence, Heat Stress, CoHE, WHIMIS, Spill Awareness, Fall Arrest, Hoist and Rigging, Fire Safety, Hearing Protection, and Mental Health.

A focus for 2023 was promotion of the Stop Think Act Review (STAR) program, a self-check tool. STAR program awareness was the focus of the fourth quarter STAR Search Contest. The purpose of the contest was to highlight the STAR methodology and for employees to expand upon the habit of conducting regular self-checks. Completed STAR self-check sheets were validated by the JHSC and entered in a draw.

Some of the other safety initiatives in 2023 included the following:

- Quarterly activities to help create a culture of safety such as:
    - Promoted NAOSH week including a safety word search, crossword & Spot the Safety Opportunity.
    - Held a BBQ to acknowledge all employees' contributions to helping keep a safe workplace and the JHSC shared gifts focusing on health & safety for the family during summer activities.
    - Held a 'Donut Forget About Safety' event with donut treats and a focus on hand safety.
    - Launched the annual Kids Safety Calendar encouraging children of employees to submit a safety related poster depicting what safety means to them with winning entries displayed in the CFM calendar.
- Designed and implemented a new electronic version of the monthly layered inspection process with increased ability for reviewing pertinent information and actioned items.
- Developed a scoring approach for completed Job Task Observations with JTO's scored out of a total of 10 possible points for including the following information:
    - Providing details of the activity observed
    - Identifying best practices, problem spots and suggestions to improve safety, quality, or efficiency and answer questions
    - Following-up on suggestions
    - Including Final signoffs and
    - Attaching photos.
- Reviewed glove requirements and updated site procedures and work instructions.
- Included data review of CAM Head results in JHSC meetings.
- Completed a lockdown drill and identified opportunities for improvement.
- Continued to support mental health improvement initiatives.

Initiatives that are planned for 2024 include the following:

- Continue to track and trend incidents, including near miss incidents, continue to direct the focus for safety improvements along with the JHSC objectives for 2024,
- Continue to complete ergonomics assessment on specified job areas,
- Continue transferring health and safety procedures to align with the Safety and Health Program, and
- Continue the Continuous Improvement teams.

The Joint Health Safety Committee (JHSC) continued in person meetings at CFM in 2023 and focused on a set of four goals:

1. Comply with the legislative standards defined for the JHSC
2. Create a culture of safety
3. Help create an injury free workplace
4. Support health and safety initiatives set by management

To achieve these goals, the JHSCs targeted specific objectives including:

- Benchmarking other facilities
- Resuming team style area inspections
- Quarterly activities
- STAR program promotion
- Glove usage review
- PPE awareness
- Camhead ALARA project

The committee met nineteen times, reviewed eight documents/program, and completed twenty-one inspections, thereby meeting Canada Labour Code requirements.

Job Task Observations (JTO) completion for CFM in 2023 averaged 100% throughout the year while 98% of all required layered inspections were completed. This is an improvement in the completion rate of JTO's from 2022 at 98% and layered inspection at 93% in 2022. In 2023, 273 Non-Routine Work Order (NRWO) permits were issued, which is up from 125 in 2022. Of the 113 NRWO's that were assessed, 97% were rated as satisfactory or higher. The overall performance of the NRWO process since the review was implemented is consistent positive results.

All health or safety-related events are entered into the CIRS database system to ensure proper tracking and management. The CIRS classification system defines five categories of incidents based on actual and potential outcome, with Category I incidents being minor in scope and Category V incidents having the highest actual and potential consequences. The tracking and trending of incidents, including near miss incidents, continues to direct the focus for safety improvements along with the JHSC objectives for 2023. Hand injuries, as a result of cuts/lacerations, have become the top injury type at CFM over the last few years and has become the focus of injury reduction for 2024. While sprains and strain injuries have dropped in numbers, ergonomics remains a priority to maintain the decline of this injury type. Ergonomic risk assessments and physical demands analysis were completed in 2023 and will continue into 2024 with a spotlight on high-risk tasks.

CFM's Safety and Health Manual serves as the Hazard Prevention Program (HPP). The Manual encompasses the identification of hazards, including health, safety, radiation, and

fire safety hazards as they associate with both routine and non-routine activities and consists of six elements:

- an implementation plan
- a hazard identification and assessment methodology
- hazard identification and assessment
- prevention measures
- employee education
- program evaluation

Following the Canada Labour Code requirement of a Hazard Prevention Program, CFM evaluates the effectiveness of its health and safety program based upon a review of the following:

a) Conditions related to the workplace and the activities of the employees.
   - Workplace violence survey/assessment
   - Management of Change process
   - Communication survey
   - Self-Check / STAR infusion into communications and training
   - Ergonomic assessments – ERAs/PDAs with recommendations dispositioned

b) Workplace inspection reports.
   - JHSC monthly inspection reports
   - Industrial hygiene reports – noise, lighting, mould, asbestos

c) Hazardous occurrence investigation reports.
   - All incidents are investigated back to root cause

d) Safety inspection.
   - JTO's
   - Layered inspections
   - Sweep inspections
   - Process inspections

e) First aid records and injury statistics, including records and statistics related to ergonomic related first aid injuries.
   - JHSC CIRS review
   - CFM Injury Classification reviews
   - Injury trending with statistics communicated to employees at monthly safety presentations

f) Observations of the Joint Health and Safety Committees; and

g) Any other relevant information.

Utilizing the program reviews above as they align with a Hazard Prevention Program, statistics indicate that CFM continues to demonstrate a robust health and safety program. Through education, pro-active initiatives, and recognition of performance, the number of injuries and the severity of those injuries are continuing to trend down over the last five years. Based upon this review, CFM has an effective safety program in place.

CFM's Total Recordable Injury Rate (TRIR), specific for the Port Hope facility, dropped from 2.90 in 2022 down to 0.00 in 2023, reflecting no recordable injuries for the year. CFM's overall safety statistics for both sites saw an increase in first aid incidents in 2023, a total of twenty-four first aid injuries were reported, an increase from the eighteen that were reported in 2022. A critical component of injury prevention at CFM is the reporting of near misses. There was an increase in near miss reporting, rising from twenty-one in 2022 to forty-eight in 2023. Increased near miss reporting is attributable to conscious efforts at CFM to encourage reporting through the removal of barriers that may have contributed to lower reporting levels in the past. For example, CFM removed the requirement for an investigation report for low severity near misses in 2023

Table 25 shows the safety statistics for the last five years, from 2019 to 2023 for the Port Hope facility only.

Table 25

2019 – 2023 Safety Statistics*					
Year / Parameter	**2019**	**2020**	**2021**	**2022**	**2023**
First Aid Injuries	11	17	15	5	16
Medical Diagnostic Injuries	3	1	2	9	1
Medical Treatment Injuries	0	2	0	3	0
Lost Time Injuries	0	0	0	1	0
Lost Time Injury Frequency	0.0	0.0	0.0	0.0	0.0
Lost Time Injury Severity	0.0	0.0	0.0	0.0	0.0

- *Port Hope facility specific statistics

2.3.3 Environmental Protection

This safety and control area covers programs that monitor and control all releases of nuclear and hazardous substances into the environment, as well as their effects on the environment, as the result of licensed activities.

There are both federal and provincial regulatory authorities that have legislative jurisdiction over environmental protection at the facility. CFM monitors facility discharges to ensure that they meet applicable provincial and federal requirements. CFM's environmental monitoring program is comprised of monitoring the following components:

- water and air emissions.
- gamma levels.
- ambient air; and
- soil and groundwater.

For key emission parameters, CFM has established internal action levels accepted by the CNSC, which may be indicative of a potential loss of control for that specific parameter. These action levels serve as an early warning of a condition that warrants further investigation. An exceedance of an action level does not indicate any adverse environmental effects; however, it is an indication there may be an issue that needs to be corrected within the environmental protection program. A result above an action level is investigated and remedial actions taken if necessary. Action levels are detailed in the Environmental Protection section of CFM's LCH.

The key characteristics of the operation and activities that can have a significant environmental impact are monitored and measured and are described in the Environmental Protection Program manual (CFM-EP) and associated procedures. This document identifies all of the emissions to the air, water and land, the programs that are in place to monitor them, what is measured, the legal requirements, and the reporting requirements.

Environmental protection objectives and targets are established jointly by the site management team and site specialists as well as corporate and divisional leaders to ensure there is agreement, commitment, and awareness of these objectives and targets across all areas of the operation. These objectives and targets can address, among other things, waste reduction initiatives and other projects which examine ways to reduce environmental emissions. Resources are allocated as required to achieve the targets and the status of these objectives are reviewed by the site management team.

Procedural reviews related to environmental protection that were made in 2023 include the following:

- HSI-542 Spill Prevention - Containment Systems – Initial Version outlining criteria for containment system design, operation, inspection, and maintenance to prevent releases of pollutants to the environment.
- MSP 26-02 Environmental, Legal and Regulatory Compliance – Updated action level for PP2 and updated critical receptor location, replaced reference to EC to environmental database, removed requirement for ionizing and non-ionizing equipment.
- CFM-EP-02 Waste Management Plan – Updated for REGDOC 2.11.1 and general revision.

Some of the objectives and targets from 2023 included:

- Reduced environmental risks by determining an operating plan for the Groundwater Treatment system and installation of the new system. By the end of 2023 the new system was commissioned and operating.
- Worked on transition to a new Environmental Management Database by testing a validating new software including the transfer of historic data and development of reporting templates. Full deployment is expected early in 2024.
- Procurement and installation of a new Tennelec alpha counting system to replace aging equipment. Commissioning of the system is expected early in 2024.
- Improved Waste Pathways by developing a plan and monthly targets in support of the reduction of legacy waste in 2023.

In February of 2023, the Ministry of Environment Conservation and Parks conducted a facility inspection on air in Port Hope. The inspection was an assessment of compliance and conformance based on observations and information available during the inspection review. No instances of non-compliance or non-conformance were identified during the inspection and no further action was required.

In 2023, CFM investigated options to lower the public dose to the critical receptor. Design work was completed in 2023 with the decision to add a shield wall on the north and west side of the Fuel Storage Building. Installation of the wall will begin in 2024.

Other environmental initiatives planned for 2024 include the following:

- Maintain environmental performance without increasing environmental impact.

- Modify building ventilation calculations to use data from the CAM heads versus the in-plant air.
- Continue efforts to move environmental data to a new software system with full implementation in 2024.
- Continue to implement recommendations from 2023 waste audit.
- Continue with plan to remove legacy uranium contaminated waste from the site.

As part of the audit program, audits of the various elements of the environmental program are done on a routine basis. Any issues identified during these audits are documented in the CIRS database so that corrective actions can be tracked, and implementation verified. Further information regarding audits is provided in the Management Systems section of this report.

In 2023, all environmental releases were below the limits detailed in CFM's licence FFL-3641.0/2023 and FFL-3641.0/2043. There were four environmental incidents in 2023 that were reportable to the MECP's Spills Action Centre and the CNSC Duty Officer. These are discussed in the Operational Performance section of the report.

The reportable incidents were thoroughly investigated with corrective action plans developed. There was no risk to the public related to any of these incidents. There was no impact to the environment resulting from these events, the health and safety of persons was maintained as was the maintenance of national and international security. Each incident is reviewed against Cameco's severity matrix and is entered into its incident reporting system to document the investigation and corrective actions. Cameco is confident that through the corrective actions implemented, the review of the incidents that occurred and robust management systems CFM will continue to operate in a safe, clean, and reliable manner.

To meet the annual assessment requirements of *CSA N288.4 Environmental Monitoring Programs at Class 1 Nuclear Facilities and Uranium Mines and Mills* and *CSA N288.5 Effluent Monitoring Programs at Class 1 Nuclear Facilities and Uranium Mines and Mills*, an assessment against performance criteria, objectives, and targets, as well as the effectiveness of the effluent monitoring programs in accomplishing their respective objectives was performed. The following summarizes this assessment:

1. All required planned sampling with both internal and external analysis was completed as required to meet the Environmental Protection Program Table 12 "Planned Samples with Internal Analysis (Stacks In-Plant Air – uranium, and sanitary sewer – pH)" and Table 13 "Planned Samples with External Analysis" (Hi-Vol – uranium, Sanitary Sewer – uranium, Sanitary Sewer –

by-law suite, Ground/surface water – general chemistry). Only planned periods (e.g., Maintenance shutdown) or severe weather conditions interrupted planned sampling. Program performance met the 90% target.

2. Sampling for some environmental parameters such as sewer and Hi-Volume air samples continued during planned maintenance outages while stack sampling (directly tied to production) were suspended until production resumed.
3. All sampling equipment was maintained in working order including applicable calibration cycles. A complement of back-up sampling equipment is maintained ready for immediate change over to limit sampling down time. Very few equipment failure events occurred in 2023.
4. All data is summarized and reported to the CNSC during CFM's quarterly and annual compliance reporting.
5. CFM updated its Environmental Risk Assessment (ERA) in 2021 to assess any risks that may have emerged since the last ERA review. The 2021 ERA concluded that "there are no identified risks that have emerged since the last ERA review". The ERA reviews:
    a. Changes that have occurred in site ecology or surrounding land use.
    b. Changes to the physical facility or processes that have the potential to change the nature of the facility effluents and the resulting risks to receptors.
    c. New environmental monitoring data collected since the last ERA.
    d. New or previously unrecognized environmental issue that have been revealed by the EMP.
    e. Scientific advancements that require a change to ERA approaches or parameters; and
    f. Changes in regulatory requirements pertinent to the ERA.

In 2023, there were no significant programmatic changes or challenges in the environmental protection program

CFM's environmental protection initiatives have been effective as evidenced by low airborne and liquid emissions from the facility. Additionally, there were no regulatory limit or action level exceedances in the environmental program in 2023. CFM performed well against planned objectives for 2023. The program is being managed effectively. CFM has identified areas for improvement and made plans/commitments for the following years to make improvements in its environmental performance.

Dose to the Public

The *NSCA* requires that no member of the public shall receive from a neighboring nuclear facility an annual radiation dose in excess of 1 mSv. To ensure compliance with this regulation, explicit limits are placed on the quantities of radioactive materials that may be released from licensed facilities in gaseous and liquid effluents, and on the gamma radiation levels emitted from the facility. These "Derived Release Limits" (DRLs) take into account all significant physical pathways and are calculated based on the average member of the site specific critical group receiving an annual dose of 1 mSv from each of the pathways. Since the pathways are site specific, different release limits apply to different facilities.

