2023 Annual Compliance Monitoring
&
Operational Performance Report

Reporting Period January 1 – December 31, 2023

Port Hope Conversion Facility
Operating Licence
FFOL-3631.00/2027

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I 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.

Cameco operates a Class IB nuclear facility in Port Hope, Ontario and employs approximately 400 workers. In 2023, the facility operated under fuel facility operating licence FFOL-3631.00/2027 which is valid until February 28, 2027.

The current licence allows for the production of uranium as uranium dioxide (UO_2) and uranium as uranium hexafluoride (UF_6). The facility currently processes and/or stores various natural, depleted, and enriched uranium compounds.

Cameco is committed to the safe, clean, and reliable operation of all its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees and local residents. PHCF 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, PHCF's operations have maintained employee radiation exposures well below the regulatory dose limits. Environmental emissions and public radiation exposures are being controlled to levels that are a fraction of the regulatory limits.

The PHCF's Management Systems program identifies the controls required to ensure all processes are conducted in a safe manner and that processes applying to licensed activities are conducted in accordance with applicable CNSC Management Systems and other regulatory requirements.

Operators in both UF_6 and UO_2 plants participated in area specific qualification training or re-training, as per individual and plant requirements.

A wide range of mandatory legislative and other job specific training activities were also carried out in 2023. This training ensures that all personnel have the level of training related to radiation safety, fire safety, chemical safety, on site-emergency arrangements, environmental protection, and conventional health and safety, appropriate for their duties.

To operate in a safe, clean, and reliable manner PHCF has programs and procedures that comprise the safety analysis for the site including the safety report, a fire hazard analysis (FHA), an environmental aspects registry, a chemical hazard assessment and other

assessments for safety and/or risk. The safety report is a licence requirement that summarizes the systematic review of the site operations to identify and assess hazards and potential risks to the public and environment from PHCF.

PHCF has conducted specific assessments to ensure the safety of its operations. These studies have included, but are not limited to, an environmental risk assessment, a flood study, a harbour wall study, and screening level risk assessments for UF_6 and anhydrous hydrogen fluoride (AHF) service.

There were no modifications made in 2023 that negatively affected the safety case for the PHCF.

The safety-significant systems at the facility have been identified and a preventive maintenance program is in place to ensure that the equipment associated with these systems is properly maintained.

Changes to the physical design of equipment, processes, and the facility with the potential to impact safety are evaluated from project planning through to the completion of the project. A site design control procedure is in place which ensures that any equipment changes, or modifications will not have an adverse effect on the environment or on the health and safety of employees or members of the public. In 2023, there were no significant changes to the Process and Design Change Control process.

The Operational Reliability program, which was introduced in late 2010, consists of four focus areas deemed key to improving and maintaining reliable operations. They include materials management, work management, reliability engineering, and operations improvement.

The radiation protection program at the PHCF is well established, with detailed procedures outlining the processes under each element of the program. Review of the 2023 dose data indicates that the program is effective in the prevention of unreasonable risk to the health and safety of workers. Though the radiation protection and as low as reasonably achievable (ALARA) programs have been demonstrated to be effective, the PHCF has also made improvements as part of its continual improvement program.

The health and safety management program fosters and promotes a strong sustainable safety culture. Under the Operational Excellence initiative, PHCF strives for a safe, healthy, and rewarding workplace. The effectiveness of the conventional Occupational Health and Safety (OH&S) system can be evaluated by the responsiveness of the site to leading safety activities such as the Conversion Safety Steering Committee (CSSC), audits, inspections, evaluations, reviews, benchmarking, training and employee participation and engagement. The PHCF was successful in meeting the expectations of

these various initiatives. Occupational health and safety efforts at PHCF are supported by one joint committee, the CSSC. The CSSC, created in 2013, incorporates the previously existing Policy Health and Safety Committee (PHSC) and Workplace Health and Safety Committee (WHSC) into one committee.

There was one significant change to the Environmental Management Program in 2023. A closed loop cooling water system was commissioned, eliminating monitoring requirements related to the harbour water intake and associated once-through cooling water system discharges.

PHCF maintained its emergency preparedness and response program while looking for opportunities to further improve. Activities and associated records are subject to various audits and are incorporated into the PHCF annual management review.

PHCF has a waste management plan in place at the facility in compliance with applicable regulatory and licence requirements. The most recent revision of the preliminary decommissioning plan was submitted to the CNSC in September 2022.

PHCF maintains a comprehensive security program which meets the requirements of the General Nuclear Safety and Control Regulations, the Nuclear Security Regulations and other CNSC requirements.

A comprehensive uranium inventory system to demonstrate compliance with safeguards requirements is maintained. PHCF participated in seven safeguard inspections/activities in 2023.

The scope of transportation activities at the PHCF includes the transport of Class 7 radioactive materials outlined in the *Transportation of Dangerous Goods Act*. There was one reportable transportation events related to the PHCF in 2023:

- On December 6, 2023, Canadian Nuclear Laboratories (CNL) informed Cameco that the lid of a roll-off bin transported from Cameco's Port Hope Conversion Facility (PHCF) to the LTWMF site was contaminated. The highest level of contamination found on the lid was 9.1 Bq/cm^2 and averaged 6 Bq/cm^2. The roll-off bin was transported to CNL on December 4. There was no release of contamination during transport.

Cameco works to build and sustain the trust of local communities by acting as a good corporate citizen in the communities 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

comprehensive approach to community outreach in 2023 with the continuation of community outreach, newsletters, and other information initiatives.

The nuclear criticality safety program at the PHCF follows the criticality control principles as described in Radiation Protection Program Manual. The PHCF met all site-specific reporting requirements.

Vision in Motion (VIM) is Cameco's plan to clean up and renew the PHCF. The project builds on work now under way through the Port Hope Area Initiative (PHAI) to address historic low-level radioactive waste issues in the Municipality of Port Hope. A separate supplementary report specific to VIM will be submitted in conjunction with this report for 2023.

In conclusion, in 2023 the PHCF continued to operate within the framework of the *Nuclear Safety and Control Act* (NSCA) and met all requirements as per its operating licence.

II TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General Introduction

Cameco Corporation (Cameco) is a major supplier of uranium processing services required to produce 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.

Cameco operates a Class IB nuclear facility in Port Hope, Ontario and employs approximately 400 workers. In 2023, the facility operated under fuel facility operating licence FFOL-3631.00/2027 which is valid until February 28, 2027. There were no new licensed activities undertaken in 2023 requiring approval from the CNSC Commission.

PHCF is situated on the north shore of Lake Ontario in Ward 1 of the Municipality of Port Hope, Ontario. Site 1 is bounded by Hayward Street to the north, the Port Hope harbour to the east, Lake Ontario to the south, and Choate Street, Marsh Street and municipal land associated with the Port Hope Water Treatment Plant to the west. Eldorado Place bisects the southern portion of the site, with the employee parking lot located further to the west. Site 2 is a storage facility situated in the Nelson Street and Dorset Street East area.

Vision in Motion (VIM) is Cameco's plan to clean up and renew the PHCF. The project builds on work now under way through the Port Hope Area Initiative (PHAI) to address historic low-level waste issues in the Municipality of Port Hope. It provides Cameco with an opportunity to deliver an allowance of qualifying waste materials to the Long-Term Waste Management Facility (LTWMF) that was constructed by the PHAI on the site of the licensed Welcome Waste Management Facility.

In 2023, key activities included the following engineering, remediation, and construction activities:

- 284 dump trucks of eligible wastes, 1,426 bags, 2,034 drums and 143 other items were transferred to the LTWMF.
- Building 27 demolition was completed.

Figure 1 – Site 1 - Port Hope Conversion Facility

Figure 2 – Site 2 - Storage Facility

Cameco is committed to the safe, clean, and reliable operation of all its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees and local residents.

PHCF 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, PHCF has continued to produce uranium products for the Canadian and international nuclear industry while at the same time maintaining radiation exposures to the workforce well below the dose limits. Environmental emissions and public radiation exposures are being controlled to levels that are a fraction of the regulatory limits.

The submission of this report fulfills the requirement of section 4.2 of the operating licence for PHCF (FFOL-3631.00/2027). The annual compliance report was prepared in accordance with the CNSC document *REGDOC 3.1.2 Reporting Requirements, Volume I: Non-Power Reactor Class I Nuclear Facilities and Uranium Mines and Mills*. This report describes the facility operations and provides a summary of the Safety and Control Areas for 2023 as listed in the Licence Conditions Handbook (LCH).

Laws, regulations, and international agreements applicable to the PHCF are referenced in site documentation including the LCH. Some of these are listed below:

- *Nuclear Safety and Control Act (NSCA) and its Regulations*
- *Canadian Environmental Protection Act*
- *Transportation of Dangerous Goods Act*
- *Access to Information Act*
- *Canada/IAEA Safeguards Agreement*
- *Canada Labour Code, Part II*

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

In addition to the CNSC, the PHCF is regulated by other federal and provincial regulators, such as the Ontario MECP, Environment and Climate Change Canada (ECCC), Employment and Social Development Canada (ESDC), and Transport Canada (TC).

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

Table 1
ACRONYMS USED WITHIN THIS REPORT

ACRONYM	DESCRIPTION
AAQC	Ambient Air Quality Criteria
AHF	Anhydrous Hydrogen
ALARA	As Low As Reasonably Achievable
BRR	Blind River Refinery
Bq/cm^2	Becquerel per Square Centimeter
Cameco	Cameco Corporation
CaO	Calcium Oxide
CBT	Computer Based Training
CCC	Criticality Control Committee
CCM	Contaminated Combustible Material
CCME	Canadian Council of Ministers of the Environment
CFM	Cameco Fuel Manufacturing
Charter	The Safety Charter
CIRS	Cameco Incident Reporting System
CNC	Contaminated Non-Combustible Material
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CofA	Certificate of Approval
COC	Contaminants of Concern
CSSC	Conversion Safety Steering Committee
C-TPAT	Customs-Trade Partnership Against Terrorism
DRD	Direct Reading Dosimeter

ECCC	Environment and Climate Change Canada
ECA	Environmental Compliance Approval
EMP	Environmental Monitoring Program
ERP	Emergency Response Plan
ERT	Emergency Response Team
ESDC	Employment and Social Development Canada
FHA	Fire Hazard Analysis
FBW	Filter Backwash
FFI	Facility Fire Inspections
FPP	Fire Protection Program
FSD	Fuel Services Division
gU/h	Grams of Uranium per hour
HAZOP	Hazard and Operability Analysis
HIRAC	Hazard Identification, Risk Assessment and Control
I&E	Impingement and Entrainment
IAEA	International Atomic Energy Agency
JTA	Job Task Analysis
KPI	Key Performance Indicator
LCH	Licence Conditions Handbook
Licence	Licence FFOL-3631.00/2027
LIMS	Laboratory Information Management System
LOPC	Loss of Primary Containment
LTWMF	Long Term Waste Management Facility
MECP	Ontario Ministry of the Environment, Conservation and Parks
mSv	Millisievert

NEW	Nuclear Energy Worker
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NSCA	Nuclear Safety Control Act
OH&S	Occupational Health and Safety
OJT	On the job training
PDP	Preliminary Decommissioning Plan
PHAI	Port Hope Area Initiative
PHCF	Port Hope Conversion Facility
PHFES	Port Hope Fire and Emergency Services
PM	Planned Maintenance
PTTW	Permit to Take Water
QA	Quality Assurance
SAP	SAP is a corporate wide enterprise application software for asset management, maintenance management, accounting and purchasing functions
SAT	Systematic Approach to Training
SCBA	Self-Contained Breathing Apparatus
SCR	Selective Catalytic Reduction
SHEQ	Safety Health Environment and Quality
SPOC	Single Point of Contact
SSC	Systems Structures and Components
TC	Transport Canada
UF_6	Uranium Hexafluoride
µgU/L	Micrograms of Uranium per Litre

UO_2	Uranium Dioxide
UO_2N	UF_6 plant + Building 2 cooling water return
UO_2S	UO_2 plant cooling water return
UO_3	Uranium Trioxide
µR/h	Microroentgen per Hour
µSv	Microsievert
WSIB	Workplace Safety and Insurance Board

1.2 Facility Operation

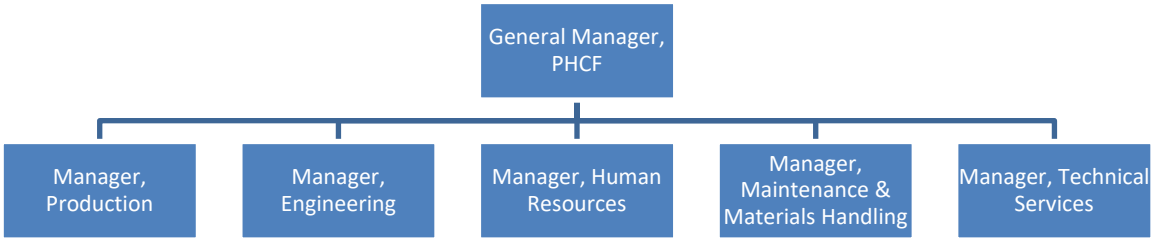
Cameco continues to strive for operational excellence at all its facilities through consistent application of management systems across its operations to ensure that they operate in a safe, clean, and reliable manner. Corporate policies and programs, including that for safety, health, environment, and quality (SHEQ) provide guidance and direction for all site-based programs and procedures that define the PHCF Quality Management System.

The general manager is accountable for the programs and procedures for operating and maintaining the facility. The responsibilities for these programs and procedures have been delegated amongst the management team at PHCF and their respective personnel. All members of the site's management team are held accountable for the roles and responsibilities that they hold.

There were no significant organizational changes in 2023.

An organizational chart for PHCF for 2023 is shown in Figure 3.

Figure 3 - PHCF Organizational Chart



The manager, technical services reports directly to the general manager and has delegated day-to-day communications with CNSC staff related to specific activities to the Sr. Coordinator, Safety and Quality. This position is responsible for coordinating and tracking compliance actions, maintenance of the facility's safety report and serves as the single point of contact (SPOC) with the CNSC for licensed activities at the site.

PHCF has a Licence Conditions Handbook (LCH), issued by the CNSC. The purpose of this handbook is to establish and consolidate into one document the compliance framework related to the Cameco PHCF 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.

In addition to Cameco requirements regarding management systems, the facility's management systems program has been designed to meet *REGDOC-2.1.1, Management System* and *CSA N286-12 Management system requirements for nuclear facilities*. This program 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 requirements and other regulatory requirements. The application of the quality requirements is scaled according to the safety significance (complexity and hazard potential) of a particular activity.

PHCF was the first site in Cameco registered to the ISO 14001 Environmental Management System Standard, which is an internationally recognized standard for environmental management. As part of the management system programs, corporate conducts audits as per a three-year schedule to assess the level of conformance to these management systems. In addition, the facility also conducts compliance audits in the areas of health safety and environmental legislation to ensure PHCF continues to meet all applicable regulatory requirements. Lastly, corporate technical experts perform 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 from project planning through to the completion of the project. This review identifies impacts and potential impacts to the environment, radiation protection, health and safety and fire protection. A site design control procedure is in place which ensures that any equipment changes, or modifications will not have an adverse effect on the environment or on the health and safety of employees or members of the public.

In 2023, there were no significant changes to the Process and Design Change Control process.

Both the UF_6 plant and the UO_2 plant operated without interruption in the first quarter of 2023. The UO_2 plant experienced a brief production interruption due to lack of hydrogen feed supply in the second quarter while the UF_6 plant operated without interruption. Hydrogen supply continued to be an issue in the third quarter causing a few outage periods for the UO_2 plant. The UF_6 plant operated throughout the fourth quarter without interruption and continued operating through the holiday period into the new year. The

UO_2 plant operated in the fourth quarter without interruption and was shutdown December 21 for the holiday period.

The PHCF experienced the following reportable events in 2023:

- Sanitary sewer action level excursions
- Cylinder flat rack loading issue
- Truck transmission fluid leak
- Elevated hi-vol dust results
- Radiation protection action level exceedance (urinalysis)
- Diesel spill
- Radiation protection action level exceedance (lung count)

PHCF 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, PHCF's operations have maintained radiation exposures well below the regulatory dose 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 Cameco is qualified to carry out the activities permitted under the Licence. All activities on the defined site in the licence are subject to the Nuclear Safety and Control Act (NSCA). Cameco 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, and the necessary measures to facilitate Canada's compliance with international safeguards obligations.

1.3 Facility Modification

There were no modifications affecting the safety analysis of the licensed facility made in 2023 that required written approval of the Commission, or a person authorized by the Commission.

The following PHCF documents referenced in the LCH were revised in 2023:

- CQP-706 Pressure and Safety Significant Piping and Vessel Control
- CQP-707 Registration and Inspection Requirements of Pressure Piping and Pressure Vessels Quality Procedures
- Fire Safety Plan
- Fire Protection Program
- Radiation Protection Program Manual
- Occupational Health and Safety Program Management Manual
- Emergency Response Plan
- Waste Management Plan
- CQP-113 Process and Design Change Control
- Port Hope Conversion Facility Main Site Layout Drawing
- Management Systems Program Manual
- Facility Licensing Manual

2.0 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 and continuously monitors its performance against these objectives, as well as fostering a healthy safety culture.

The PHCF's management systems program identifies the controls required to ensure all processes are conducted in a safe manner and that processes applying to licensed activities are conducted in accordance with applicable CNSC management systems requirements and other regulatory requirements. The application of management systems requirements is scaled according to the complexity and hazard potential of a particular activity.

The annual site management review meeting was held March 6, 2024, to review the suitability, adequacy, and effectiveness of the SHEQ policy during 2023. The site management systems, which cover all site programs, were reviewed and sufficient information was provided to demonstrate effectiveness. All safety and control areas were assessed as part of the 2023 Annual Management Review.

As part of its management system the PHCF has a site audit program that routinely looks at various aspects of site operations related to the licensed activities. In addition to internal SHEQ and compliance audits, PHCF also had a number of audits completed in 2023 as shown below. It should be noted that the list does not include inspections completed by CNSC staff as part of their oversight of licence activities.

- A second party audit of the FSD Internal Dosimetry Program was completed. This audit is a requirement under the quality assurance program developed for the Internal Dosimetry Services Licence issued to BRR, CFM and PHCF.
- An annual facility condition inspection was conducted in 2023.
- An internal corporate SHEQ audit was completed in 2023 focusing on safety, contractor management, emergency response and training.

There were no significant issues identified during the internal or external audits completed in 2023. Audits will not be discussed elsewhere in this report. Details and findings related to the audit program will be submitted under separate cover due to the confidential nature of the information.

All procedures that support licensed activity are subject to the site document control process as described in the various site document control procedures. Procedures that support the licensed activity 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, all environmental health and safety procedures, radiation protection and management systems.

In 2023, the PHCF maintained its Management Systems Program Manual in compliance with *CSA N286-12 Management System requirements for nuclear facilities*. There were no significant changes to the Management Systems Program in 2023.

PHCF follows a systematic evaluation method for its safety culture self-assessments which are generally completed every five years. Cameco uses these assessments to shape the safety program improvements at each site. The last safety culture self-assessment completed for the PHCF was done in 2021.

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 that ensure that licensee staff members are sufficient in numbers in all relevant job areas, and have the necessary knowledge, skills, and tools in place, in order to safely carry out their duties.

PHCF operations continued to ensure that all training requirements were met for all personnel. In 2023, the site completed the year with 96.0% compliance. The site target for training compliance was 95% in 2023. Training activity included mandatory, legislative and job specific training. The goal at the PHCF is to ensure employees are competent and qualified to perform the duties of their position safely. A well-trained employee is also a safe employee. A systematic approach to training (the process in use at the PHCF) ensures that all required knowledge, skill, and safety-related attributes have been attained, through a process of performance-based assessment and evaluation.

Training ensures that all personnel have the level of training related to radiation safety, fire safety, chemical safety, on site-emergency arrangements, environmental protection, and conventional health and safety, appropriate for their duties. Systems are in place to ensure employees only perform functions for which they are qualified.

In UF_6 there were seven training area packages updated in 2023. Training qualifications and ongoing training were met for operators. In UO_2 all SAT packages were up to date with no issues experienced. Three new SAT packages for Material Handling were created and work began to update all work instructions to align with the format in UF_6 and UO_2.

2023 Training Procedural Improvements:

- PHF-TRNG-A043 Course Evaluation Feedback Form
- CQP-956 Materials Handling Operator Training Procedure
- CQP-905 Apprentice Training, Certification and Subsidization
- CQP-906 Approval Process for External Training
- PHF-TRNG-A007 Training Change Request and Tracking Form
- PHF-TRNG-A030 Supervisor In-Training Procedural Sign Off
- PHF-TRNG-A028 SAT Design Template
- PHF-TRNG-A025 Apprentice Progress Review
- PHF-TRNG-A024 Apprenticeship Contract

In 2023, an overall 26,153 hours were spent on eLearning, Instructor Led Training, and informal learning. This was an 84% increase from 2022 total hours (14,256), which was a result of increased training post-pandemic.

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, violence in the workplace, respectful workplace as well as addressing more general health matters such as routine medical surveillance and radiation protection monitoring.

During 2023, the PHCF maintained a sufficient number of production personnel to ensure that operating production areas and the site were adequately staffed to run safely. In cases where staffing became an issue, production areas were safely shut down until sufficient personnel were available.

In 2023, the following changes occurred with respect to certified or licensed employees:

- 1 operating engineer resigned and was replaced with an external qualified operating engineer.
- 1 dayshift welder was replaced with a qualified welder, 1 dayshift millwright/machinist resigned in 2022 and was replaced with a qualified machinist, 1 millwright/machinist retired and was replaced with a qualified machinist. In addition, maintenance activities expanded to shift which required recruiting 4 shift steamfitter/welders/ERT, 2 shift instrument techs/electricians/ERT and 3 shift millwright/ERT positions. 5 shift maintenance supervisors were recruited to support the 4 shift maintenance crews.
- 1 reliability engineer was added to the maintenance team (for a total of 3) and was replaced with an internal mechanical engineer.
- 1 additional external mobile equipment mechanic was recruited.
- 1 external senior mechanical engineer was recruited to replace a senior mechanical engineer who retired in July 2023.
- 3 external production engineers recruited.
- 3 external UO_2 chemical operators were recruited as well as 3 external UF6 operators. 1 external cell maintenance operator was recruited.
- 1 specialist, II technical, recruited to replace the senior technical specialist who retire in 2024.