In 2021, CFM updated the Derived Release Limit Report to incorporate assessments of:

- a worker at the Port Hope Sewage Treatment Plant (STP),
- a palliative care facility constructed in 2014 to the northwest of CFM,
- changes to fuel storage practices,
- a shield berm installed on the north side of the fuel storage building,
- the current version of N288.1 *Establishing and implementing action levels for releases to the environment from nuclear facilities*.

This update resulted in significant changes to how the dose to the public is calculated. Most significantly, the critical receptor changed from the residents to the west of the facility to the residents of the palliative care facility to the northwest of the facility. The gamma dose as measured on the north fence line was determined to be most appropriate for calculation of dose at this receptor location. Additionally, the assessment of the STP worker indicated that although small, dose from water discharges needed to be included in the calculation of the dose to the public.

Similar to the changes to the calculations for dose to the public at PHCF in 2016 following the update to the DRL, the updated dose calculations for CFM related to the releases to water and the fence line gamma location are more conservative than those previously used. The reported dose since 2021 appears higher than previous years, but there has not been an actual increase in the emission/dose from the facility. The results represent a much more conservative estimate of dose to the public because the gamma monitoring location at the facility fence line is now closer to the operating facility than the previous location, resulting in the increase shown in Table 26. For this reason, the results beginning in 2021 should not be compared with previous years' results.

The dose to the public from CFM operations is calculated based on three components: dose to the public from air emissions, dose from water discharges, and dose from gamma radiation.

The DRLs used in the calculations are:

- air effluent (process stacks) – 299 kg/year
- air effluent (building ventilation) – 41.5 kg/year
- liquid effluent – 331 kg/year; and
- gamma radiation levels (location 12) – 1.35 microsievert (µSv)/hr

On March 1, 2022, CFM was issued a one year licence in which the release limit for liquid emissions changed to 1.7 mg U/L for a twice weekly composite sample and air emissions changed to 10.5 kg/yr. The release limit for air emissions includes emissions from both the exhaust ventilation and process stacks. In August of 2023, the CNSC released an updated LCH after the 20 year licence was granted. The release limits in the LCH were changed for air emissions to 1.2 g/hr for an annual averaging period. CFM is in the process of updating an environmental software database which will include the ability to report data against the release limit. Until this system is in place, CFM will continue to compare results against the yearly limit of 10.5 kg which is the yearly equivalent of the hourly rate.

The dose to the public from air and water is a small fraction of the public dose limit. The gamma component represents virtually all of the estimated public dose.

Under its ALARA activities, CFM has focused considerable effort on ensuring adequate shielding to the west side of fuel storage areas due to the historical identification of the critical receptor as west of the facility. Prior to changing the critical receptor to location 12, CFM had implemented public dose reduction measures by installing a soil berm north of the Fuel Storage Building. Following the updated DRL and the first year of calculating dose based on a different critical receptor, CFM has identified an ALARA opportunity to further improve the gamma shielding on the north and west side of the Fuel Storage Building. Installation of the shielding selected is to begin in 2024.

Air effluent calculations include the assessment of releases of particulate UO_2 to air from process stacks and building ventilation from the facility. Process stacks are continuously sampled and analyzed daily for uranium emissions. The total amount of UO_2 released to the environment during the year in gaseous effluent from stacks in 2023 was 0.004 kg.

In addition, each process area also has its own separate ventilation system. Emissions in the building ventilation from the Pelleting area is determined using the average in-plant air sampling results from the Pelleting Area along with exhaust discharge rates. The

amount of uranium emitted from the PP2 area is calculated using the daily average of the continuous alpha monitors (alpha CAMs) set up in the area. As the building ventilation in this area uses HEPA filtration, a 90% efficiency factor is used in the calculation. The estimated release of UO_2 from all sources of building ventilation during 2023 was 1.05 kg. Therefore, the total amount of UO_2 released to air from stack emissions as well as building ventilation is estimated to be 1.054 kg in 2023.

At CFM, the gamma component represents the majority of the public dose. The closest residence to the CFM facility is located outside the fence line on the west side of the site. The location at the fence line that represents the critical receptor is location 12. To determine the total effective dose in this location, the natural background dose rate of 0.08 µSv/hr for the Port Hope area is subtracted from the result.

The public dose calculation is demonstrated in the following formula:

Public Dose = Dose Air (stacks) + Dose Air (building ventilation) + Dose Water + Dose Gamma (location 12)

The total dose to the member of the public, in 2023, from air emissions (process and building ventilation), liquid emissions and gamma levels is calculated to be 0.241 mSv.

The 2023 annual estimated dose is provided in Table 26 and Figure 14. Also provided for 2019 – 2021 is the estimated public dose using the previous method of calculation.

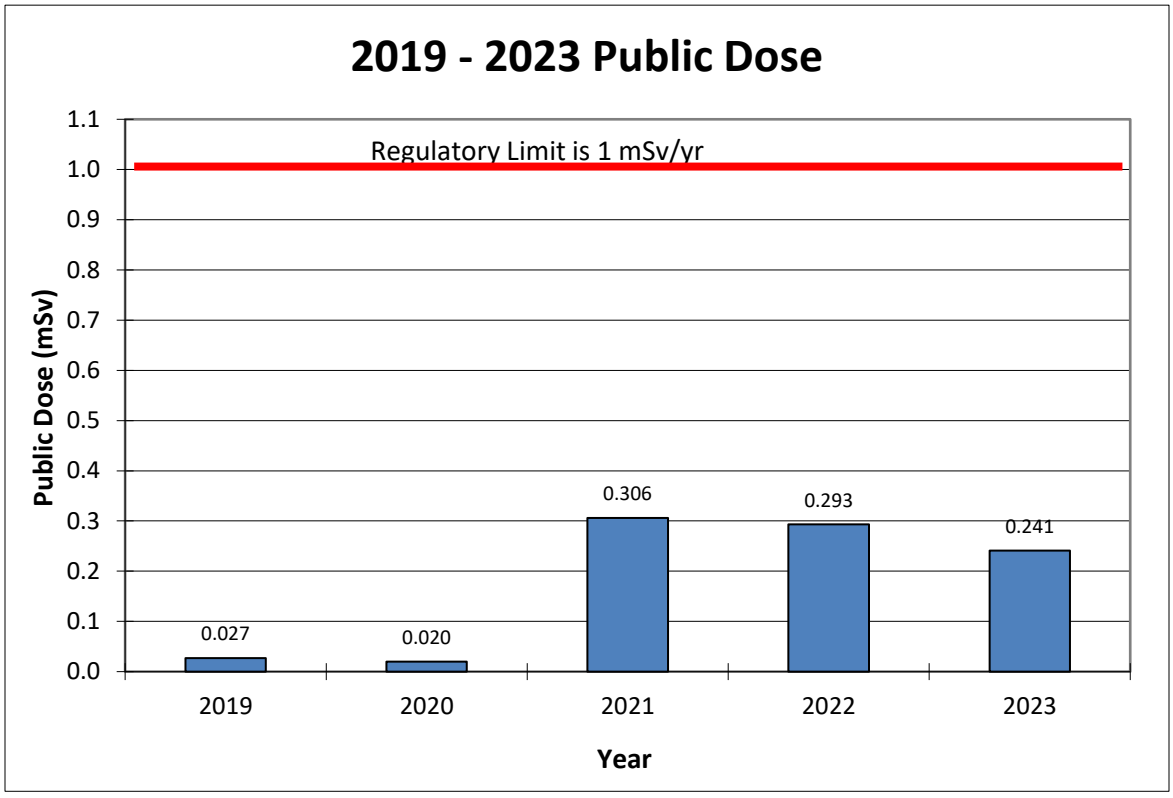
The table provides the total dose to the critical receptor as well as the individual contributions from air and gamma converted into mSv/yr units for comparison. The dose to the critical receptor remains low when compared to the dose limit; however, the value reported for public dose appears elevated since 2021 for the reasons noted above. The public dose calculated in 2023 is lower than the public dose calculated in 2021 and 2022. This is directly related to the gamma dose rate at location 12 which accounted for 89% of the public dose in 2023.

Table 26

2019 – 2023 Dose to the Public (mSv/yr)					
Parameter	**2019**	**2020**	**2021**	**2022**	**2023**
Air (combined)	0.004	0.003	0.021	-	-
Air (process stacks)	-	-	0.000	0.000	0.000
Air (building ventilation)	-	-	0.021	0.026	0.025
Liquid	-	-	0.004	0.001	0.001
Gamma (Location 12)	-	-	0.281	0.267	0.215
Gamma (Location 1)	0.023	0.017	0.002*	-	-
Total dose to Previous Critical Receptor (Location #1)	0.027	0.020	0.027*	-	-
Total Dose to Critical Receptor (Location #12)	-	-	0.306+	0.293	0.241

*Data calculated using location #1 gamma dose as well as revised DRL's and including liquid dose
+Data calculated using location #12 gamma dose as well as revised DRL's and including liquid dose
- not calculated in specified time period

Figure 14



Gamma Monitoring

In order to ensure that local residents are not exceeding the public dose limit, environmental dosimeters are strategically placed (at chest height) around the exterior perimeter of the licensed facility. The dosimeters are deployed on a quarterly basis and measure gamma levels in mSv and are converted into µSv/hr when the number of hours the dosimeters were deployed are considered. Twelve locations have been selected around the licensed facility's fenced perimeter.

The perimeter gamma DRL for the critical receptor at location 12 is 1.35 µSv/hr and the action level remains at 1.0 µSv/hr respectively. The other DRL's listed for gamma monitoring are for location #1 and location #2 at 4.96 µSv/hr and 0.46 µSv/hr respectively. There were no exceedances of the DRL's or the action levels in 2023.

Table 27 provides the average quarterly and maximum gamma levels in µSv/hr for all fence line monitoring locations (i.e., 1-12) in 2023. The location with the highest gamma level in 2023 was location 12. This is due to the proximity of the location to the Fuel Storage Building and is within the typical range.

Table 27

2023 Gamma Monitoring Results (µSv/hr)				
Location	**Regulatory Limit (DRL)**	**Action Level**	**Annual Average**	**Quarterly Maximum**
1	4.96	0.2	0.00	0.00
2	0.46	0.2	0.03	0.05
3	-	1.0	0.00	0.00
4	-	1.0	0.00	0.00
5	-	1.0	0.00	0.00
6	-	1.0	0.00	0.00
7	-	1.0	0.00	0.00
8	-	1.0	0.00	0.00
9	-	1.0	0.04	0.07
10	-	1.0	0.00	0.00
11	-	1.0	0.20	0.27
12	1.35	1.0	0.29	0.36

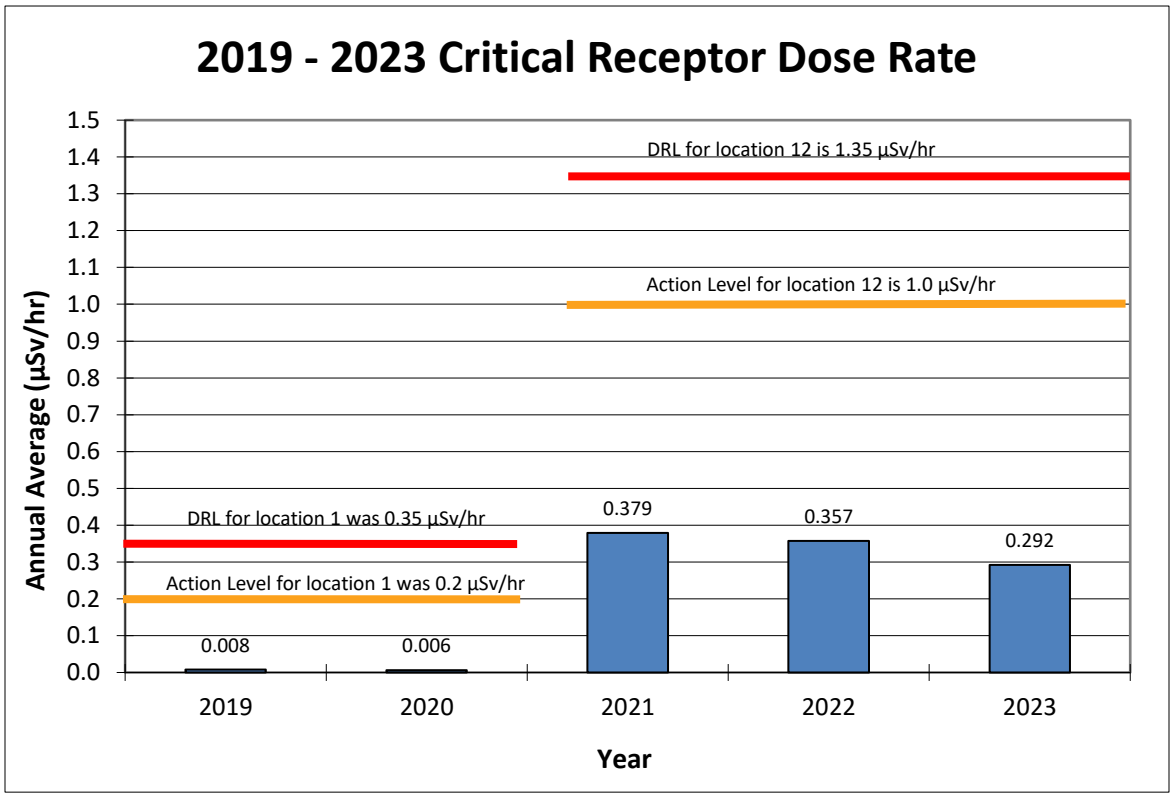
The annual average monitoring results for location 1 (previous critical receptor location) and location 12 (critical receptor from 2020 DRL report) are provided in Table 28 and Figure 15. Results have been corrected to take into account background gamma levels by subtracting 0.08 µSv/hr.

Table 28

2019 – 2023 Critical Receptor Gamma Monitoring Results (µSv/hr)			
Period	**Regulatory Limit (DRL)**	**Action Level**	**Annual Average**
2019	0.35	0.2	0.008*
2020	0.35	0.2	0.006*
2021	1.35	1.0	0.379+
2022	1.35	1.0	0.357+
2023	1.32	1.0	0.292+

*Uses location #1 as the critical receptor and 2002 DRLs
+ uses location 12 as the critical receptor and 2020 DRLs

Figure 15



Discharge to Air

Discharge to air is calculated from the releases of particulate UO_2 to air from process stacks and through building ventilation. Process stacks are sampled and analyzed daily for uranium emissions. In addition, each process area also has its own separate ventilation system. Emissions from this system are determined using in-plant air sampling data and exhaust discharge rates.

Stack Emissions

Samples of the gaseous effluent released from the plant are obtained by stack sampling which has been designed to meet the requirements of ANSI N13.1 *Guide to Sampling Airborne Radioactive Materials at Nuclear Facilities*. The samples are analyzed by alpha counting to obtain the uranium concentration. In 2023 CFM sampled nine process stacks throughout the year for uranium emissions.

A variety of pollution control equipment including baghouses, and absolute filters are used at the facility to control and reduce emissions to air. On March 1, 2023, when CFM was issued a new licence, the release limit for air emissions changed from 10.5 kg/yr to 1.2 g/hr for an annual averaging period. This includes emissions from both the exhaust ventilation and process stacks. Until CFM is able to report the stack emissions using the new software system, the annual release limit is used for comparison. The stack effluent action level is 2.0 µg/m³ uranium concentration for a single stack reading. There were no exceedances of the release limit or the action level with respect to air emissions.

Table 29 provides the 2023 average and maximum daily uranium concentration in µg/m³ by stack. The maximum for all the stacks was 0.3 µg/m³ and occurred in the Waste Treatment Area absolute filter.

Table 30 and Figure 16 provide the estimated uranium emitted in kilograms from 2019 to 2023. The total amount of uranium dioxide released to the environment during the year in gaseous effluent from stacks was 0.004 kg (4 grams). As indicated in the tables, stack emissions remain low and are well below the annual release limit.

Table 29

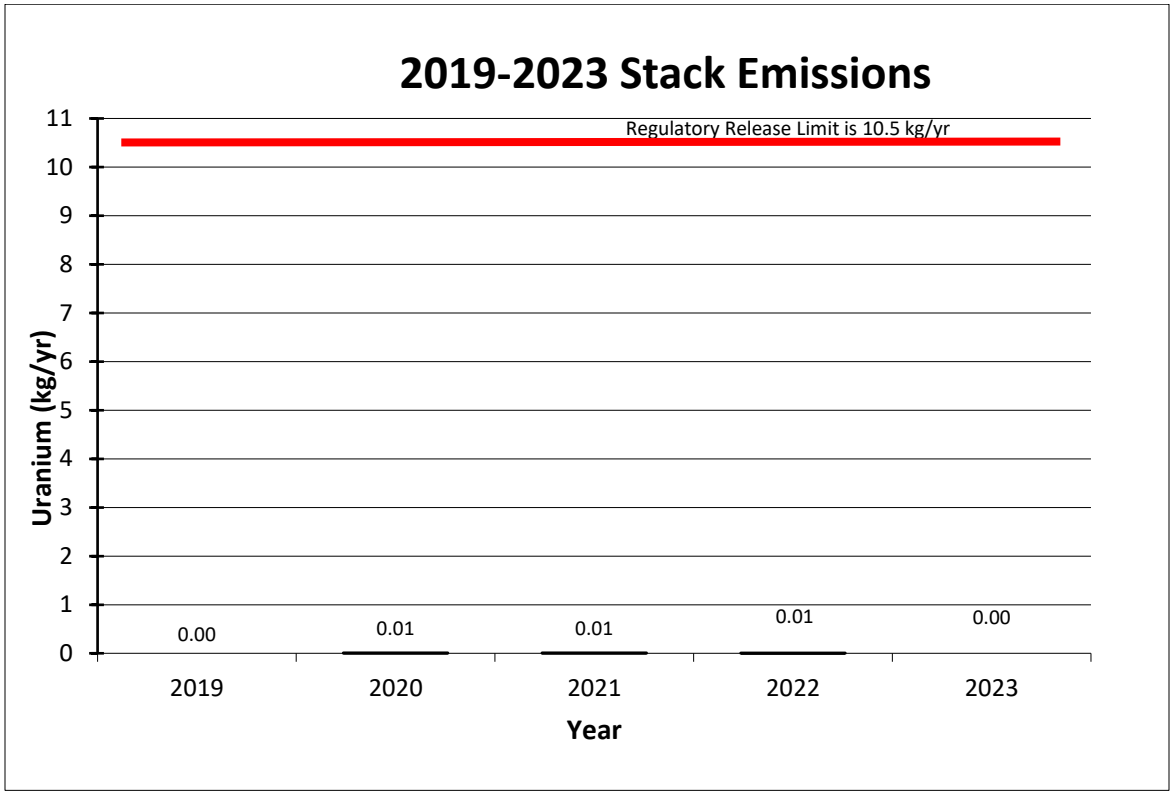
2023 Stack Sampling Summary (µg/m³)			
Source	**Action Level (µg/m³)**	**Average Annual Result (µg/m³)**	**Maximum Annual Result (µg/m³)**
BMS Extraction	2.0	0.04	0.21
Furnace Burn-off	2.0	0.01	0.08
Hoffman Vacuum	2.0	0.01	0.15
Mist Collector	2.0	0.02	0.08
PP2 East	2.0	0.01	0.04
PP2 West	2.0	0.00	0.04
Pangborn North Dust Collector	2.0	0.03	0.31
Pangborn South Dust Collector	2.0	0.01	0.12
Waste Treatment Area Absolute Filter	2.0	0.08	0.28
Overall Average & Maximum		**0.02**	**0.31**

Table 30

2019-2023 Stack Emissions (kg/yr)						
	Release Limit	**2019**	**2020**	**2021**	**2022**	**2023+**
Annual Stack Emissions	**10.5 kg+ 1.2 g/hr+**	0.00*	0.01	0.01	0.01	0.00*

*Air emissions for 2019 and 2023 was 4 grams therefore reported as 0.00 kg
+ release limit 10.5 kg/yr under licence FFL-3641.00/2023 and 1.2 g/hr under licence FFL-3641.00/2043

Figure 16



+ release limit 10.5 kg/yr under licence FFL-3641.00/2023 and 1.2 g/hr under licence FFL-3641.00/2043

Building Ventilation Emissions

Emissions from the main Pelleting Area building ventilation system are determined using in-plant air sampling data and exhaust discharge rates. Emissions in the PP2 area are calculated using alpha continuous air monitors and the exhaust discharge rate for the area. As the exhaust in this area uses HEPA filtration, a 90% efficiency factor is also applied in the calculation.

The DRL for air effluent (building ventilation) is 41.5 kg/year. On March 1, 2022, when CFM was issued a new licence, the release limit for air emissions changed to 10.5 kg/yr and in the 20 year licence the release limit is 1.2 g/hr. This includes emissions from both the exhaust ventilation and process stacks. The action level for building ventilation is 1.0 g/hr monitored on a daily basis for the Pelleting Area and 0.4 g/hr for the PP2 area. There were no exceedances of the release limit or the building ventilation action levels in 2023.

Table 31 and Figure 17 provides the estimated release of uranium concentration through exhaust ventilation from 2019 to 2023. The estimated release of UO_2 from all exhaust

ventilation in 2023 was 1.05 kg, with the majority of the amount coming from the Pelleting Area (approximately 87%).

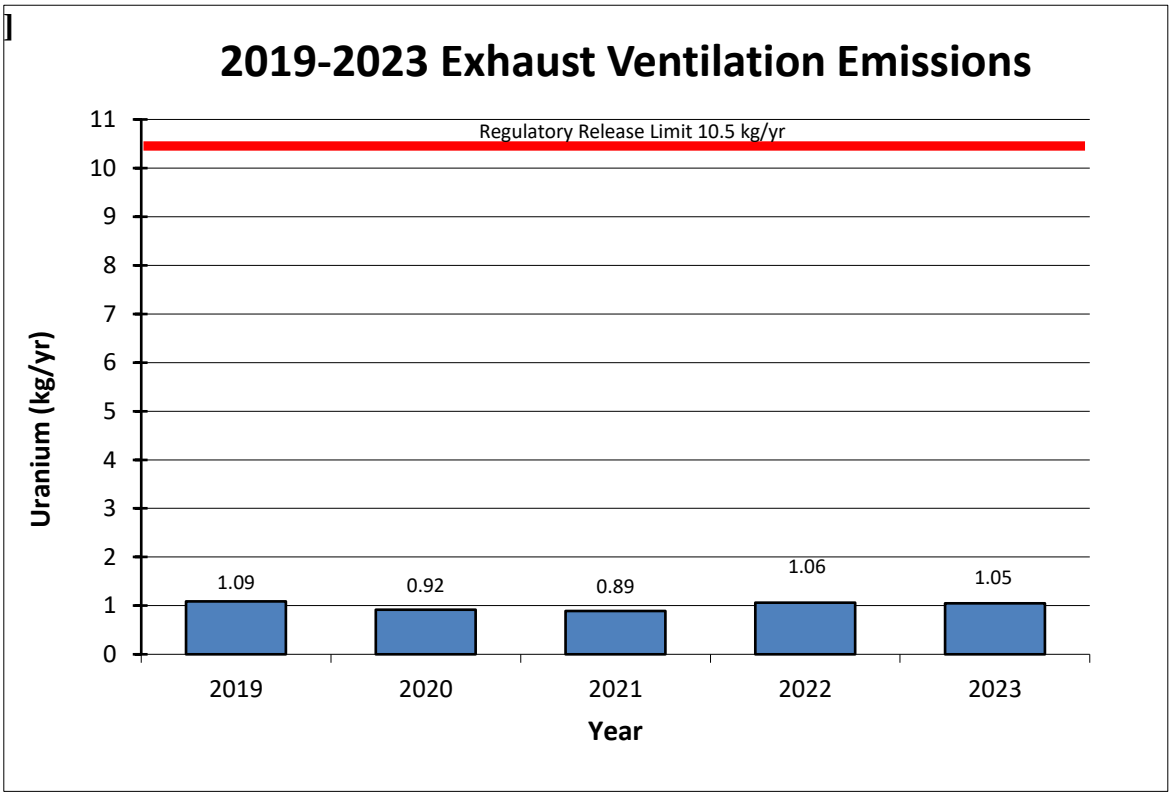
The annual value is calculated on a daily basis with a total sum provided for the year. The amount emitted in 2023 was higher than 2020 and 2021 but was lower than 2019 and 2022.

Table 31

Exhaust Ventilation Emissions (kg/yr)						
Parameter	Release Limit	2019	2020	2021	2022	2023
Annual Exhaust Emissions	10.5* 1.2 g/hr*	1.09	0.92	0.89	1.06	1.05

*release limit 10.5 kg/yr under licence FFL-3641.00/2023 and 1.2 g/hr under licence FFL-3641.00/2043

Figure 17



*release limit 10.5 kg/yr under licence FFL-3641.00/2023 and 1.2 g/hr under licence FFL-3641.00/2043

The daily average concentration of uranium emitted through exhaust ventilation in the Pelleting Area in 2023 was 0.2 g/hr and the maximum concentration of uranium was 0.4 g/hr which is comparable to the average and maximum from previous years. The average and maximum value in the PP2 area in 2023 was 0.0 g/hr and 0.1 g/hr respectively which is the same as previous years. Table 32 provides the average and maximum uranium concentration emitted through the building ventilation system in g/hr from 2019 to 2023 for the Pelleting Area and the PP2 area. Figure 18 provides the average and maximum uranium concentration emitted through the Pelleting Area and Figure 19 provides the average and maximum uranium concentration emitted through the PP2 area.

The table and figures demonstrate that the PP2 area has much lower emissions through building ventilation than the Pelleting Area.

Table 32

Building Ventilation Rates by Year (g/hr)

Parameter	Action Level	Measure	2019	2020	2021	2022	2023
Uranium Emissions from Pelleting Area	1.0	Average	0.2	0.1	0.1	0.2	0.2
		Maximum	0.5	0.5	0.3	0.4	0.4
Uranium Emissions from PP2 Area	0.4	Average	0.0	0.0	0.0	0.0	0.0
		Maximum	0.1	0.1	0.1	0.1	0.1

*release limit 10.5 kg/yr under licence FFL-3641.00/2023 and 1.2 g/hr under licence FFL-3641.00/2043