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

Both the UF_6 plant and the UO_2 plant operated without interruption in the first quarter of 2023. The UO_2 plant experienced a brief production interruption due to lack of hydrogen feed supply in the second quarter while the UF_6 plant operated without interruption. Hydrogen supply continued to be an issue in the third quarter causing a few outage periods for the UO_2 plant. The UF_6 plant operated throughout the fourth quarter without interruption and continued operating through the holiday period into the new year. The UO_2 plant operated in the fourth quarter without interruption and was shutdown December 21 for the holiday period.

The maximum daily production rate for the UF_6 plant did not exceed the licensed limit of 45 tonnes uranium as UF_6. The annual production of uranium in the UF_6 plant did not exceed the limit of 12,500 tonnes uranium as UF_6.

The annual production of uranium as UO_2 did not exceed the licensed limit of 2,800 tonnes uranium.

Detailed plant production information is considered “Protected Proprietary” and is submitted to the CNSC on an annual basis under a separate cover.

PHCF’s operating performance is tracked using a comprehensive set of key performance indicators (KPIs) and objectives. In addition, the CNSC and other regulatory agencies have conducted facility inspections to verify compliance with applicable acts and regulations.

As part of its management system, the PHCF has a site audit program that routinely looks at various aspects of site operations related to the licensed activities. This is discussed in detail in the Management System section.

During 2023, PHCF experienced the following reportable incidents. All these events were thoroughly investigated with corrective action plans developed. There was no risk to the public related to any of these incidents. Cameco is confident that through the corrective actions implemented, the review of the incidents that occurred and robust management systems the PHCF will continue to operate in a safe, clean, and reliable manner.

For the January 4, 5, 13 - 15, 17, 18, March 25, 26 and April 5,6 monitoring periods, the daily sanitary sewer discharge composite sample uranium values were reported at or above the daily action level. Facility discharge quality otherwise remained well below the monthly average limit through the 2023 calendar year.

On January 6, 2023, a UF_6 cylinder on a flat rack was being loaded onto a truck using a large fork truck. The load tipped too soon causing the flat rack/cylinder to fall to the ground. There were no injuries or impact to the environment as a result of this event.

On January 12, 2023, a transport truck leaked a small amount of transmission fluid to the ground. Due to weather conditions, the fluid was able to discharge to a nearby catch basin.

On June 5, 6, and 7, 2023, ambient station high volume air sampler (hi-vol) results for total suspended particulate (TSP) were above the dust criteria for visibility (at six sampling locations). Poor air quality (smoky conditions) in the area due to wildfires in Ontario and Quebec are the likely cause.

A contractor working in the UF_6 plant on July 14 removed their respirator too close to the work area and as a result had a urinalysis sample result above the action level of 80 µg U/L.

An operator was filling an emergency generator tank with diesel outside the Powerhouse. An overflow caused approximately 1L of diesel entered the sanitary sewer system.

On October 6, 2023, Cameco reported to the Ontario Ministry of Environment, Conservation and Parks (MECP) an ambient station high volume air sampler (hi-vol) exceedance of 179 µg TSP/m^3 total suspended particulate (TSP) for the period of October 4-5, 2023, at the Marsh Street Hi-Vol station. The measurement was above the ECCC and MECP 120 µg/m^3 TSP dust criteria for visibility and was attributed to construction work immediately adjacent to the hi-vol station.

On October 16, 2023, non-chlorinated water was able to enter the storm sewer system in relation to structure removal hot work taking place at Building 27. Initially the water was thought to be chlorinated which prompted reporting of the event to the MECP and CNSC. The water was later determined to be non-chlorinated and therefore, no impact to the environment.

On October 25, 2023, a contractor was assigned an effective dose of 8.6 mSv in relation to an exposure that occurred during an abnormal event on September 14, 2023, in the UO_2 plant. The action level for lung counting is 5 mSv which was exceeded in this dose assignment.

On December 6, 2023, Cameco was informed of contamination on a lid of a roll-off bin that was transported December 4, 2023, from the PHCF to the Long-Term Waste Management Facility. The lid was decontaminated and transported back to the PHCF. Due to the location on the lid, no contamination left the bin during transport.

2.2 Facility and Equipment

2.2.1 Safety Analysis

This safety and control area covers the maintenance of the safety analysis which supports the overall safety case for the facility. This 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.

PHCF has a safety report that documents the detailed safety analysis carried out for the facility. The safety report summarizes the systematic review of the site operations to identify and assess hazards and potential risks to the public and environment from PHCF operations. Cameco uses a hazards and operability (HAZOP) approach to assess new processes or equipment. This focuses on equipment, instrumentation, human actions, and other factors that impact on the process. HAZOPs are conducted prior to making any plant modifications that may affect the safety case for the facility, with the site safety report updated at least every five years to include the findings from any HAZOP's completed since the last revision to the report.

There were no modifications made in 2023 that negatively affected the safety case for the PHCF.

The safety-significant systems at the facility have been identified and a preventive maintenance program is in place to ensure that the equipment associated with these systems is properly maintained.

2.2.2 Physical Design

This safety and control area relates to activities that impact on the ability of systems, structures, and components (SSCs) 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. A Stage Gate process is used at PHCF to review capital projects at up to four points in the design process. This process includes sign-off by site management (or designate), to ensure that these requirements are addressed in every capital project.

PHCF contains numerous types of conventional industrial equipment including storage tanks, conveyors, and associated piping, as well as specialized equipment for the uranium conversion processes. The plant equipment is designed, installed, operated, and modified with materials suitable for the service and hazards of each area.

Changes to the physical design of equipment, processes, and the facility with the potential to impact safety are evaluated from initial planning through to the completion of the project. This review identifies impacts and potential impacts to the environment, radiation protection, health and safety and fire protection. A site design control procedure is in place which ensures that any equipment changes, or modifications will not have an adverse effect on the environment, on the health and safety of employees or on members of the public.

PHCF has a contractual arrangement with the provincial Technical Standards and Safety Authority (TSSA) to ensure that oversight of pressure retaining components and systems continues to be carried out by a third-party expert. As part of this process, PHCF utilizes non-destructive examination techniques to assess the integrity of pressure vessels and related systems. These examinations are primarily done in-house by qualified staff, though qualified third-party experts are used when necessary.

There were no significant changes to systems, structures and components that occurred at the PHCF in 2023.

There were no significant changes to the Process and Design Change Control process.

2.2.3 Fitness for Service

This safety and control area covers activities that impact on the physical condition of SSCs, 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.

Critical requirements for maintaining a safe facility are effective maintenance and QA programs. This is to ensure any changes to plant equipment are adequately controlled and authorized, and do not adversely affect the safety of the facility.

Work continued in 2023 to progress in all areas of the Operational Reliability program. The site Operational Excellence scorecard established a variety of objectives and targets for 2023 as part of the 5-year Operational Excellence Master Plan. There were 21 targets/objectives captured in the annual 2023 Operational Excellence scorecard.

The effectiveness of the program, as it pertains to reliability of equipment and systems, continues to be measured through a number of leading and lagging metrics (KPI's). Program effectiveness is defined by upward trends of these indicators to reach world class standards for chemical manufacturing industries. 2023 was impacted by high absenteeism due to use of medical or personal leave of absences as defined in the Canada Labour Code.

Highlights of selected KPI's by focus area include:

- Work Management
    - Schedule load, which represents the planned work each week versus the available resource hours, was 80% versus a target of 90%. With high absenteeism rates, scheduled work activities were reduced versus previous years to account for the absenteeism rates.
    - Schedule compliance was slightly improved year over year with 72% of work being executed in the week it was scheduled. While below the target of 90%, this result is consistent with PHCF's recent performance.
- Materials Management
    - Inventory management of our spare parts was well executed in 2023 with minimal impacts to safe reliable production. Work continues to assess and improve appropriate stock levels of Maintenance, Repair and Operating materials. Issues with broad supply chain disruptions were less noticeable in 2023 versus the previous year.
- Reliability Engineering

  - Condition based monitoring of equipment continues to be a focus with additional improvements being made on all inspection types: thermography, ultrasonic bearing inspections, ultrasonic steam trap inspections, ultrasonic compressed air leak inspections, vibration, and oil analysis.
  - Pilot projects were completed in 2023 for real time condition monitoring for high priority assets with bearing condition for rotational assets and vibration monitoring. These two pilot projects were deemed a success by the PHCF Operational Excellence Steering team and will move to full scale implementation in the future. A third type of condition monitoring, for steam traps, continues in the pilot phase and has been expanded to additional traps at site to ensure we effectively evaluate this technology.
  - 'Bad Actor' assets continue to be identified in the Production Loss Elimination Process (PLEP), for both downtime and high maintenance costs. Reliability engineers facilitated Reliability Centered maintenance workshops to review failures/costs with key stakeholders and assessed existing asset maintenance strategies for opportunities to improve.
- Operations Improvement
  - Overall Equipment Effectiveness (OEE) for the UF_6 was just under target and the UO_2 plant was below target. The UF_6 plant set an all-time record for production, and we continue to apply best practices to achieve even higher levels of safe production.

Testing and verification activities are integrated into the preventive maintenance strategy for any SSCs. Compliance to the activities is measured on a weekly basis.

The asset management program accounts for ageing through several processes designed to detect early warning signs and to prescribe rehabilitation programs or pro-active replacement strategies. The effectiveness of the program is measured by the same means as the overall maintenance program and is considered to be effective.

PHCF has an established Planned Maintenance (PM) program whereby all tasks are initiated and documented through the computerized maintenance management system in SAP (SAP is a corporate wide enterprise application software for asset management, maintenance management, accounting and purchasing functions). PM plans are issued, reviewed, and updated periodically to ensure the PM routines continue to be effective and adequate. KPIs are in place to monitor the effectiveness of the 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 required tests and inspections with respect to fire protection are completed and these review reports are submitted to the CNSC.

Based on the maintenance related KPI's, the maintenance program, which includes the aging management component, is considered to be effective.

There were no significant changes to the Asset Management and Reliability program in 2023.

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*. This program must ensure that contamination and radiation doses are monitored and controlled.

PHCF 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 ensure exposures are kept to levels as low as reasonably achievable (ALARA). The program includes the following aspects:

- External dosimetry – personal monitoring
- Internal dosimetry – urine analysis & lung counting programs
- Workplace air sampling program
- Respirator program
- Radiation & contamination surveys

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

For various radiological parameters, Cameco has established action levels, which are well below regulatory limits 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 addition, as a continual improvement tool, Cameco has established lower-tier internal administrative levels, which are set below the action levels and provide very early warning of a potential concern. A result above an internal administrative level is also investigated and remedial actions taken if necessary.

Radiation protection objectives and targets are established jointly by the site management team, site specialists and FSD specialists, including the health physicist, to ensure there is agreement, commitment and awareness of these objectives and targets. These objectives and targets can address, among other things, worker dose reduction initiatives and other projects which examine ways to reduce in-plant uranium-in-air concentrations. The status of these objectives and targets is reviewed by the site management team and resources are allocated as required to achieve the targets.

Audits and inspections were performed in accordance with licence conditions. Refer to the Management Systems section of this report for further details.

The performance of the Radiation Protection Program is tracked using KPIs. The KPIs for this program include but are not limited to risk control, training, objectives and targets, operational controls, and monitoring.

The radiation protection program at PHCF is well established, with detailed procedures outlining the processes under each element of the program. Review of the 2023 dose data indicates that the program is effective in the prevention of unreasonable risk to the health and safety of workers.