Figure 18

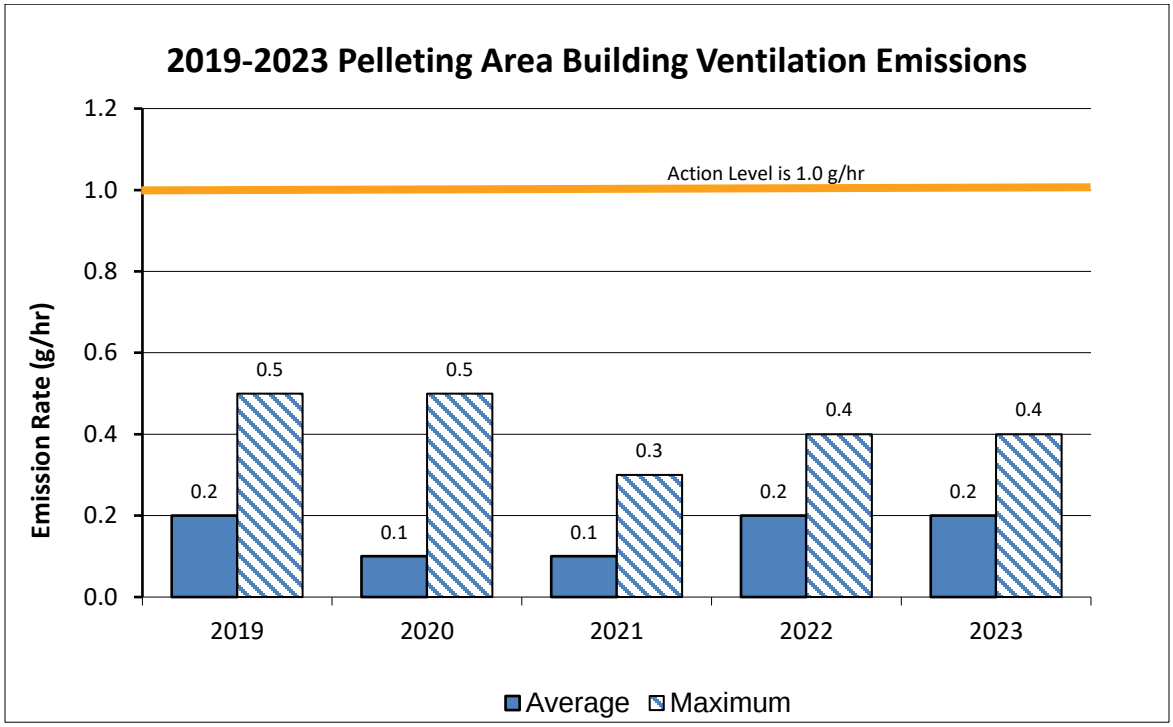
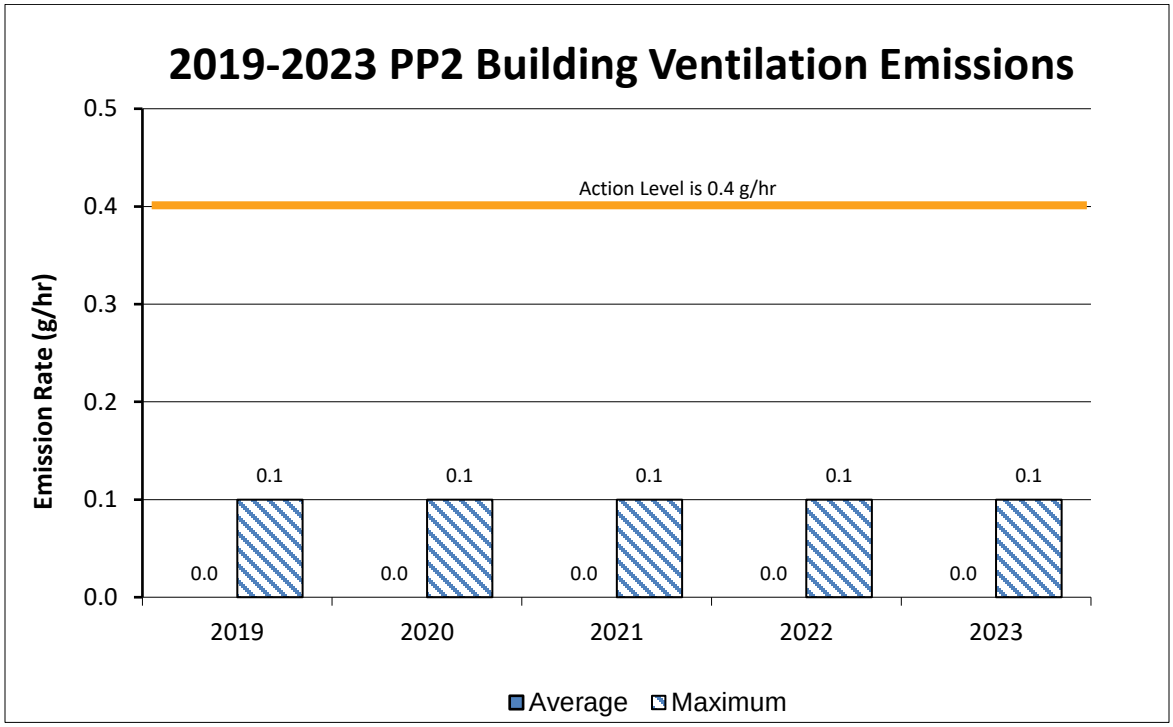


Figure 19



Discharge to Sewer

Liquid effluent generated from production processes is collected and treated to remove the majority of the UO_2 using an evaporator process. The condensed liquid is sampled and analyzed prior to a controlled release to the sanitary sewer. Liquid effluent generated from sanitary sewer systems (i.e., showers and bathroom facilities, laundry facilities, etc.) are released directly to sanitary sewer.

Liquid effluent is monitored for uranium content to ensure compliance with various federal, provincial, and municipal regulations. Automated sampling takes a sewer sample from the plant sewer line at regular intervals 24 hours per day at the point of discharge to create a composite. A composite sample is taken twice a week and is analyzed for uranium concentration. The composite sample is representative of liquid effluent discharged from the facility, including the condensate liquid effluent and the discharge from the groundwater treatment system.

The release limit for liquid emissions is 1.7 mg U/L for a twice weekly composite sample. The action level for the uranium concentration in sewer emissions discharged to the municipal sewer system is 0.1 mg/L. The action level for pH is greater than or equal to 6.5 and less than or equal to 9.0.

The total amount of uranium released to the sanitary sewer in 2023 was estimated to be 0.27 kg. The average concentration of uranium in the sewer effluent for the year was 0.01 mg/L with a maximum result for a single composite sample of 0.03 mg/L.

Table 33 provides the average and maximum uranium concentration for single composite samples from 2019 to 2023. Also provided are the 2023 minimum and maximum pH measurements along with the volume of water discharged and the emission results. Figure 20 provides the estimated amount of uranium discharged through the sanitary sewer. Figure 21 provides the maximum concentration of a single composite sample for 2019 to 2023 discharged through the sanitary sewer. The release limit and the action level were not exceeded in 2023. The estimated annual discharge in 2023 was lower than previous years, except in 2022 when the operation of the groundwater treatment system was suspended for part of the year.

Table 33

2019-2023 Sanitary Sewer Emissions							
Parameter	**Measure**	**Action Level**	**2019**	**2020**	**2021**	**2022**	**2023**
Uranium	**Avg.**	**0.1**	0.01	0.01	0.01	0.02	0.02
(mg/L)	**Max.**	**0.1**	0.03	0.05	0.03	0.09	0.03
pH	**Min.**	**6.5**	7.4	7.3	6.8	6.6	7.1
(pH units)	**Max.**	**9.0**	8.2	8.9	8.9	7.6	8.1
Volume of water (m3)	**-**	**-**	29 064	24 172	20 998	13 720	19 025
Estimated Discharge (kg)	**-**	**-**	0.39	0.34	0.29	0.21	0.27

Figure 20

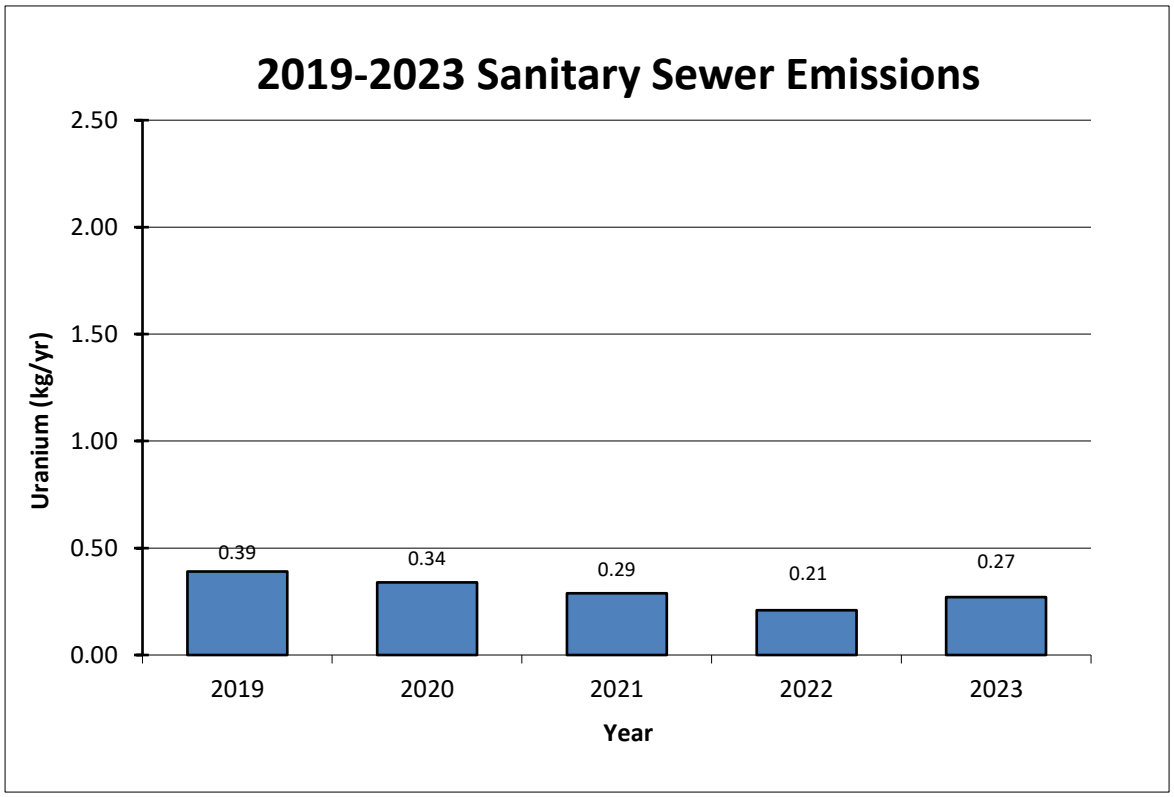
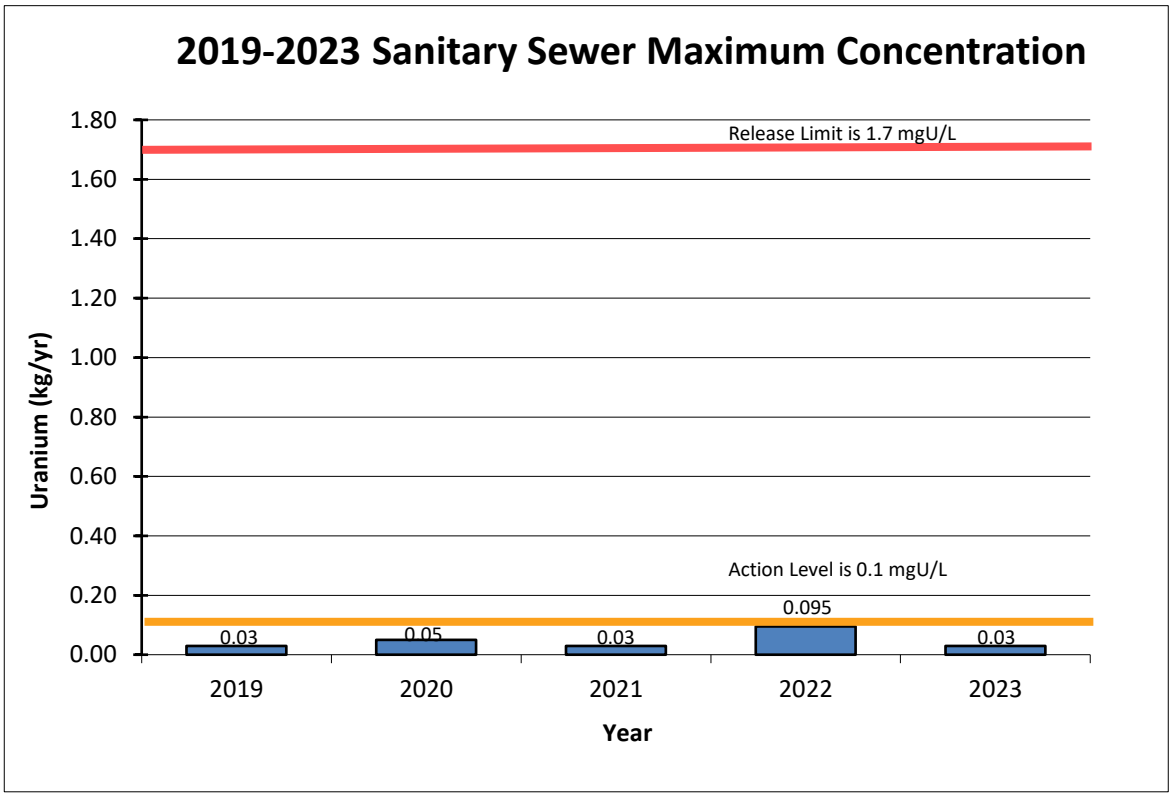


Figure 21



Ambient Air Monitoring

In addition to onsite monitoring of emissions, CFM has a comprehensive ambient monitoring program including sampling of ambient air, soil, and groundwater.

CFM uses hi-volume air samplers to measure the concentration of UO_2 that has been emitted from gaseous emissions (i.e., stack and building ventilation emissions) along the plant boundary at ground level. The system provides information on the impact to the public as well as the environmental impact from facility operations. Hi-volume air samples are collected in the four corners within the CFM fence line. The samplers are run for 24 hours per day on a continuous basis. The sample filter is changed once per week and analyzed for uranium concentration.

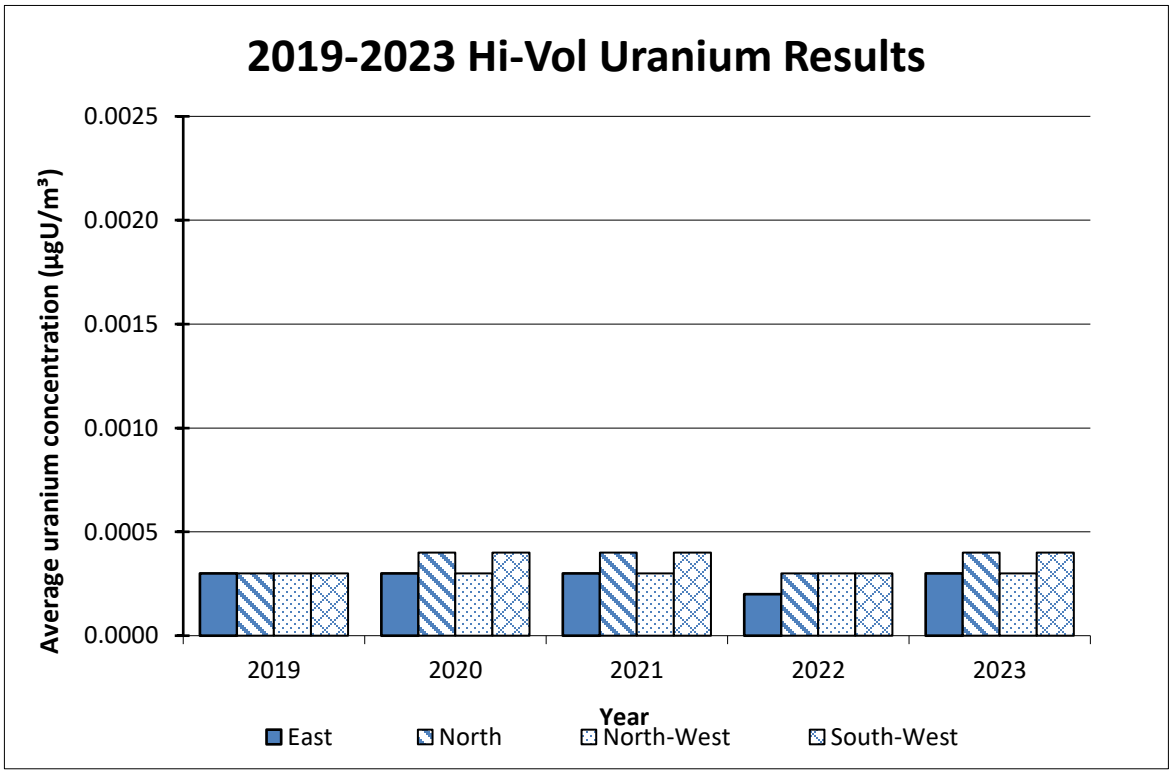
The maximum concentration of uranium in 2023 was 0.0021 µg/m³ and occurred during the third quarter in the North location. Annual results from all stations remain well below the MECP standard annual average limit of 0.03 µgU/m³ that came into effect in July 2016 as well as the provincial ambient air quality criteria (AAQC) of 0.06 µgU/m³ for Total Suspended Particulate (TSP).

Table 34 and Figure 22 present results of the annual average and maximum uranium in air concentrations for 2019 – 2023 at the four locations.

Table 34

Annual Uranium-in-Air Concentration at Hi-Vol Stations (µgU/m³)						
		2019	2020	2021	2022	2023
East	Average	0.0002	0.0003	0.0003	0.0002	0.0003
	Maximum	0.0008	0.0014	0.0039	0.0009	0.0008
North	Average	0.0003	0.0004	0.0004	0.0003	0.0004
	Maximum	0.0014	0.0024	0.0050	0.0023	0.0021
North West	Average	0.0003	0.0003	0.0003	0.0003	0.0003
	Maximum	0.0016	0.0012	0.0042	0.0021	0.0012
South West	Average	0.0003	0.0004	0.0004	0.0003	0.0004
	Maximum	0.0015	0.0014	0.0056	0.0011	0.0013

Figure 22



Soil Monitoring

As part of CFM's commitment to protecting the community and the environment, samples from the soil and vegetation are routinely collected from specific locations surrounding the facility for analysis. The purpose of the survey is to measure and document uranium concentrations in the soil and vegetation to verify that no significant build up from emissions of uranium have been released from the facility.

At least every three years, vegetation and core samples are each separately collected at twenty-three locations surrounding the facility (locations are provided in Figure 24).

Core samples are taken in five areas within each location. Each core sample is divided into three sections (0-5 cm, 5-10 cm, and bottom 10-15 cm) and combined with the other cores taken from the same site to obtain a representative sample of that location. In addition, a representative sample of the surface vegetation growing within the sampling site is taken. Uranium samples are sent to an external laboratory and are reported in micrograms per gram (µg/g).

Soil sampling was conducted in 2022 on the three-year schedule. The average and maximum results of the soil sampling conducted in 2022 are provided in Table 35 and Figure 23 along with the last five sampling campaigns. The maximum results in 2022 were higher than previous years with the maximum of 33.9 µg/g measured in location 14 which is located in the north-east corner of the parking lot outside the fence line. This location has historically shown elevated results although not in recent years. The elevated maximum results are not attributed to air deposition due to the low levels or uranium released. The results are most likely attributed to natural variations in the soil.

Table 35

Soil Results (µg/g)						
Depth	Average/Maximum	2010	2013	2016	2019	2022
Vegetation	Average	1.5	1.3	0.7	0.3	0.3
	Maximum	6.0	2.9	3.4	1.3	2.8
Surface	Average	5.2	4.1	-	-	-
	Maximum	18.6	13.1	-	-	-
0-5cm	Average	5.6	4.7	3.0	2.9	3.6
	Maximum	21.1	17.4	10.2	7.6	25.8
5-10cm	Average	5.6	4.8	3.2	3.0	4.0
	Maximum	19.1	17.3	11.2	7.5	33.9
10-15cm	Average	-	-	3.2	2.8	3.4
	Maximum	-	-	11.1	7.5	20.6

- results are not available due to change in sampling approach.

Figure 23

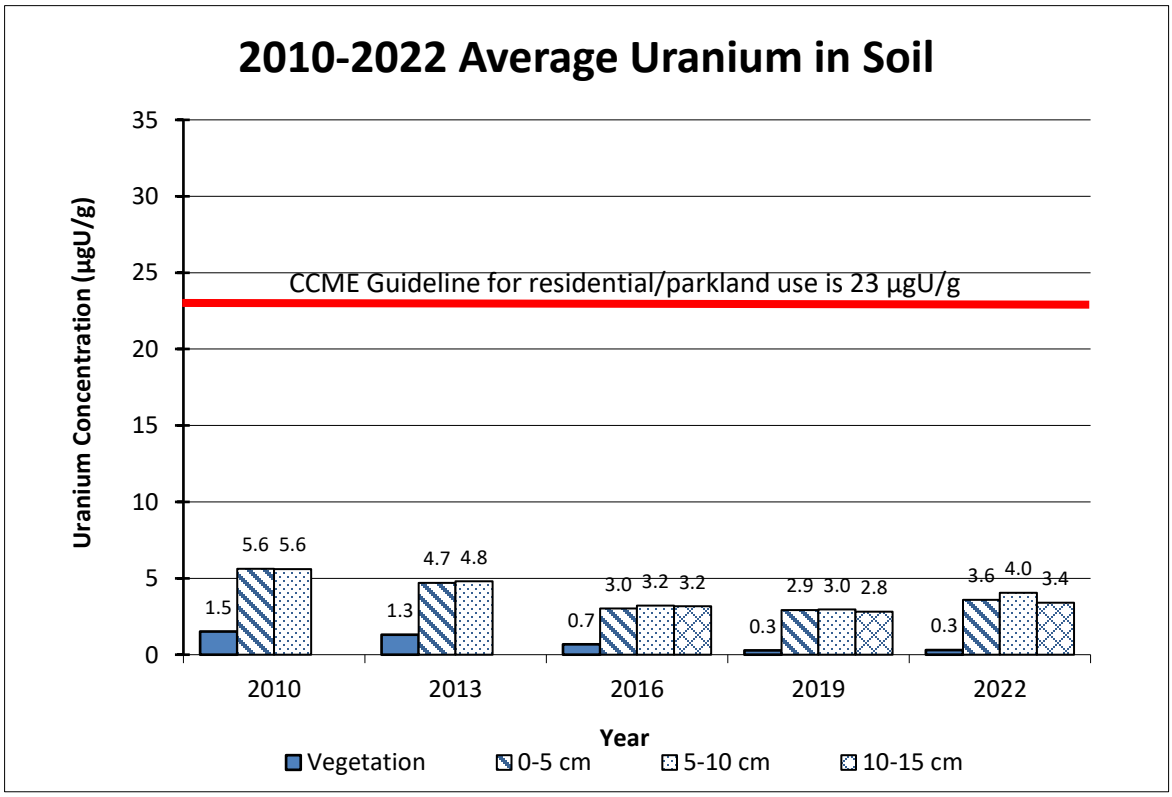
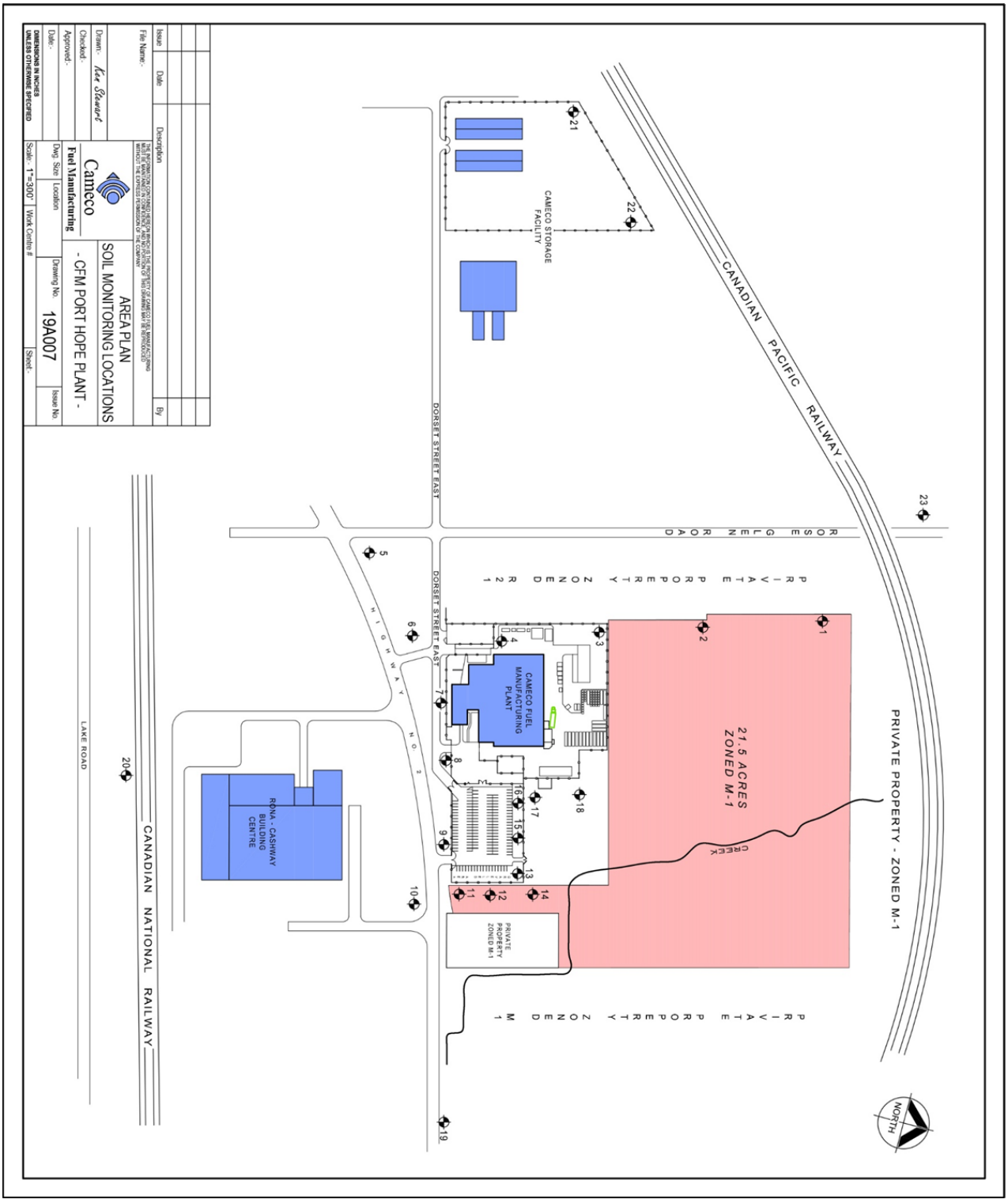


Figure 24: Soil Sampling Locations



Groundwater Monitoring

CFM has an extensive groundwater monitoring program in place. Groundwater monitoring locations are sampled semi-annually in the spring and fall of each year, while the surface water and storm sewer intermittent drainage feature (drainage ditch) locations are targeted for sampling three time per year in the spring, summer and fall in association with precipitation events. Samples are collected by a third-party consultant and are sent to an independent laboratory for analysis. Results of the groundwater monitoring program, among other items, are summarized and discussed in third party annual groundwater and surface water review reports. These reports are submitted to the CNSC and the MECP under separate covers.

The groundwater recovery and treatment operation utilized up to ten of twelve pumping wells and up to two sumps (internal and external) during 2023. The 2023 mean recovery rate was approximately 24.3 m3/day, an increase from the 2022 mean recovery rate of 7.9 m3/day. The extended period of system downtime from mid-August through December of 2022 extended into the first quarter of 2023. The system was not operational most of Q1 2023 and returned to operation in late-March.

Groundwater recovery and treatment operations were subsequently isolated in November 2023 in preparation for the demolition and replacement of the groundwater treatment system. The new treatment system was operational as of December 21, 2023.

The main improvement in 2023 was the replacement of the groundwater pump-and-treat system; refinements and improvements to operational efficiency of the system will continue into 2024.

Uranium in groundwater summary

Groundwater quality was compared to the MECP *Soil, Ground Water, and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2011. The Table 3 standard of 420 µg/L (full depth generic site condition standard, non-potable condition, all types of property use) was referenced for locations that were greater than 30 m from a water body. For select monitoring wells in the vicinity of West Gage's Creek, groundwater quality was compared to the Table 9 standard of 330 µg/L (generic site condition standards, within 30 m of a water body, non-potable condition, all types of property use).

Groundwater quality met the Table 3 standard for uranium, with one exception. Uranium in groundwater was reported at 670 µg/L at overburden monitoring well TW-39-2. The well is located in the licensed facility yard area near the northeast corner of the CFM production facility. Uranium in soil impacts have been confirmed in the facility yard area

adjacent to the monitoring well installation. The Table 9 standard was otherwise satisfied at the two monitoring well locations within 30 m of a water body.

Uranium in surface water/stormwater summary

Stormwater and surface water uranium results were compared to Canadian Council of Ministers of the Environment (CCME) water quality guidelines (freshwater).

All West Gage Creek surface water samples satisfied the CCME long-term exposure guideline of 15 µg/L. The maximum recorded concentration was 2.2 µg/L.

All stormwater samples taken from drainage features beyond the licensed facility satisfied the CCME short-term exposure guideline of 33 µg/L. The maximum recorded concentration was 5.5 µg/L.