Though the radiation protection and ALARA programs have been demonstrated to be effective, PHCF has also made significant improvements as part of its continual improvement program, including:

Program Improvements:

- 5 new iCAMs have been put in service in the UF_6 plant.
- The site safety meeting for the month of June 2023 was focused on managing the ALARA program and ALARA objectives.
- New liquid nitrogen overflow sensors were designed and fabricated to support the lung counter.

Safety Improvements:

- Improved monitoring for personnel leaving the Dorset Street site.
- PPE signage on all lunchrooms was standardized.
- Swipes were added in production lunchrooms to enhance the current process.
- Minimum number of monitor points for room surveys was determined.

Procedural Improvements

- CAP:RAD:9 Preparation and Collection of Track Etch Radon Detectors
- CAP:RAD:21 Internal Dosimetry – In-Vitro – Urinalysis Monitoring
- CAP:RAD:22 Internal Dosimetry – In-Vivo-Lung Counting Program
- CAP:RAD:28 Room Surveys
- CAP:RAD:38 Alpha Counting
- CAP:RAD:42 Assigning Internal Dose from Lung Counting Data
- CAP:RAD:44 iCam – Continuous Air Sampling for Uranium
- CAP:RAD:46 Routine iCam Maintenance
- CAP:RAD:48 Health and Safety Risk Control Guidelines for Pregnant NEW's
- CAP:RAD:53 Relocating Lung Count Trailer to the Blind River Refinery

- CAP:RAD:54 Lung Counting Liquid Nitrogen System Setup and Operational Methods
- CAP:RAD:58 Maintenance and Calibration of the Canberra Argos-5AB Whole Body Monitors
- CAP:RAD:61 Annual Calculation and Verification of Lung Dose

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

- Maintain employee maximum radiation exposures to ALARA levels or below:
  - The 5 mSv for external whole-body dose was not met. The maximum dose of 6.1 mSv in 2023 was received by a UF_6 operator.
  - The 36 mSv for external skin dose was met. The maximum dose of 16.0 mSv was received by a UF_6 operator.
  - The 1 mSv for internal dose – urine analysis was met. The maximum dose of 0.53 mSv was received by a maintenance employee.
  - The 4 mSv for internal dose – lung counting was not met due to an exposure in the UO_2 plant. The maximum dose of 8.8 mSv was received by a Contractor.
- Utilized the 'top five' approach in order to follow up on the five workers with the highest year-to-date doses in each dose component. Results were tracked monthly, and the approach was found to be effective in meeting the ALARA targets for internal urine analysis and external whole-body dose.
- Achieved >98.5% compliance to scheduled urine sample submissions.
- Continued to support the production team with improving engineering and administrative controls to address radiation issues associated with operation of flame reactors and management of ash cans.

The 2024 ALARA targets are as follows:

- Dose targets: Whole body dose < 5 mSv
- Skin dose < 36 mSv
- Urine analysis dose < 1 mSv
- Eye dose < 36 mSv
- Lung dose < 4 mSv

Radiation protection initiatives planned for 2024 include:

- Continue to utilize the 'top five' approach in order to follow up on the five workers with the highest year-to-date (YTD) doses in each dose component.
- Achieve 98% or greater compliance to scheduled urine sample submissions.
- Continue to support the production team to develop and implement a plan for improved engineering and administrative controls for the operation of flame reactors and management of ash cans.

PHCF uses a licensed dosimetry service provider that is accredited by the CNSC. The dosimetry service provides optically stimulated luminescence (OSL) dosimeters to PHCF for use by employees, contractors, and visitors. An OSL badge is used to monitor whole body, skin, and eye dose. Dosimeters are changed monthly for production, maintenance, and support services and quarterly for all other employees. The provider reports the OSL results to the National Dose Registry (NDR) as well as provides a copy to PHCF.

In 2023, PHCF did not exceed any CNSC licensed limits with respect to radiation protection. There were no estimated doses in 2023 that required a formal change request.

NEW training is conducted for each employee or contractor, who is likely to receive dose above 1 mSv or requires unlimited access to Zone 3 areas. All employees and contractors receive annual refresher training in the form of a monthly safety meeting presentation. In 2023, PHCF recorded 100% compliance to Radiation Protection training requirements.

The radiation monitoring instrumentation was maintained as per regular calibration and maintenance schedules.

Inventory of sealed and unsealed sources that are used or possessed on site are listed in the radioisotope source control procedure. Regular inspection and leak tests of the sealed sources were carried out in 2023 according to this procedure. Results showed that sources are in a state of safe operation and pose no undue risk to workers. Control of sealed sources was maintained throughout the year.

Internal doses are assigned through urine analysis and lung counting programs which are part of Cameco's licensed internal dosimetry service.

The following tables and graphs summarize employee dose results, including contractors that are designated as NEWs. All data from previous years is also presented with these groups of individuals, which may result in slight differences from previously reported summary data. Note that in figures with ranges on the horizontal axis, a range of 1 – 2, for example, means all results are greater than 1 and less than or equal to 2.

Whole Body Dose

Distributions of 2023 external whole-body dose are shown in Table 2 and Figure 4. More than 93% of the whole-body exposures were below 1 mSv with a total of 32 workers receiving a whole-body dose greater than 2 mSv.

Table 2

2023 Whole Body Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 1	93.4
1 – 2	3.8
2 – 3	1.1
3 – 4	0.7
4 – 5	0.7
> 5	0.3

Figure 4

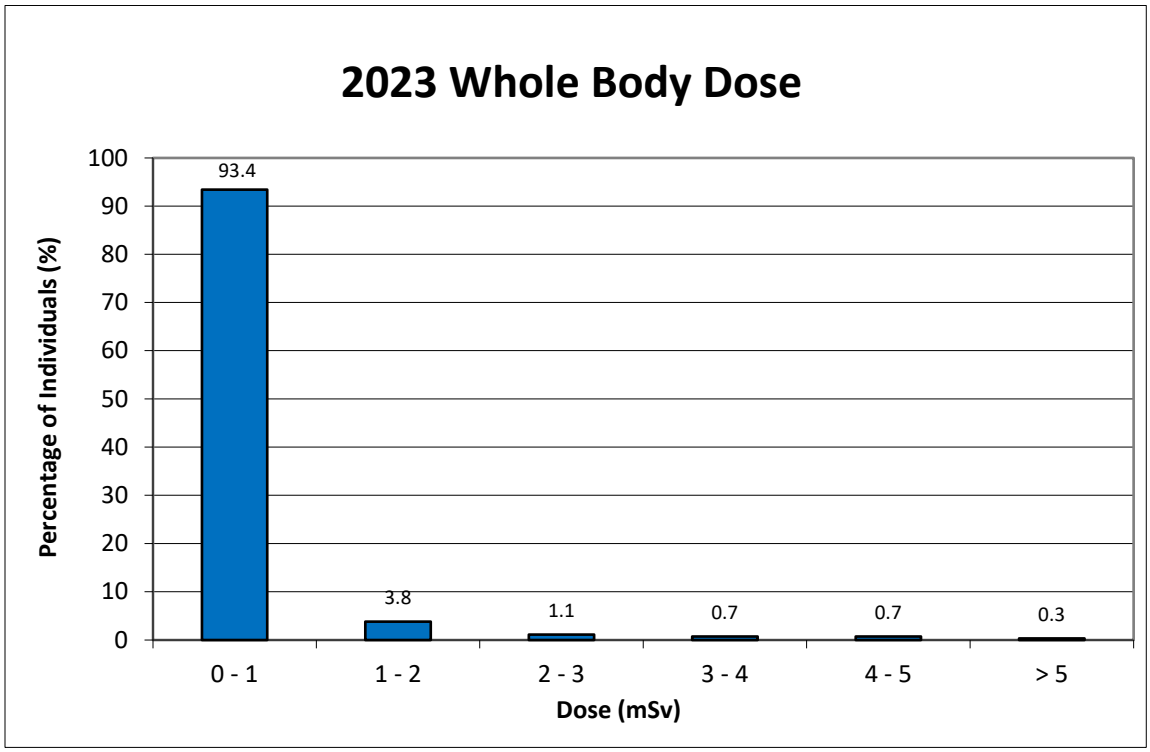


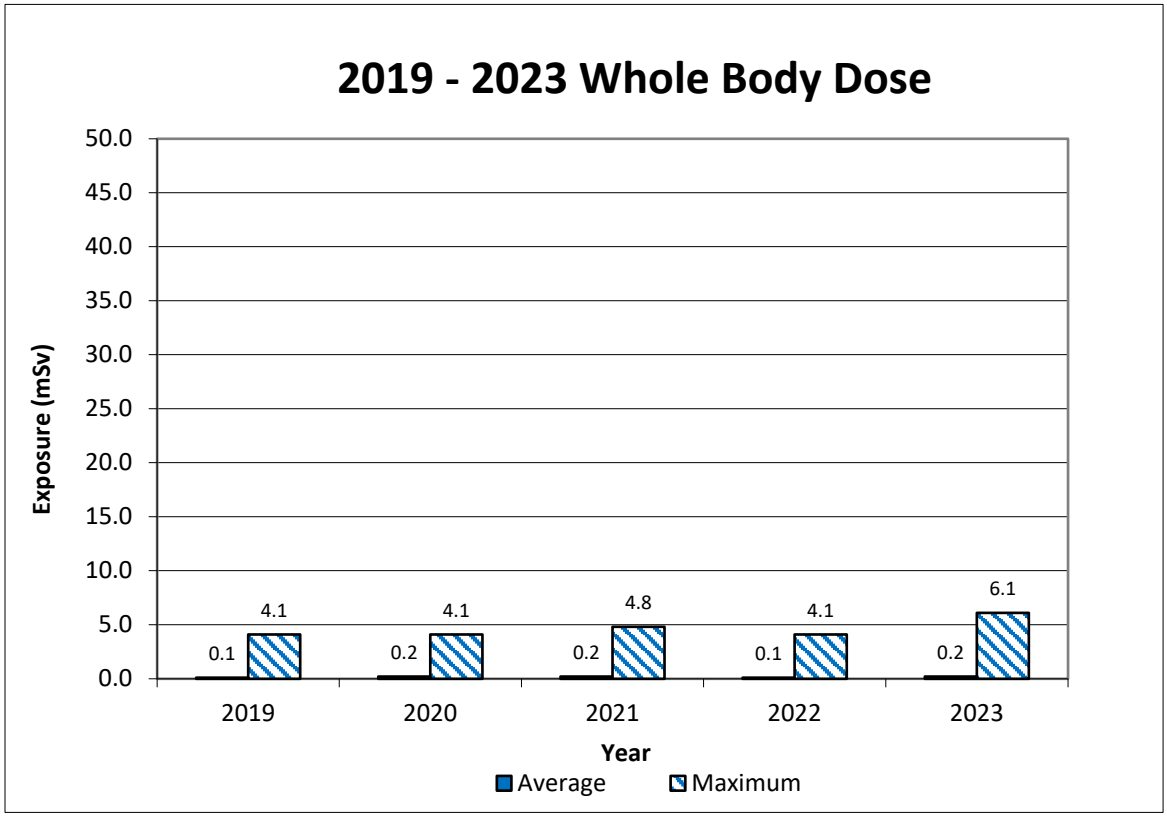
Table 3 and Figure 5 show the employee average and maximum individual external whole-body dose for the five-year period from 2019 – 2023. This data includes

contractors with NEW status. The average dose in 2023 was relatively the same compared to the average dose from 2019 through 2022. The maximum individual external whole-body dose was 6.1 mSv received by a UF_6 operator.

Table 3

2019 – 2023 Whole Body Dose				
Year	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum (mSv)**
2019	1,099	0.1	0.0	4.1
2020	946	0.2	0.0	4.1
2021	874	0.2	0.0	4.8
2022	1,110	0.1	0.0	4.1
2023	1,132	0.2	0.0	6.1

Figure 5



Skin Dose

Distributions of 2023 external skin doses are shown in Table 4 and Figure 6. Over 98% of the external skin doses were below 10 mSv.

Table 4

2023 Skin Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 10	98.8
10 – 20	1.2
20 – 30	0.0
30 – 40	0.0
40 – 50	0.0
> 50	0.0

Figure 6

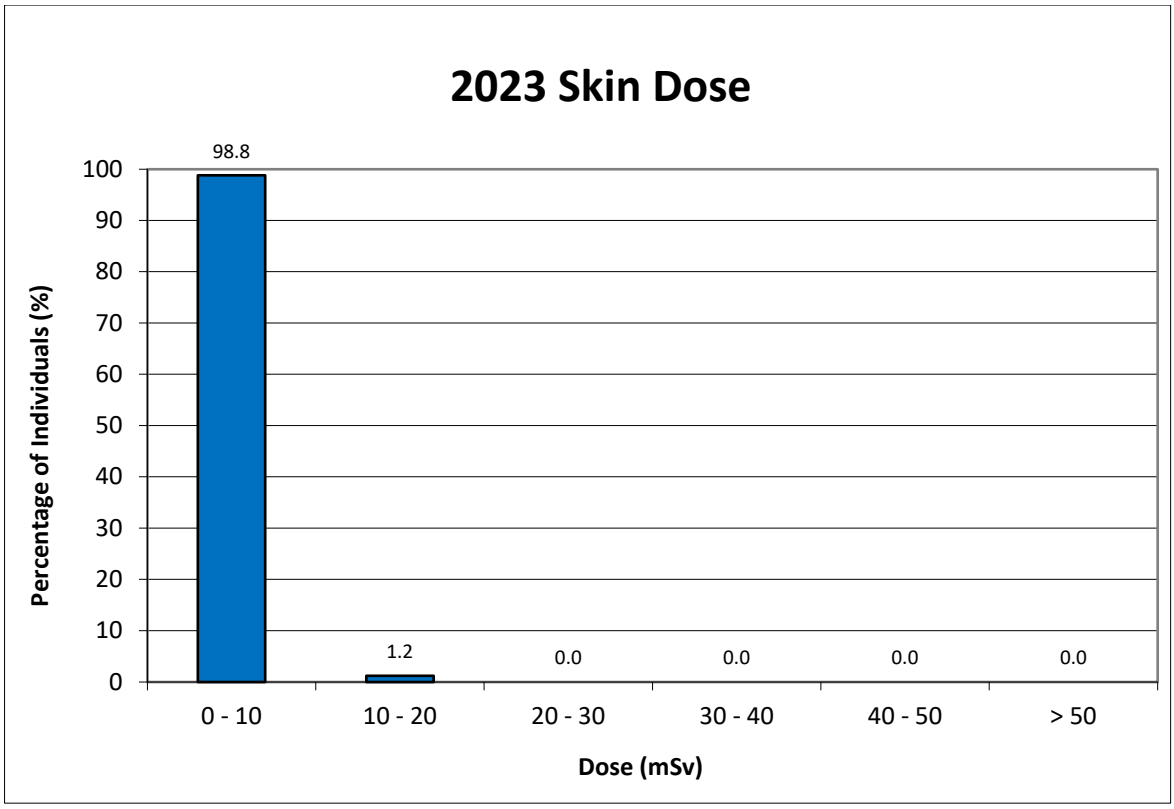


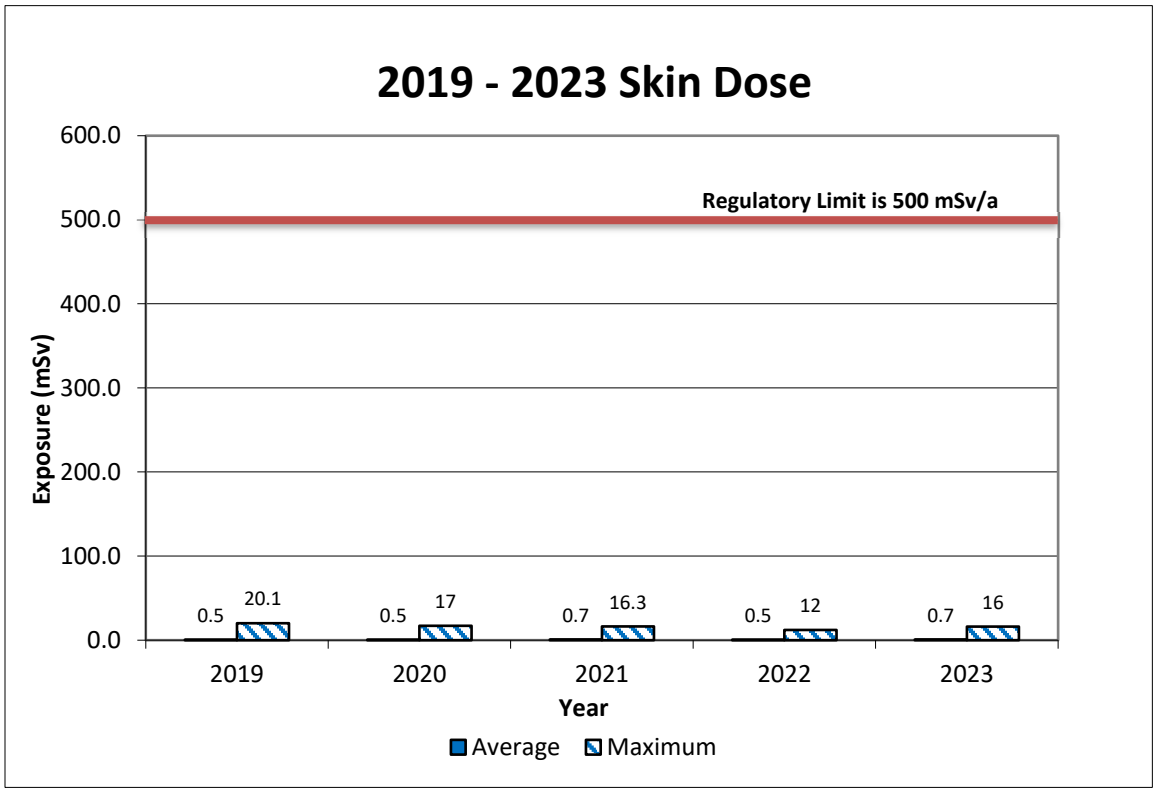
Table 5 and Figure 7 show the employee average and maximum individual skin dose for the five-year period from 2019 – 2023 including contractors (NEW). Average dose

remained constant over the period. The maximum individual skin dose was also consistent with the previous 4 years. The maximum individual dose in 2023 was 16.0 mSv, which is below 5% of the CNSC annual limit of 500 mSv for skin dose. The individual with the highest exposure was a UF_6 operator.

Table 5

2019 – 2023 Skin Dose				
Year	**Number of Individuals**	**Average**	**Minimum**	**Maximum**
2019	1,099	0.5	0.0	20.1
2020	946	0.5	0.0	17.0
2021	874	0.7	0.0	16.3
2022	1,110	0.5	0.0	12.0
2023	1,132	0.7	0.0	16.0

Figure 7



Site visitors and non-NEW contractors are also issued dosimeter badges. The average and maximum whole-body results for these individuals were 0.00 mSv and 0.02 mSv, respectively. The average and maximum non-NEW contractor/visitor skin dose results were 0.00 mSv and 0.01 mSv, respectively.

Eye Dose

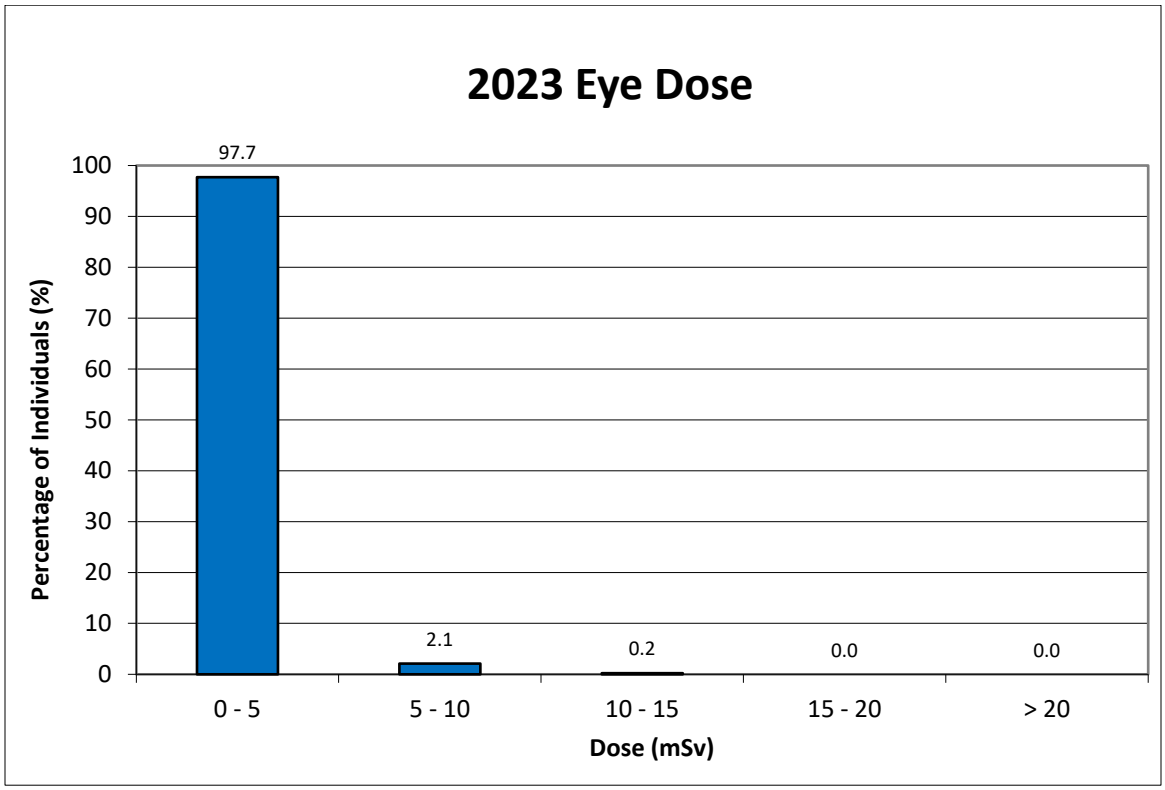
The CNSC regulatory dose limit to the lens of the eye for NEW's is 50 mSv per year. The current interim action level for eye dose is 6 mSv/month and 12 mSv/Quarter.

Table 6 and Figure 8 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 (97.7%) with no employees above 20 mSv.

Table 6

2023 Eye Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 5	97.7
5 – 10	2.1
10 – 15	0.2
15 – 20	0.0
> 20	0.0

Figure 8



The highest eye doses are from the operations work group, consisting of production and maintenance personnel. In 2023, the average eye dose for all NEWs was 0.5 mSv and the maximum annual eye dose was 11.1 mSv.