Figure 25 and Figure 26 illustrate the monitoring well locations and groundwater elevation contours for the 2023 spring and fall sampling campaigns. Groundwater in overburden is interpreted as entering the site from the west to northwest and flowing to the east and southeast in the direction of Gages Creek. When operational, the groundwater pump-and-treat system has local influence on overburden groundwater flows.

Effluent and Environmental Monitoring Program Performance

The facility Environmental Protection Program sets out the effluent and environmental monitoring requirements for the facility to ensure adequate environmental protection measures are in place. The performance criteria of these programs is that at least 90% of planned samples are collected and analyzed to meet the data acceptance criteria. Below is the performance criteria for the data collected during the year:

- Water samples (i.e., sanitary discharge) – 100% of planned samples were collected.
- Air samples (i.e., stacks, in-plant air, CAM heads) – 99.9% of planned samples were collected.
- Environmental Samples (i.e., 96% surface water, 95% groundwater, 100% hi-vol, 100% fence line gamma) – 98% of planned samples were collected.

In 2023, all analysis under the environmental program was completed with the quality control set out in the analytical methods. There were approximately 20 samples not collected either due to analytical issues or collection issues due to weather, etc.). Therefore, the samples collected and analyzed throughout the year meet the data acceptance criteria.

Figure 25: Groundwater Elevation Contours – Spring

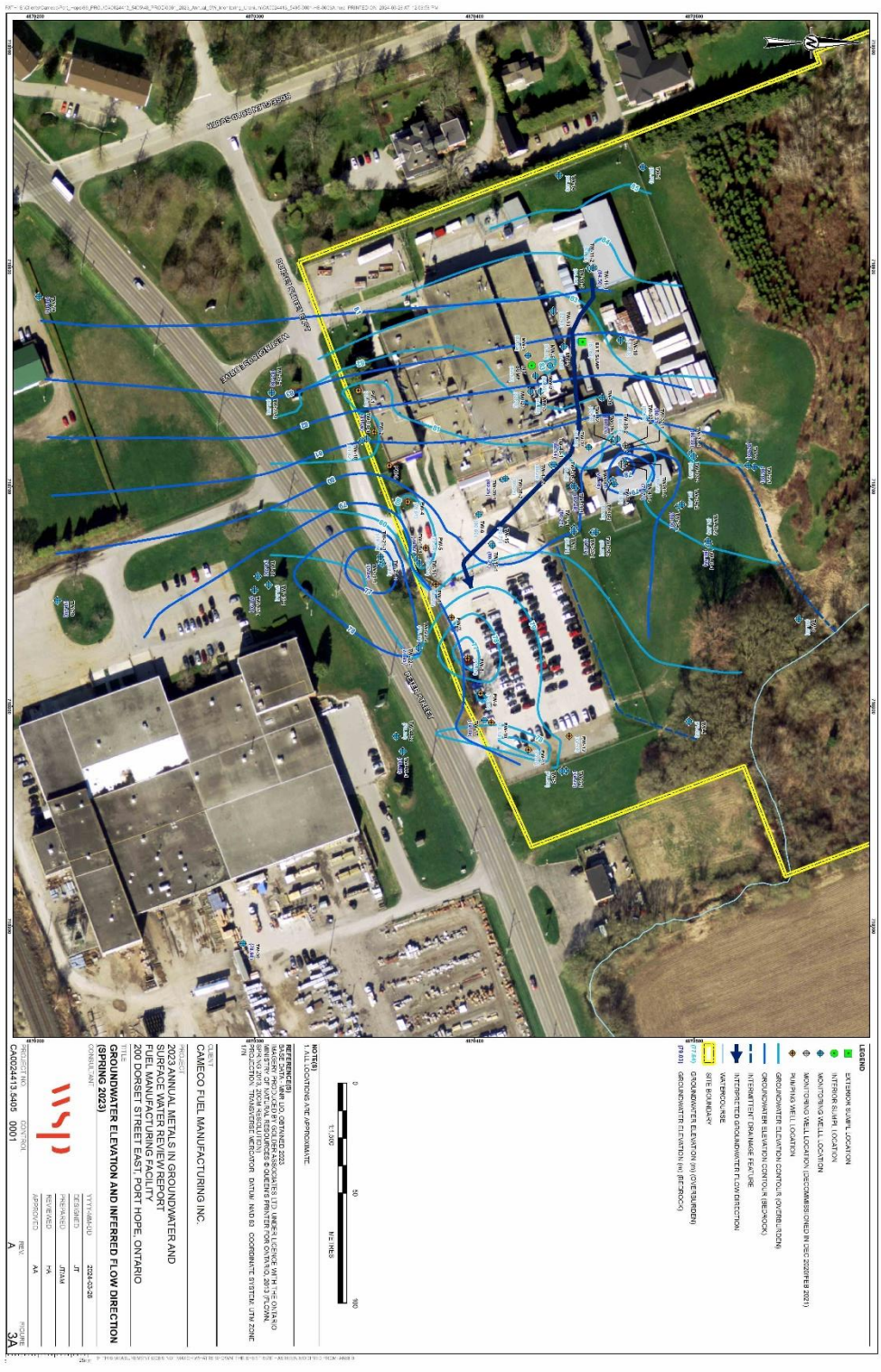
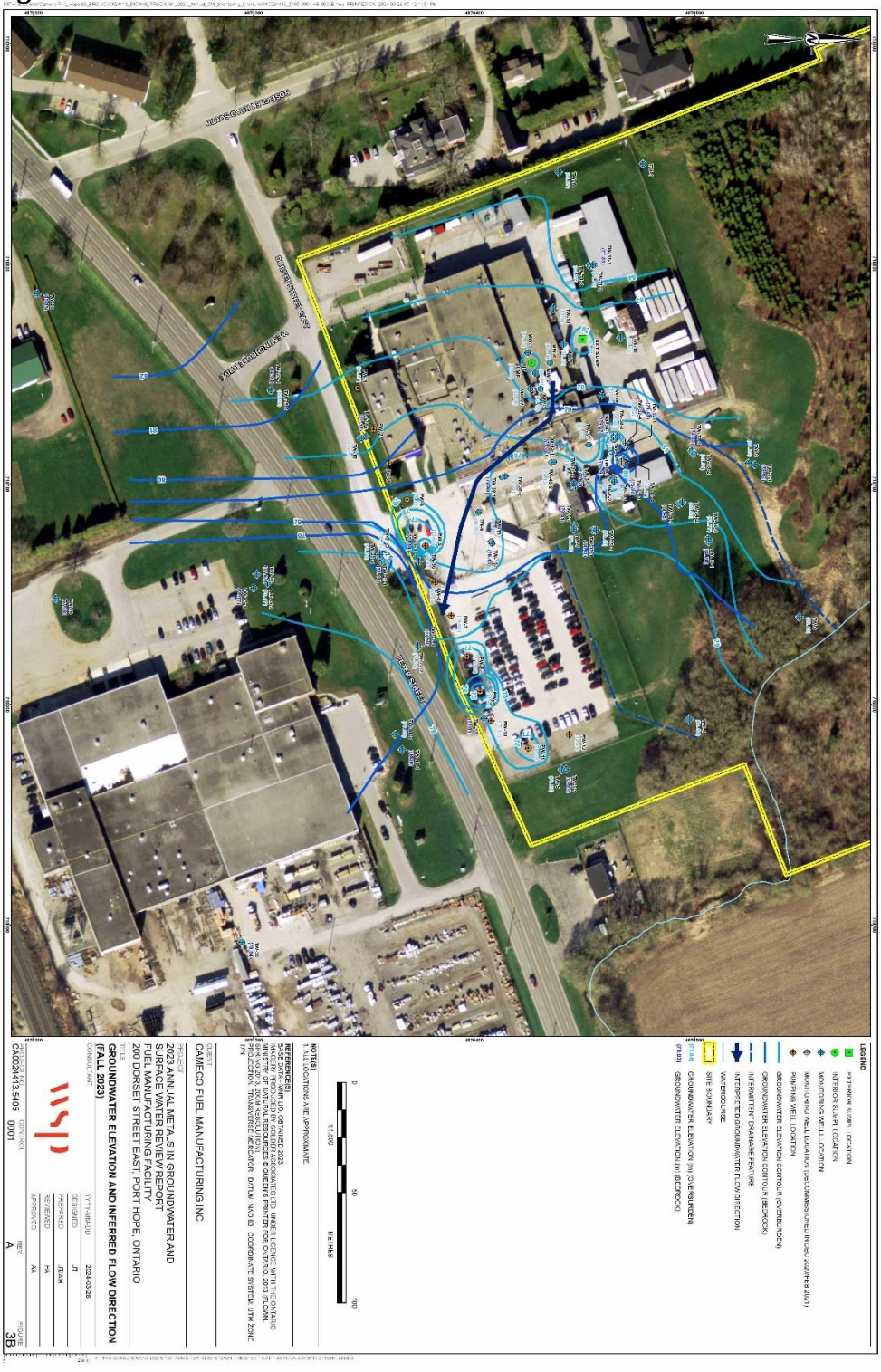


Figure 26: Groundwater Elevation Contours – Fall



2.3.4 Emergency Management and Response

This safety and control area covers emergency plans and emergency preparedness programs. These procedures must exist for emergencies and for non-routine conditions. This also includes the Fire Protection Program (FPP) and any results of emergency exercise participation.

Effective emergency response is carried out through CFM's Emergency Preparedness and Response Procedure. The plan assigns specific accountabilities and sets out processes and procedures to protect the health and safety of employees, contractors, the public, and the environment in the case of an emergency.

As the primary response provider for the facility, the Port Hope Fire and Emergency Services (PHFES) have the resources in place to effectively respond to emergencies at the facility. CFM has a memorandum of understanding with the PHFES and the Municipality of Port Hope which provides the framework for successful emergency response to the facility. Also, as part of the agreement, CFM provides PHFES with the necessary equipment and training to effectively respond to emergencies at the facility.

Emergency response is a key component of an effective FPP. The FPP at the facility meets both internal Cameco requirements, and it also meets the requirements of the standards: *N393-13; Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances*, *National Fire Code of Canada*, 2015, and the *National Building Code of Canada*, *2015*. In developing the FPP, a defense-in-depth approach was used to ensure that the fire protection measures are adequate for the fire safety of the facility. The FPP is comprised of the FHA and other fire protection supporting documents which cover a number of areas including fire prevention and fire protection. The supporting documents define those elements which positively contribute to prevent fires, maintain fire safe conditions at the facility, maintain reliability of the fire protection systems, and provide an effective emergency response to limit the effects of fire.

The annual third-party review completed in 2023, will be submitted in 2024, and included all elements according to the three-year cycle outlined in CSA N393. The annual Site Condition Inspection (SCI) report identified nine new findings that were minor in nature in terms of impact on the fire, life, and nuclear safety at the facility. As a result of the findings, five corrective actions and two activities were entered into CIRS. Three corrective actions and one activity have been closed; all open findings remain on schedule.

A gap analysis was completed to review the changes in requirements between CSA N393-13 and CSA N393-22, NBCC 2015 and NBCC 2020, and NFCC 2015 and NFCC 2020. Twelve gaps were identified related to technical clauses with eight recommended actions to address the gaps. CFM has a targeted date for completion of October 31, 2024 and has added this to its 2024 Objectives.

CFM completed the annual emergency response training to the internal emergency response team, consisting of senior managers, supervisors as well as immediate responders. In 2023 the training department delivered the emergency response training in-person and offered a virtual format as well. Immediate Responder qualifications continue to be reviewed on a monthly basis. If any qualifications are not current, the Immediate Responder is deemed "inactive" and is informed they are not to take on an active role during an emergency situation.

There were evacuation drills as part of the Lockdown Drills completed at each site, with members of the JHSC being observers. Both drills resulted in three opportunities for improvement that were identified and entered as activities into CIRS. The quarterly RAVE Emergency Responder Call-in Tests were completed with successful responses to meet the minimum complement of responders. A successful transport emergency tabletop exercise was completed with external responders to test procedures related to responding to a transport related emergency event.

During routine annual inspection of the dry chemical fire suppression system in the Fuel Storage Building, the system inadvertently came out of bypass and four of twelve dry chemical cylinders discharged into the closed building. The system function was restored within an acceptable time frame.

The Site Condition Inspection concluded that there is sufficient evidence that the fire protection program is being followed and effectively maintains the condition of the facility in compliance with that required by CSA N393-13, the NFCC-2015, and other applicable codes and standards. With the positive outcomes from the transport tabletop emergency exercise and the findings from the Site Condition Inspection, as well as the successful evacuation drills and emergency call in tests, it has been determined the Emergency Management and Fire Protection has been effective.

2.3.5 Waste and By-product Management

This safety and control area covers internal waste and by-product-related programs which form part of the facility's operations, up to the point where the waste is removed from the facility to a separate waste and by-product management facility. This also covers the ongoing decontamination and planning for decommissioning activities.

Solid waste materials contaminated with uranium are reprocessed, recycled, and re-used to the extent possible. Waste materials that cannot be reprocessed, recycled, or re-used are safely stored on site until disposal.

Waste generated at CFM are segregated as non-hazardous, contaminated hazardous, or non-contaminated hazardous waste at the point of generation. Non-hazardous waste is either recycled or transferred to an appropriate waste management facility. Contaminated hazardous waste and non-contaminated hazardous waste is stored in appropriate containers pending assessment of recycling or disposal options in accordance with site procedures.

During 2023, CFM continued to improve the existing waste management program in accordance with Canadian Safety Association (CSA) standards N292.3-14 *Management of low and intermediate-low radioactive waste* and N292.0-14 *General principles for the management of radioactive waste and irradiated fuel*. Removal activities were undertaken in 2023 to address some of the accumulated legacy radioactive waste that has been stored at CFM for many years. This included sorting, removal of nuclear material, and repackaging of legacy drums. Disposal of this material at an appropriately permitted facility continued in 2023 with three shipments removing approximately 20,643 kg of contaminated non-combustible and combustible waste from the facility.

There was no significant generation of by-products at the facility in 2023.

All contaminated waste material was packaged and shipped in accordance with applicable *Transportation of Dangerous Goods* regulations. All waste was shipped to facilities that are licensed to accept the waste material.