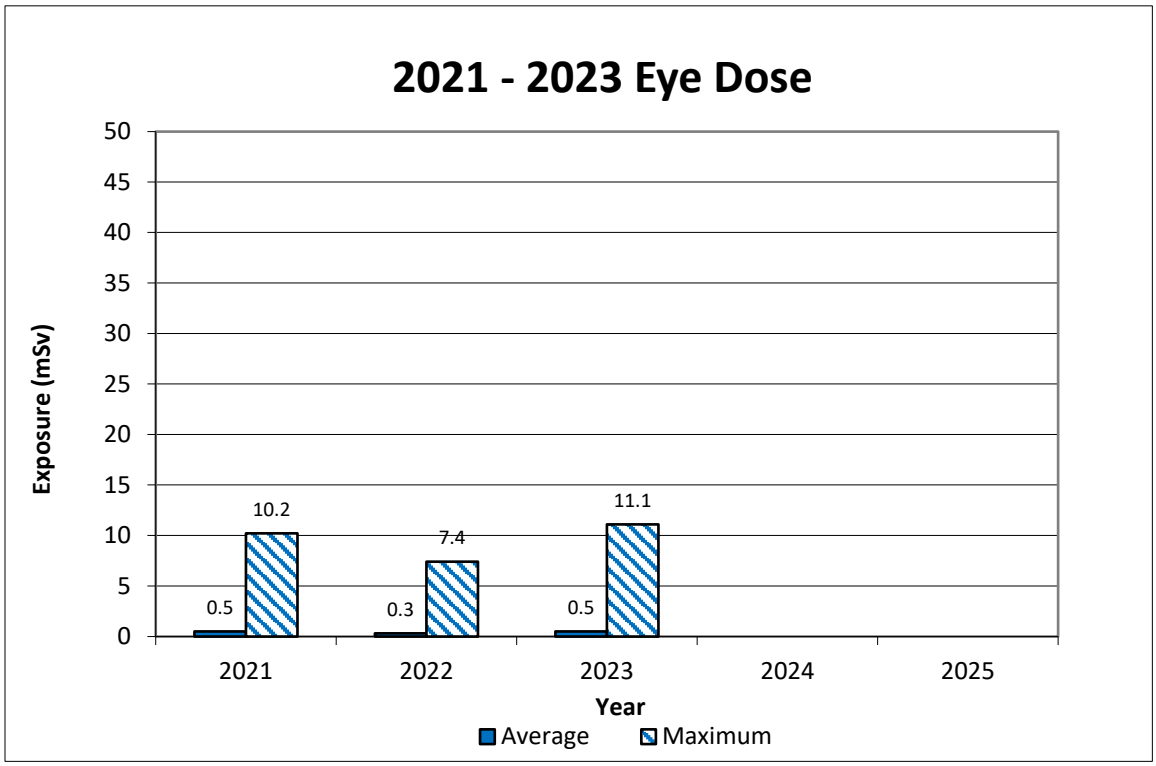
Changes to the radiation protection regulations prompted the PHCF to initiate tracking and analysis of eye dose to employees and contractors in 2021. Table 7 and Figure 9 presents the employee average, minimum and maximum eye dose for the 2023 period. This table and figure will include year by year comparison in future reports as data is collected.

The chart illustrates that the maximum annual dose received by an individual is below the regulatory limit. In 2023, the individual with the highest dose was a UF_6 employee this individual also had the maximum skin dose.

Table 7

2021 - 2023 Eye Dose				
Year	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
2021	873	0.5	0.0	10.2
2022	1,110	0.3	0.0	7.4
2023	1,132	0.5	0.0	11.1

Figure 9



Urine Analysis

Table 8 shows the distribution of urine results for 2023. A total of 55,900 urine samples were collected and analyzed for uranium and/or fluorides during 2023. The majority of uranium in urine results (> 98.8%) were less than 5 µg U/L in 2023.

Table 8

2023 Urine Analysis Results	
Distribution of Results	**2022**
Number of Samples ≤ 5 µg U/l	55,244
Number of Samples >5 to ≤ 25 µg U/l	621
Number of Samples >25 to ≤ 50 µg U/l	27
Number of Samples > 50 µg U/l	8
Number of Uranium in Urine Samples Analyzed	55,900
Number of Samples above the Action Level	1
Maximum Routine Sample Result (µg U/L)	18
Maximum Non-Routine Sample Result (µg U/L)	340

The distribution of 2023 internal urine dose for employees is shown in Table 9 and Figure 9. Approximately 95.8% of the individual assigned doses were below 0.2 mSv.

Table 9

2023 Internal Dose Distribution (Urine Analysis)	
Dose Range (mSv)	**Percentage of Individuals (%)**
0.0 – 0.2	95.8
0.2 – 0.4	3.8
0.4 – 0.6	0.5
0.6 – 0.8	0.0
0.8 – 1.0	0.0
> 1.0	0.0

Figure 9

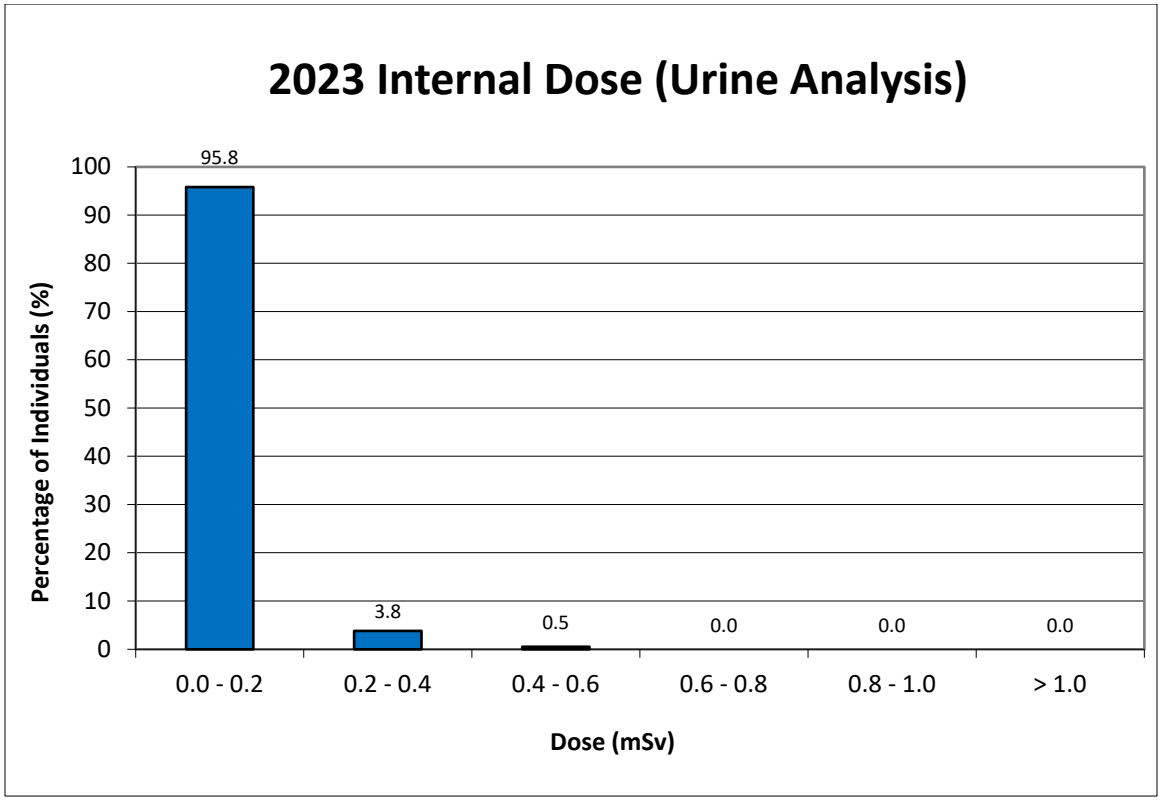


Table 10 and Figure 10 present the average and maximum internal urine analysis doses for the 2019 through 2023 period. A total of 895 employees, contractors and visitors were monitored by the urine analysis program during 2023. The average and maximum internal urine analysis doses in 2023 (including contractors) were 0.03 mSv and 0.53 mSv respectively which was the same as the previous year. The maximum dose of 0.53 mSv was received by a Maintenance employee.

The annual ALARA target for internal urine analysis exposure of 1 mSv was not exceeded in 2023.

Table 10

2019 – 2023 Internal Dose (Urine Analysis)				
Year	**Number of Individuals (Includes Contractors)**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
2019	905	0.04	0.00	0.75
2020	755	0.04	0.00	0.63
2021	674	0.03	0.00	0.70
2022	860	0.03	0.00	0.53
2023	895	0.03	0.00	0.53

Figure 10

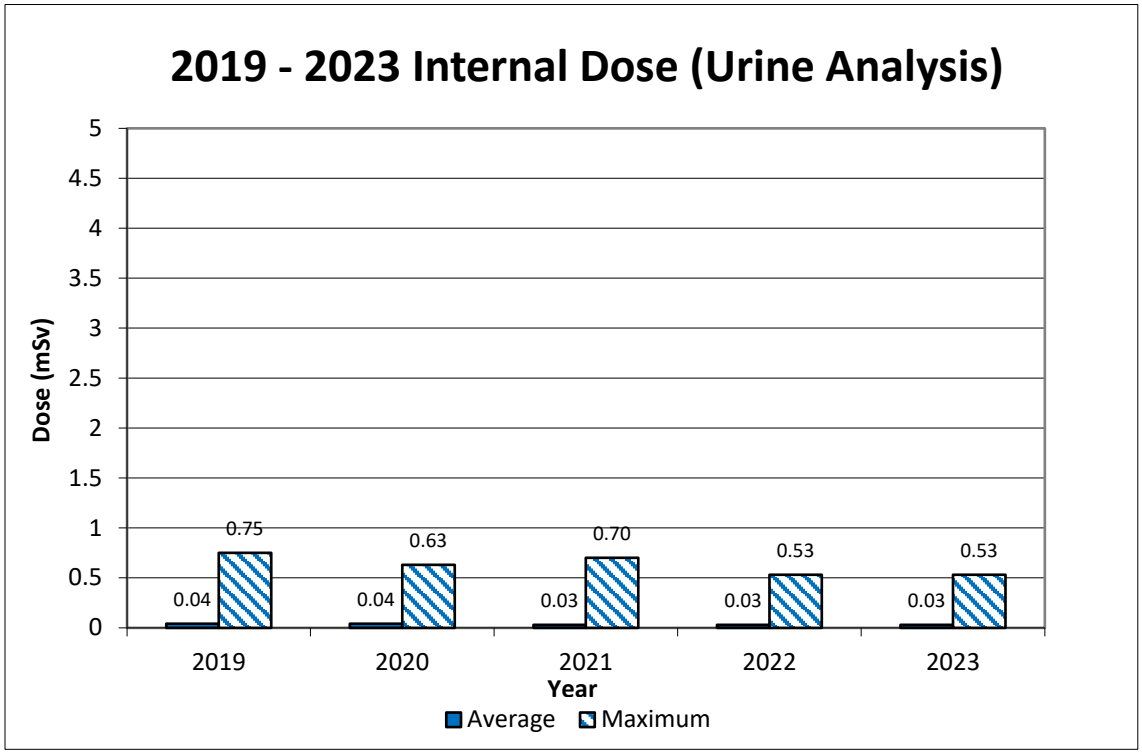


Table 11 shows a comparison of the annual exposure results for whole body dose, skin dose, eye dose and urine analysis broken down by work group. The highest doses are from the operations work group, consisting of production, materials handling, waste management and maintenance personnel.