CFM has waste processing and disposal streams in place for contaminated combustible materials that are generated through current production as well as a stream for marginally contaminated material. CFM also performs decontamination of other materials for recycling (metal) or disposal through domestic waste streams. As a result of the waste minimization effort and the removal of legacy waste along with inspection and audit results completed in 2023, management determined the waste management program to be considered effective.

Table 36 provides the amount of waste generated and recycled for hazardous and non-hazardous materials in 2023.

Table 36

2023 Waste Management Results (kg)	
Hazardous Waste Disposed via Certified Waste Disposal Co.	1676
Hazardous Waste Recycled	926
Hazardous (Contaminated) Combustible Waste Shipped to BRR	609
Hazardous (Contaminated) Combustible Waste Shipped to Other Facilities	3641

2.3.6 Nuclear Security

This safety and control area covers the programs required to implement and support the security requirements stipulated in the regulations, in *Nuclear Safety and Control Regulations*, the *Nuclear Security Regulations* and other CNSC requirements.

CFM's security plan provides the basis for security operations at the facility and identifies the systems and processes in place to meet security program objectives. Accordingly, the plan and related procedures are considered prescribed information, subject to the requirements of the *Nuclear Safety and Control Regulations.*

Though CFM's security program is well managed and remains in compliance with CNSC regulatory requirements, the facility continues to look for enhancement opportunities. Management determined the security program at CFM is suitable and was reviewed to be effective by reviewing audit and inspection findings along with reviewing security concerns or incidents.

Lockdown drills were completed at each site, with members of the JHSC being observers. The drills resulted in opportunities for improvement that were identified and entered as activities into CIRS.

2.3.7 Safeguards and Non-proliferation

This safety and control area covers the programs required for the successful implementation of the obligations arising from the Canada/ International Atomic Energy Agency (IAEA) Safeguards and Non-proliferation Agreement. CFM maintains compliance with the CNSC regulatory document, *Safeguards and Nuclear Material Accountancy, REGDOC – 2.13.1*.

All required reporting obligations to the regulators for 2023 were submitted either prior to the deadline or on time.

CFM participated in five safeguard inspections/activities in 2023:

- Short Notice Random Inspection, January 2023
  - Findings: No major findings
  - Performed by IAEA inspectors and CNSC personnel (participated remotely).
- Short Notice Random Inspection, June 2023
  - Findings: No major findings
  - Performed by IAEA inspectors and CNSC personnel (participated remotely).
- Physical Inventory Verification/Design Information Verification, July 2023
  - Findings: No major findings
  - Performed by: IAEA inspectors and CNSC personnel.
- Design Information Verification (DIV), July 2023
  - Findings: No major findings
  - Performed by IAEA inspectors and CNSC personnel (participated remotely).
- Short Notice Random Inspection, December 2023
  - Findings: No major findings
  - Performed by: IAEA inspectors and CNSC personnel (participated remotely).

All of the above activities were successfully completed without event or any notable non-conformance.

CFM is maintaining an effective Safeguards program and is ensuring all measures required to ensure safeguards are implemented at the facility.

2.3.8 Packaging and Transport of Nuclear Substances

This safety and control area covers the packaging and transport of nuclear substances and other nuclear materials to and from the licensed facility.

UO_2 powder is transported by road from the PHCF to CFM. As well, UO_2 in the form of finished fuel bundles is transported in shipping containers that meet the package requirements as specified in the CNSC *Packaging and Transport of Nuclear Substances Regulations, 2015.*

There were no reportable events which occurred at CFM in 2023 that were in violation of the CNSC *Packaging and Transport of Nuclear Substances Regulations, 2015* or the *Transport of Dangerous Goods Act*. CFM is maintaining an effective program for the receipt, packaging, and transport of nuclear and hazardous substances.

Cameco has in place an Emergency Response Assistance Plan (ERAP) describing the system used by Cameco to respond to off-site transport incidents for Class 7 products. The plan which has been accepted by Transport Canada is pursuant to federal transportation of dangerous goods requirements and applies to transportation emergencies. Transportation activities related to the shipping and receiving of goods to or from CFM are included in the plan.

CFM completed a tabletop transport emergency exercise in 2023 in response to the corporate Threat, Risk and Vulnerability Assessment (TRVA). The exercise was completed with input from Corporate SHEQ and external responders. The exercise was a valuable learning tool with three opportunities for improvement identified and entered as activities into CIRS.

3. PUBLIC INFORMATION PROGRAM

In 2023, Cameco Fuel Manufacturing continued to fully meet the requirements of the Canadian Nuclear Safety Commission's (CNSC) *REGDOC 3.2.1, Public Information and Disclosure.*

For 2023, the communications team for Cameco's Fuel Services Division was comprised of a manager of public and government affairs, one communications specialist and a specialist, Indigenous engagement was added to the team in July. The divisional communications team is part of Cameco's corporate Sustainability and Stakeholder Relations department.

Education and Awareness

Cameco leverages a range of communications tools to help inform and educate interested persons and/or groups of PHCF's operations and activities.


energize
Cameco
News & Information from Cameco
spring 2023
Cameco and Bruce Power Celebrate Extension of Long-Term Arrangements for Nuclear Fuel Through 2040

Cameco issues its Energize newsletter to help keep the Port Hope community up to date. Four issues were published in 2023 and mailed to all addresses in the Municipality of Port Hope. Each issue was posted to camecofuel.com promoted on social media.

Fall 2023
Energize – Fall 2023 – Making a Difference – Community – Cameco Fuel Services
Summer 2023
Energize – Summer 2023 – Making a Difference – Community – Cameco Fuel Services
Spring 2023
Energize – Spring 2023 – Making a Difference – Community – Cameco Fuel Services
Winter 2023
Energize – Winter 2023 – Making a Difference – Community – Cameco Fuel Services

Each issue provided readers with a variety of updates about Cameco's activities such as VIM updates, community initiatives, safety performance and the closed loop cooling system at PHCF.

A news release announcing that the CNSC had granted CFM a 20-year licence was posted online and on Cameco social media channels. Information about the renewal was also included in the Winter 2023 edition of Energize.

On April 4, Cameco and Bruce Power celebrated the extension of their long-term exclusive nuclear supply agreement. An event was held at CFM Port Hope. A news release was issued to local media and the news release, and a video were posted to the website.

On August 8, students from Loyalist College's Radiation Protection program toured CFM Port Hope.

CFM Port Hope and Cobourg offered Friends and Family tours in February/March and November resulting in approximately forty-five people visiting the Port Hope facility.

Cameco sponsored an information booth at the Port Hope Fall Fair from September 15-17. The booth was staffed by Cameco leaders and subject matter experts throughout the weekend. The information boards featured Cameco's operations and activities including PHCF, Vision in Motion, CFM and more.

The annual community barbeque was held on June 22 from 4-7 p.m. in Memorial Park, Port Hope. Postcards advertising the event were mailed out to approximately 2,700 addresses in Port Hope and advertised via social media. Cameco leadership and subject matter experts were available to talk with guests and answer questions. The BBQ was attended by the Mayor of Port Hope and a few councilors, as well as representatives from Curve Lake First Nation. Information boards and displays provided information about PHCF, Vision in Motion, CFM operations and activities and the licence renewal. Approximately 400 people attended the BBQ.

Public Inquiries: Ensuring stakeholders and residents have access to information about Cameco is an important component of the Public Information Program. Interested persons can contact Cameco via email (cameco_ontario@cameco.com) or phone (905.800.2020).

In 2023 the cameco_ontario email received twelve emails from the public to RSVP to the annual BBQ.

Cameco received zero inquiries regarding CFM.

Public Polling

There was no public opinion polling in 2023. The Port Hope polling program shifted to every-other-year and is scheduled to be conducted in 2024.

Social Media

@Cameco.Ontario @CamecoOntario @Cameco_Ontario

In 2023, the Cameco Ontario Facebook page grew by 65 fans ending the year with over 1.1k fans. The 186 posts over the course of the year shared information about Cameco's operations, community initiatives and sponsorships.

The Cameco Ontario X (Twitter) page grew by 44 followers with 432 followers by the end of the year.

The Cameco Instagram page continued to grow in 2023, reaching 856 followers, an increase of 117 followers. The content was primarily the same as what was posted to Facebook.

Public Disclosure

In 2023, CFM made five public disclosures. Four of these were related to reportable spills. There was no health or safety risk posed to the public or environment.

Environment & Safety – Fuel Manufacturing: Port Hope & Cobourg – Fuel Services – Businesses – Cameco

Posting Date	October 19, 2023
Incident Date	October 17, 2023
Incident	Reportable Spill
Details	A fork truck operator identified a hydraulic fluid leak coming from the rear of the forklift. The fluid had leaked outside on the pavement between two storage facilities including over a storm drain grate. An estimated 3-4 litres were released onto the pavement, an estimated 100ml entered the storm drain. There was no health or safety risk posed to the public, workers or the environment.
Corrective Action	Oil absorbent was spread on the oil leak on the paved areas and an oil absorbent spill pad was placed in the storm drain to absorb oil that was floating on top of the water in the catch basin. Cameco notified the Canadian Nuclear Safety Commission and the Municipality of Port Hope.
Cameco Environmental Effect Rating	1

Public Disclosures were shared with Curve Lake and Scugog Island First Nations. No questions were received from members of the public.

Community Investment

Over the course of 2023, Cameco provided support and sponsorship to 46 community organizations including Northumberland Hills Hospital, Northumberland Fare Share Food Bank, Green Wood Coalition, Northumberland United Way, Northumberland Hispanic Cultural Club's Hispanic Heritage Month in October, Rebound Child and Youth Services, Community Care Northumberland, Cornerstone, Port Hope Rainbow Network and more. This does not include the organizations that were supported through the Cameco Fund for Mental Health.

On April 4, Cameco president and CEO announced a $200,000 gift to Northumberland Hills Hospital Foundation to support the equipment needs of the Diagnostic Imaging Department. A news release was issued to local media and posted to the website.

Cameco's Step Up for Mental Health initiative had its most successful year ever, raising $88,000 to support mental health initiatives in Northumberland County and area. Two events were held in support of the Cameco Fund for Mental Health – the 12th annual Cameco Charity Golf Tournament, which raised $26,000, and after a three-year hiatus, Cameco brought back the Step Up for Mental Health 5K event, which saw over 600 runners and walkers come out to raise over $57,000. Every dollar from the 5K registration fees, plus a matching amount from Cameco, supported the Cameco Fund for Mental Health.

Adjudication for the Cameco Fund for Mental Health involved Cameco representatives and local mental health experts. Recipients were notified and a news release was issued.

Over 30 Cameco employees took part in the 24th annual United Way Day of Caring on June 2, helping to complete 24 projects around the community.

On September 28, Cameco celebrated its 35th anniversary with a $100,000 donation to Habitat for Humanity Northumberland. Cameco leaders participated in a team build day at the site in the afternoon. A news release was issued to local media and posted to the website.

Industry

Cameco was a sponsor of the Canadian Nuclear Association conference which took place in Ottawa from February 22 to 24. Cameco was a bronze sponsor' and staffed a booth.

On February 2, Cameco participated in the Durham College Campus job fair.

On October 3 and 4, Cameco participated in the Queen's University career fair.

Cameco was a sponsor of the NAYGN Canadian Regional Conference on October 11. A Cameco SME presented at the conference and Cameco hosted a booth with information about its operations. CFM continued to maintain its membership as part of the Northumberland Manufacturer's Association.

Earned Media

Cameco received media coverage throughout the year covering a range of activities. Media coverage was overall positive:

- **Commission renews Cameco Fuel Manufacturing Inc.'s Class IB nuclear fuel facility licence for its facility for a 20-year period** – January 18, 2023 – Canada.ca
  - Commission renews Cameco Fuel Manufacturing Inc.'s Class IB nuclear fuel facility licence for its facility for a 20-year period - Canada.ca
- **Cameco Fuel Manufacturing in Port Hope, Ont. granted 20-year licence renewal –** January 18, 2023 – Global News
  - (1) Cameco Fuel Manufacturing in Port Hope, Ont. granted 20-year licence renewal - Peterborough | Globalnews.ca
- **Licence renewal for Cameco Fuel Manufacturing** – January 24, 2023 – Nuclear Engineering International
  - Licence renewal for Cameco Fuel Manufacturing - Nuclear Engineering International (neimagazine.com)
- **Cameco will continue to fuel Ontario for at least another 20 years** – February 1, 2023 – GoNorthumberland.ca
  - COMMUNITY SPOTLIGHT: Cameco will continue to fuel Ontario for at least another 20 years | 93.3 myFM (gonorthumberland.ca)
- **Cameco to become sole supplier of Ukraine's nuclear power plants** – Feb 9, 2023 – CKOM.com
  - Cameco to become sole supplier of Ukraine's nuclear power plants | 650 CKOM
- **Cameco to supply Ukraine's uranium needs to 2035** – February 9, 2023 – World Nuclear News
  - Cameco to supply Ukraine's uranium needs to 2035: Uranium & Fuel - World Nuclear News (world-nuclear-news.org)
- **Cameco Step Up For Mental Health Run May 13** – March 30, 2023 – PortHopeNow.com
  - http://www.porthopenow.com/?p=17788
- **Cameco's Step Up for Mental Health 5K Fun Run/Walk returns as in-person event May 13** – March 12, 2023 – Northumberland News
  - https://www.northumberlandnews.com/life/camecos-step-up-for-mental-health-5k-fun-run-walk-returns-as-in-person-event/article_911751cd-8c39-5770-9828-3043c08551bc.html