Table 11

2023 Annual Exposure Results by Work Group												
Work Group	**Whole Body (mSv)**			**Skin Exposure (mSv)**			**Eye Dose (mSv)**			**Urine Analysis (mSv)**		
	Avg	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**
UF_6 Plant	1.22	0.00	6.14	3.70	0.00	16.03	2.45	0.00	11.1	0.10	0.00	0.49
UO_2 Plant	0.48	0.00	1.26	1.32	0.01	4.47	0.94	0.00	2.98	0.05	0.00	0.21
Maintenance	0.60	0.00	3.77	2.67	0.00	13.22	1.59	0.00	7.33	0.09	0.00	0.53
Technical Support [1]	0.07	0.00	2.40	0.17	0.00	3.33	0.13	0.00	2.48	0.01	0.00	0.30
Administration	0.02	0.00	0.09	0.02	0.00	0.17	0.02	0.00	0.13	0.00	0.00	0.10
Total	**0.22**	**0.00**	**6.14**	**0.70**	**0.00**	**16.03**	**0.46**	**0.00**	**11.1**	**0.03**	**0.00**	**0.53**
[1] Includes contractors (NEWs)												

Fluoride in Urine

A total of 38,530 urine samples were analyzed for fluoride in 2023, with summary results provided in Table 12. There were 42 samples above the internal administrative investigation level of 4 mg F/L during the year. 39 of these were determined to be non-occupational related to tea drinking, 2 were determined to be related to respirator use and 1 was investigated with no cause able to be determined.

Table 12

2023 Fluoride in Urine Analysis Results			
Type of Fluoride Samples	**Number of Samples**	**Minimum Concentration (mg F/L)**	**Maximum Concentration (mg F/L)**
All fluoride samples	38,530	0	7.3
Routine post-shift fluoride samples >= 7 mg F/L	0	-	-
Routine pre-shift fluoride samples >= 4 mg F/L	2	-	-
Non-routine fluoride samples	1,674	0	7.3
Samples analyzed for U, insufficient volume (< 30mL) for F analysis	37	-	-

Lung Counting

As part of the licensed internal dosimetry program Cameco employs the use of a lung counter to monitor and assess exposure of uranium in the lungs of its employees and contractors (NEW) at PHCF. This equipment is capable of measuring extremely low levels of contamination to the point where an employee's exposure could be stopped well before it could become an issue.

A total of 1,153 internal lung count doses were assigned at the PHCF in 2023. There were no investigations triggered by the lung counting program during the year and no regulatory action level was exceeded for lung count measurements. Intercomparisons (independent tests) were conducted by Health Canada in 2023 to validate, test, and certify the lung counting system. This testing was completed July 19.

The estimates of 2023 internal exposures, based on the lung counting program, were assigned for 269 employees and the prorated actuals of 2023 internal exposures were calculated for 707 contractors (NEW) and administrative employees. The 2023 average internal lung counting dose assigned was 0.3 mSv. The maximum calculated dose of 8.8 mSv, was over the action limit. This dose was received by a Contractor (NEW) due to an exposure in the UO_2 plant.

Taking into consideration counting statistics and the minimum detectable activity (MDA) of the lung counter, six basic dosimetry groups are in place with a greater number of workers in each to increase the accuracy of group-based dose assessment. These dosimetry groups are:

- UF_6 plant
- UO_2 plant
- Maintenance
- Technical support
- Administration
- NEW Contractors.

The technical support dosimetry group includes materials handling, environmental and radiation safety personnel, and engineering work groups.

Table 13 and Figure 11 show the distribution of assigned lung counting doses.

Table 13

2023 Internal Dose Distribution (Lung)	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 1	87.8
1 – 2	12.1
2 – 3	0.0
3 – 4	0.0
4 – 5	0.0
> 5	0.1

Figure 11

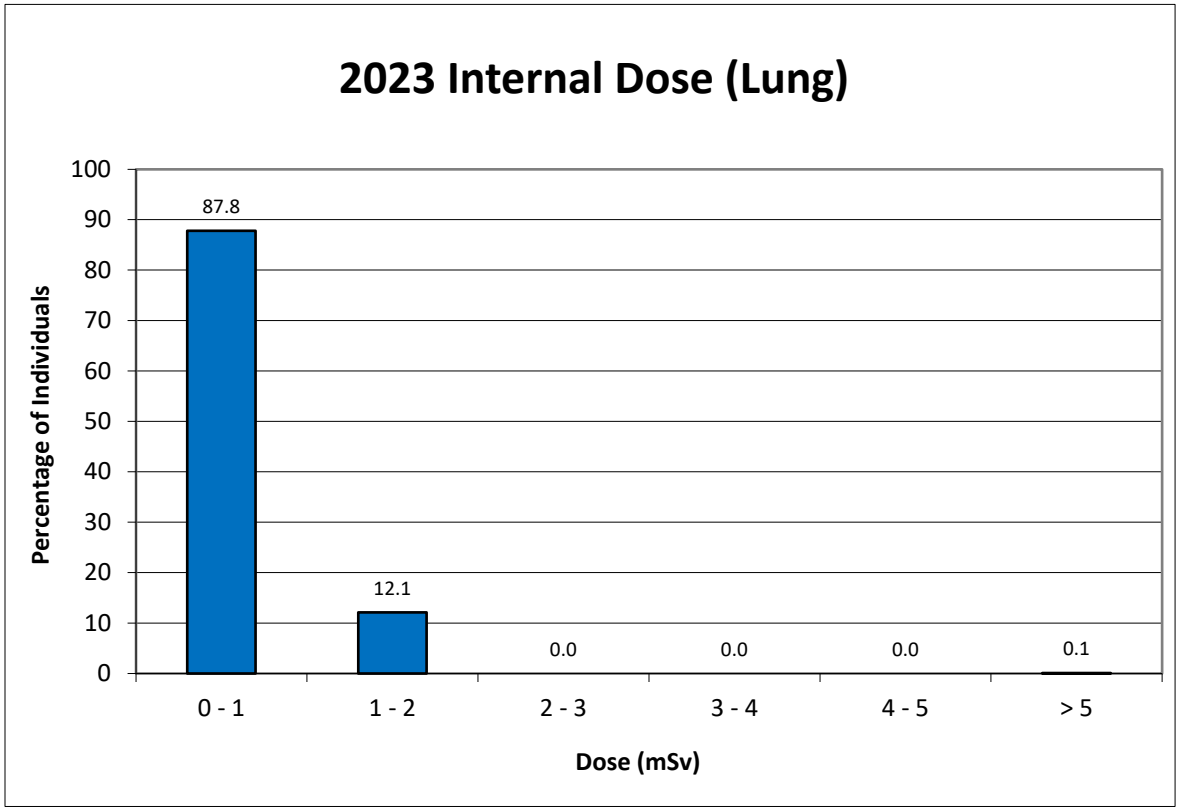


Table 14 presents the internal lung counting dose indicators for 2019-2023 period.

Table 14

Internal Lung Count Exposures 2019 – 2023				
Year	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum[1] (mSv)**
2019	1,173	0.2	0.0	2.3
2020	979	0.3	0.0	1.7
2021	898	0.5	0.0	3.4
2022	1,130	0.3	0.0	3.3
2023	1,153	0.3	0.0	8.8
[1]Maximum annual dose to an individual				

Table 15 shows the assigned internal lung count doses for 2023.

Table 15

Assigned Internal Lung Count Doses 2023				
Dosimetry Group	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum[1] (mSv)**
UF_6 Plant	104	1.2	0.0	1.5
UO_2 Plant	24	0.2	0.0	0.7
Maintenance	86	0.8	0.0	1.3
Technical Support[2 3]	829	0.2	0.0	8.8
Administration[2]	109	0.0	0.0	0.0
Regulatory Limit - annual (5 years)		50 (100)		
[1]Maximum annual dose to an individual				
[2]Includes prorated doses				
[3]Includes Contractors (NEW)				

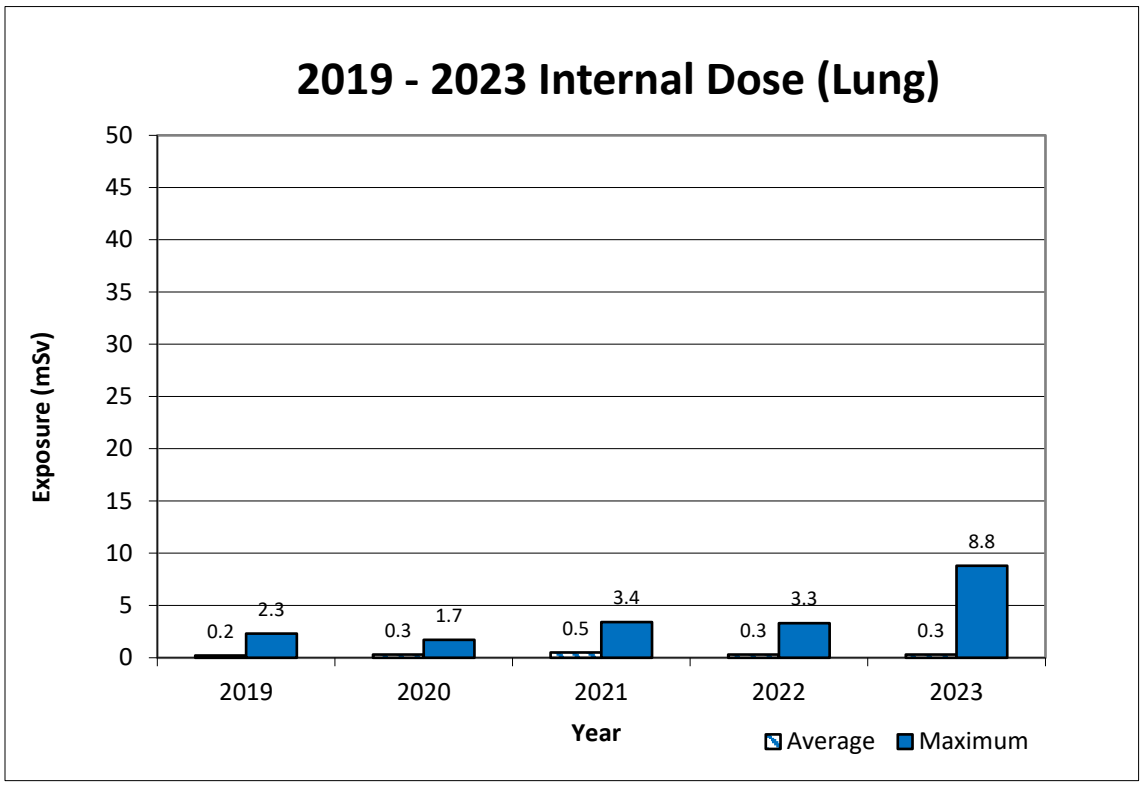
In 2023, one lung count measurement exceeded the Decision Level (DL) of the lung counter; therefore, all but one lung dose for individuals were based and assigned on group averages. Differences in individual lung doses within the same group are due to different fractions of the group average being applied to the individual's annual dose, based on the dates the individual's lung counts occurred.