- **Cameco's Step Up for Mental Health 5K Fun Run/Walk returns as in-person event May 13** – March 12, 2023 – Northumberlandnews.com
    - Cameco's Step up for Mental Health event returns May 13 (northumberlandnews.com)
- **Cameco's Step Up for Mental Health 5K Fun Run/Walk returns as in-person event May 13** – March 12, 2023 – ThePeterboroughexaminer.com
    - Cameco's Step Up for Mental Health 5K Fun Run/Walk returns as in-person event May 13 | ThePeterboroughExaminer.com
- **Cameco's Step Up for Mental Health 5K returns to in-person event** – May 16, 2023 – Gonorthumberland.ca
    - Cameco's Step Up for Mental Health 5k returns to in-person event | 93.3 myFM (gonorthumberland.ca)
- **COMMUNITY SPOTLIGHT: Step Up for Mental Health this Saturday** – Brightontoday.ca – May 10, 2023
    - COMMUNITY SPOTLIGHT: Step Up for Mental Health this Saturday | Brighton Today.ca
- **Bruce and Cameco partner for long-term nuclear fuel supply** – April 4, 2023 – World Nuclear News
    - Bruce and Cameco partner for long-term nuclear fuel supply: Corporate - World Nuclear News (world-nuclear-news.org)
- **COMMUNITY SPOTLIGHT – Cameco has extended its relationship with Bruce Power to 2040** – Go Northumberland – April 4, 2023
    - COMMUNITY SPOTLIGHT: Cameco has extended it's relationship with Bruce Power to 2040 | 93.3 myFM (gonorthumberland.ca)
- **Cameco, Bruce Power extend nuclear fuel supply deal through to 2040** – Global News – April 4, 2023
    - Cameco, Bruce Power extend nuclear fuel supply deal through to 2040 | Globalnews.ca
- **Cameco, Bruce Power nuclear fuel partnership extended** – Northumberland News – April 6, 2023
    - Cameco, Bruce Power nuclear fuel partnership extended (northumberlandnews.com)
- **Step-Up for Step Up to Mental Health Fun Run/Walk Begins** – May 10, 2023 – Today's Northumberland

  - Set-Up for Step Up to Mental Health Fun Run/Walk Begins - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)
- **Step Up for Mental Health this Saturday** – May 10, 2023 – Go Northumberland
  - COMMUNITY SPOTLIGHT: Step Up for Mental Health this Saturday | 93.3 myFM (gonorthumberland.ca)
- **Cobourg road closures to accommodate fundraising run May 13** – May 12, 2023 – Northumberland News
  - Cobourg road closures to accommodate fundraising run May 13 (northumberlandnews.com)
- **Hundreds of People and Cameco Step Up for Mental Health in Cobourg** – May 14, 2023 – Today's Northumberland
  - Hundreds of People and Cameco Step Up for Mental Health in Cobourg - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)
- **Cameco and Port Hope Fire and Emergency Service Hold Joint Training Exercise** – June 13, 2023 – Today's Northumberland
  - Cameco and Port Hope Fire and Emergency Services Hold Joint Training Exercise - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)
- **Cameco supporting 'world-class care and medical technology' at Northumberland Hospital** – April 9, 2023 – Northumberland News
  - Cameco supporting 'world-class care and medical technology' (northumberlandnews.com)
- **Cameco donates $100,000 to Habitat for Humanity** – September 28, 2023 – Northumberland 89.7 FM
  - Cameco donates $100,000 to Habitat for Humanity Northumberland — Northumberland 89.7 FM (northumberland897.ca)
- **Cameco Fund for Mental Health 2023 Awards Grants to 11 Northumberland County Organizations** – December 13, 2023 – Today's Northumberland
- Cameco Fund for Mental Health 2023 Awards Grants to 11 Northumberland County Organizations - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)

Advertising

Cameco conducts advertising to support various activities in the local community. In 2023, much of the advertising was conducted through social media platforms, local news websites and local radio.

The four local social and radio media campaigns ran at various times through the year:

- Port Hope Cameco Charity Golf Tournament
- Port Hope Community BBQ
- Cameco Fund for Mental Health Applications
- Promoting the application process for the Cameco Fund for Mental Health in Northumberland County.

Online ads were placed with Today's Northumberland, Port Hope Now, Cobourg Now and Go Northumberland.

Cameco also continued the monthly community partner advertising program with the local radio station. With this program, a one-month radio advertising package is donated to a local charity or community organization each month. Recipients included Five Counties Children's Centre, Northumberland Fair Share Food Bank, and the Northumberland Diversity Festival.

Cameco placed print ads in the Northumberland Hills Hospital Gala booklet, Handbags for Hospice, Watershed Magazine and advertised on the Port Hope Police reusable shopping bag which was given out at community events by the Port Hope police. Cameco also sponsors boards at the Cobourg Community Centre and Jack Burger Complex in Port Hope.

Government Stakeholders

Government relations (GR) involves building strong relationships and positive interactions with local elected officials. Cameco engages in GR activities at the municipal, provincial, and federal levels. The majority of federal engagements take place through Cameco's GR experts located in Ottawa and Saskatoon. Locally, the focus is primarily on municipal and provincial officials.

The VP of Fuel Services Division, and the general managers of PHCF and CFM met with the Mayor of Port Hope on May 15. The presentation provided an introduction to Cameco's local operations and activities.

On August 28, Cameco representatives attended a Port Hope Business Chamber of Commerce breakfast event with Minister Smith and Minister Piccini. The two ministers toured CFM Cobourg later that morning.

Tours

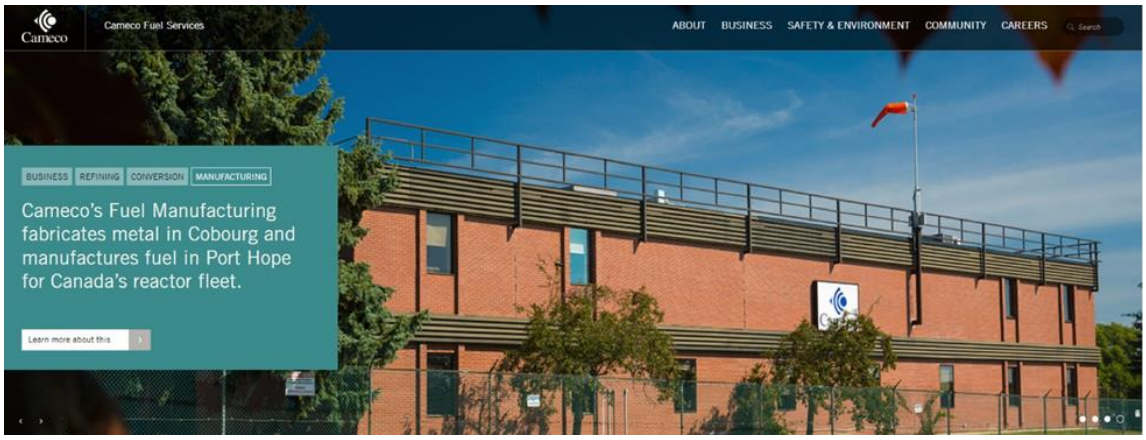
Providing facility tours is a valuable component of CFM's engagement and outreach activities.

CFM Port Hope and Cobourg offered Friends and Family tours in February/March and November resulting in approximately 45 people visiting Port Hope.

On June 14, CFM hosted guests from Women in Nuclear.

Loyalist College Radiation Safety Program students were provided a tour on August 8.

Website



Cameco has a dedicated website for its Ontario operations: Home - Cameco Fuel Services.

Cameco updated its website with information throughout 2023 including:

- Five Public Disclosure related to CFM
- Four Energize newsletters
- Cameco Step Up for Mental Health activities including news releases
- News release celebrating Cameco and Bruce Power's extension of long-term arrangement for nuclear fuel through 2040
- News releases announcing community investments
- Quarterly and annual CNSC reports
- Invitation to the community barbeque

Communications Products

Cameco strives to provide accurate and timely information to stakeholders and other interested parties. Information products are developed to support various communications and engagement vehicles and activities.

- Four issues of Energize – mailed to all Port Hope addresses and posted online
- Leveraging social media to link to Energize and other key updates for the public
- Invitation to the community barbeque – posted online and mailed
- Printed information boards at the community barbeque and Port Hope Fall Fair
- Advertising on local media

4. INDIGENOUS ENGAGEMENT

Cameco continued regular meetings with Curve Lake and Scugog Island First Nations in 2023. Public disclosures were emailed to Curve Lake and Scugog Island throughout the year, and these were discussed at regular scheduled meetings. Quarterly compliance reports and copies of the Energize newsletters were sent to Curve Lake, Hiawatha, Alderville, Scugog Island, Rama, and the Mohawks of the Bay of Quinte.

An invitation to attend the community barbeque was sent to Curve Lake, Scugog Island, Alderville and Hiawatha First Nations. Representatives from Curve Lake First Nation attended the community barbeque.

On May 24, Cameco's vice-president, Sustainability and Stakeholder Relations, and the vice-president of Cameco Fuel Services Division met with Curve Lake First Nation's Chief, members of Council and consultation committee for the official signing of an agreement that formalizes the relationship between Curve Lake First Nation and Cameco.

Cameco attended the Curve Lake First Nation 'Alternative Routes Fair' in January and highlighted career openings and information about Cameco's operations and career opportunities. Cameco representatives attended the Curve Lake First Nation Consultation Committee Meeting in February and Cameco was invited to the Curve Lake First Nation Harvester Event in September where Cameco provided information regarding its activities and operations.

The Cameco Fund for Mental Health news release with information on how to apply was sent via email to Hiawatha, Alderville, Curve Lake, Mississaugas of Scugog Island and Mississauga First Nation in October. Alderville First Nation's Mino-Bemaadiziwin (A Good Life) Dinner Series was a Cameco Fund for Mental Health recipient. This project will bring together mainstream health professionals and Indigenous Elders and Knowledge Keepers.

Cameco was a sponsor for the Scugog Island and Curve Lake First Nations annual Pow Wows.

Below is a summary of the meetings and topics covered in 2023:

Indigenous Community	Date of Meeting	Topics
Curve Lake First Nation	January 25	Review of 2022 and 2023 areas for discussion
	February 13	General Discussion/Next Steps
	March 29	Cameco provided information on: Vision in Motion Ukraine contract Public disclosures The Mary Jean Mitchell Green Award at PHCF, and Community initiatives
	May 3	Discussion of new public disclosures and review of annual compliance reports
	May 24	Meeting with Chief and Council to formalize the Relationship
	August 31	General Discussion/Next Steps
	November 2	Oversight Committee meeting
	December 13	Environmental Working Group meeting. Provided overview of Cameco operations discussed mandate of group, roles, and responsibilities
Mississaugas of Scugog Island	February 16	Review of public disclosures since the last meeting and general discussion
	March 31	Presentation on Cameco's operations and activities as a recap for meeting attendees who are newer to the regular meetings
	August 14	Review of public disclosures since the last meeting and general discussion

5. SITE-SPECIFIC

CFM's Ceramics lab has the capability and equipment to produce small quantities of special material fuel containing enriched uranium. These fuel types are manufactured in a similar manner but on a smaller scale than natural uranium manufacturing. As CFM has the ability to handle enriched UO_2 in batch processes and in solid form, nuclear criticality safety is achieved by employing engineered and administrative controls over batch size (Smallest Critical Mass) in processing and storage areas. CFM has a *Nuclear Criticality Safety Program Manual* (CFM-NC) to address the handling and processing of enriched uranium. The CFM-NC has been developed to guide generation and implementation of CFM's criticality prevention practices as they pertain to licensing and criticality prevention issues. This safety program meets the CNSC regulatory document *REGDOC - 2.4.3 CNSC Regulatory Document Safety Analysis Nuclear Criticality Safety v1.1*.

Processing of any amount of enriched material at CFM is governed by a criticality control committee (CCC) as described in the CFM-NC.

There were no processing activities of enriched material conducted on site in 2023.

Cameco maintains the required nuclear liability insurance for CFM as required under the Canadian *Nuclear Liability Act*.

CFM has a CNSC approved Preliminary Decommissioning Plan (PDP), which was updated in 2021 in accordance with the CNSC guidance documents *G-219, Decommissioning Planning for Licensed Activities*, and *G-206, Financial Guarantees for the Decommissioning of Licensed Activities*. With the update of CFM's Preliminary Decommissioning Plan in 2021, this reduced liability allowed for a reduction of financial guarantee required by the G-206.

CFM met all site-specific reporting requirements in 2023.

6. IMPROVEMENT PLAN AND FUTURE OUTLOOK

Some of the improvement plans and the future outlook at CFM for 2024 include:

- Continue to reduce workplace hazards.
- Continue to improve ergonomics through ergonomics assessments.
- Commission environmental tracking software.
- Commission Tennelec alpha instrument.
- Continue to support the plan to remove legacy waste from the site.
- Implement an approved option to lower public dose at critical receptor location.
- Continue groundwater treatment system upgrades.
- Maintain compliance to regulatory, industry and corporate standards.
- Support nuclear safety through continual product quality improvement.

Improvements will include continued work to clarify expectations through improved procedures and training material, continued responsiveness to employee identified and data driven SHEQ improvements, increased supervisor oversight for procedural compliance, and continuing to stabilize equipment reliability.

CFM is not planning any other major changes in 2024 that may require approval from the Commission.

7. SAFETY PERFORMANCE OBJECTIVES FOR FOLLOWING YEAR

CFM remains committed to continual improvement and will continue to look for opportunities to make the site operate more efficiently, while minimizing risk to employees, the public, and the environment.

The following is a summary of the projected facility operations, changes to equipment, procedures, production capacity, organization, and licensing documents that are planned for 2024:

- Submit updated Radiation Protection Program manual.
- Submit updated Environmental Program manual.
- Submit updated Emergency Response Plan.
- Submit updated Safety and Health Program Manual.

8. CONCLUDING REMARKS

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 the local residents.

CFM management systems continue to be effective in providing an appropriate level of management direction to CFM. Opportunities for continual improvement continue to be identified and acted upon. As such, CFM is positioned to effectively manage operational risks and needs while continuing to improve.

Improvements will include continued work to clarify expectations through improved procedures and training material, continued responsiveness to employee identified and data driven SHEQ improvements, and continuing to stabilize equipment reliability, particularly of those processes that have been recently installed.

Overall, it was determined during the management review that the CFM Management Systems, adhering to the N286, N299.1 and N285.0 standards, and the CFM License Conditions (LCH) are suitable, adequate, and effective.

As a result of the effective programs, plans and procedures in place, CFM was able to maintain individual radiation exposures well below regulatory dose limits. In addition, environmental emissions and public radiation exposures continued to be controlled to levels that are a fraction of the regulatory limits.

In 2023, there were no action level exceedances in the radiological or environmental monitoring program.

CFM remains committed to continual improvement and will continue to engage all employees in the identification and implementation of activities that reduce injury risks, increase environmental protection, improve product quality and efficiency in 2024.