Differences in individual lung doses from year to year are due to correction factors. The current methodology assigns the dose from a lung count to the next lung count, hence the lung doses for 2023 are estimates only, projecting the exposure from the last lung count

in 2023 until the end of the year to be the same as the one between the last two lung counts. Once the lung counts are completed in 2024, the actual lung doses for 2023 can be calculated. The difference between the actual and estimated lung doses is applied to the next year estimates (becoming corrected estimates).

Figure 12 shows the average and maximum internal lung dose for PHCF employees for the 2019 through 2023 period, including the outside contractors work group (NEWs).

Figure 12



Total Effective Dose

The total effective dose (TED) was assessed for 1173 employees and contractors. It should be noted that the internal lung dose component was assessed using the estimating function of the lung counting program management. The site average and maximum total effective dose for 2023 were 0.55 mSv and 9.02 mSv, respectively.

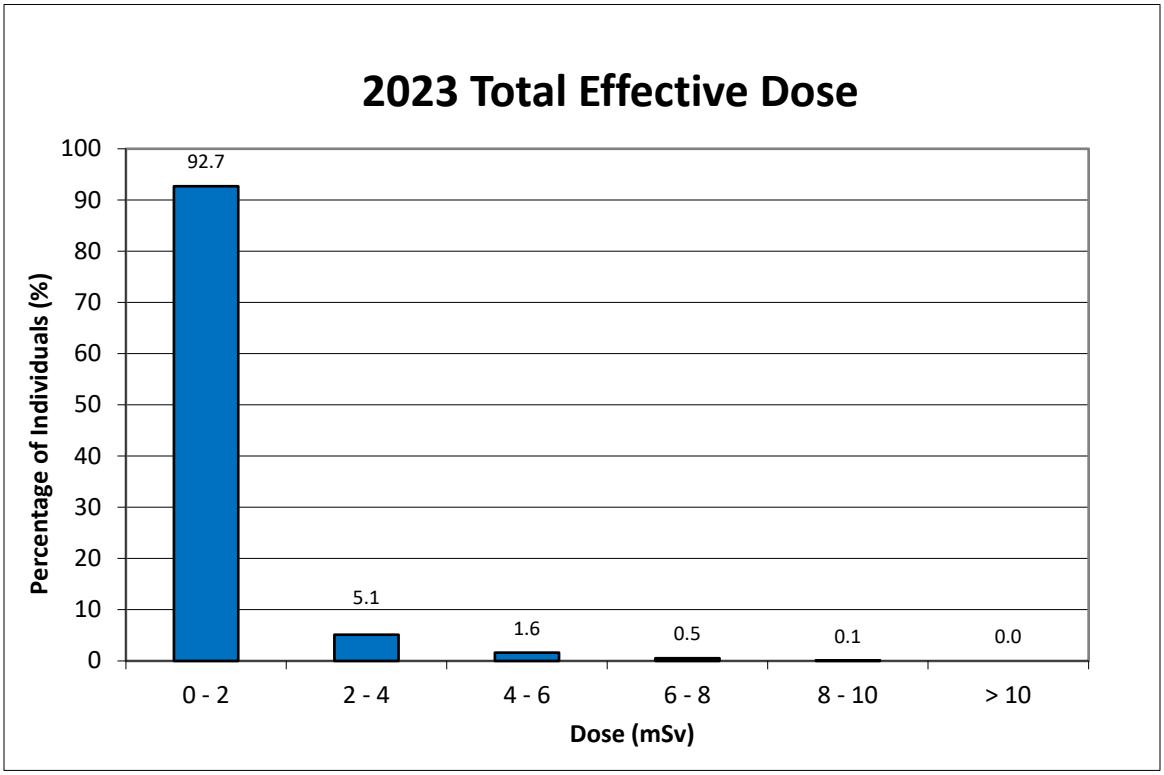
In 2023, there were 661 contractor NEWs. The maximum TED for a contractor NEW was 9.02 mSv. This dose was due to an exposure in the UO_2 plant.

Table 16 and Figure 13 show the breakdown of the total effective dose for employees in 2023. 97.8% of employees or contractors (NEWs) had an effective dose of 4 mSv or less.

Table 16

2023 Total Effective Dose Distribution	
Dose Range (mSv)	**Percentage of Individuals (%)**
0 – 2	92.7
2 – 4	5.1
4 – 6	1.6
6 – 8	0.5
8 – 10	0.1
> 10	0.0

Figure 13



The average employee effective dose in 2023 is consistent with the average effective dose recorded over the past five-year period.

Table 17 and Figure 14 present the total effective dose for employees during the 2019 - 2023 period.

The five-year regulatory limits established in the *Radiation Protection Regulations* apply to unique five-year periods of time. The current period extends from January 1, 2021, to December 31, 2025. The maximum individual effective dose for the current five-year dosimetry period is 9.0 mSv which is well below the regulatory limits of 50 mSv/year and 100 mSv/5 years.

Table 17

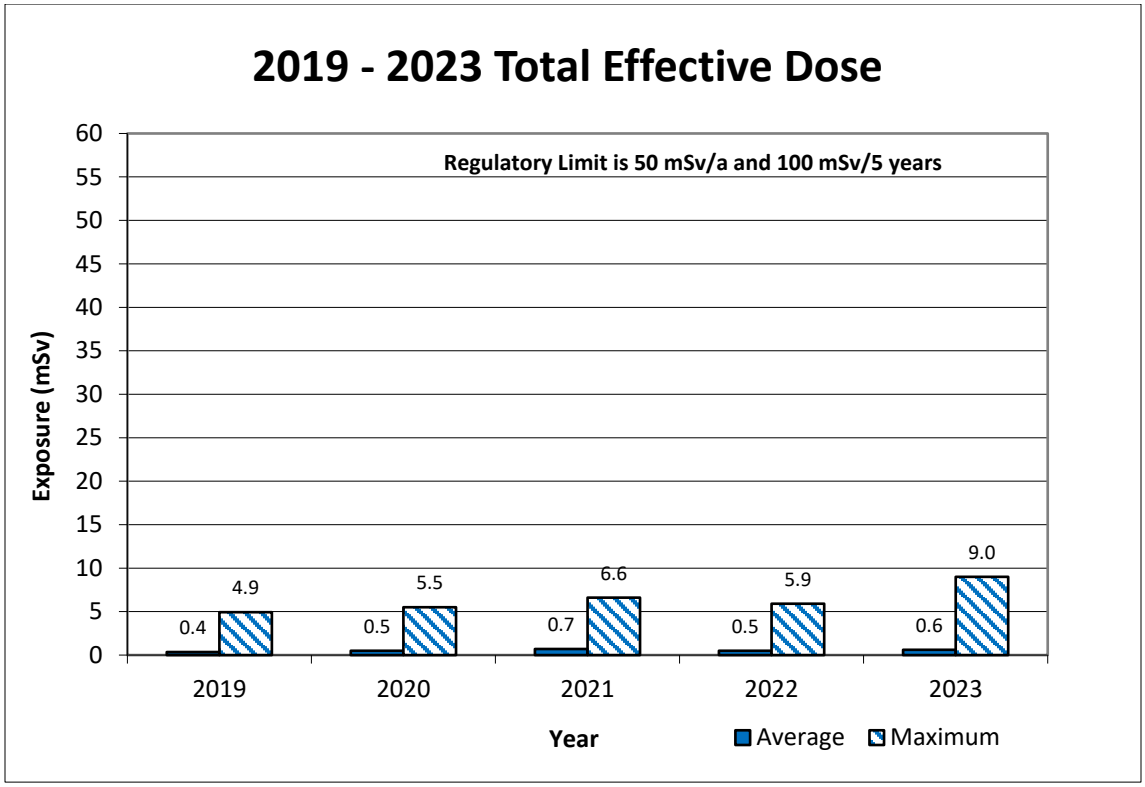
Total Effective Dose 2019 - 2023				
Year	**Number of Individuals**	**Average (mSv)**	**Minimum (mSv)**	**Maximum[1] (mSv)**
2019	1,177	0.4	0.0	4.9
2020	994	0.5	0.0	5.5
2021	908	0.7	0.0	6.6
2022	1,150	0.5	0.0	5.9
2023	1,173	0.6	0.0	9.0
[1]Maximum annual dose to an individual				

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 NEW total effective dose results for measurable doses (removal of zero doses). The average total effective dose for all measurable doses (zero doses removed) for a NEW in 2023 was 1.0 mSv.

Table 18

Total Effective Dose (All Measurable Doses – Zero Dose Removed)				
Year	**Number of Individuals**	**Average[2] (mSv)**	**Minimum (mSv)**	**Maximum[1] (mSv)**
2020	556	0.8	0.1	5.5
2021	473	1.4	0.1	6.6
2022	579	0.7	0.1	5.9
2023	620	1.0	0.1	9.0
[1]Maximum annual dose to an individual [2]PHCF began reporting non-zero average total effective dose in 2020				

Figure 14



The average total effective dose five-year trend from 2019 through to the end of 2023, remains stable, with a maximum average of 0.7 mSv in 2021 and a minimum average of 0.35 mSv in 2019.

Table 19 shows the total effective dose broken down into urine analysis dose, lung count dose and external whole-body dose for 2023.

Table 19

Dose Components & Total Effective Dose 2023												
Dosimetry Group	**Urine Analysis Dose (mSv)**			**Lung Counting Dose[1] (mSv)**			**External Whole-Body Dose (mSv)**			**Total Effective Dose (mSv)**		
	Avg	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**
UF_6 Plant	0.10	0.00	0.49	1.18	0.02	1.51	1.22	0.00	6.14	2.49	0.00	7.80
UO_2 Plant	0.05	0.00	0.21	0.25	0.00	0.73	0.48	0.00	1.26	0.76	0.00	1.60
Maintenance	0.09	0.00	0.53	0.77	0.00	1.29	0.60	0.00	3.77	1.46	0.00	5.19
Technical Support	0.01	0.00	0.30	0.20	0.00	8.76	0.07	0.00	2.40	0.28	0.00	9.02
Administration	0.00	0.00	0.10	0.00	0.00	0.04	0.02	0.00	0.09	0.02	0.00	0.12
PHCF Average	**0.03**	**0.00**	**0.53**	**0.32**	**0.00**	**8.76**	**0.22**	**0.00**	**6.14**	**0.55**	**0.00**	**9.02**
[1]Based on estimated individual lung doses												

Doses assigned by the urine analysis program continue to be minimal. All but one calculated lung dose was assigned using a group average method. As with the previous year's data, the group averages for external whole-body dose are low compared to maximally exposed individuals. This indicates that workplace controls are adequately controlling exposure for the group as a whole but the actions of specific employees are causing those individuals to receive unnecessary dose.

As indicated in Table 20, the individuals with the highest effective doses at the PHCF include operators in the UF_6 plant and a contractor.

Table 20

2023 Five Highest Effective Dose Individuals				
Occupation	**Urine Dose (mSv)**	**Lung Dose (mSv)**	**External Whole-Body Dose (mSv)**	**Effective Dose (mSv)**
Contractor (NEW)	0.23	8.8	0.0	9.0
UF_6 Operator	0.23	1.4	6.1	7.8
UF_6 Operator	0.24	1.5	5.9	7.6
UF_6 Operator	0.22	1.4	5.9	7.6
UF_6 Operator	0.24	1.5	4.7	6.4

Collective dose for each dose component with all assigned doses is provided in Table 21 for 2020 through 2023.

Table 21

Collective Dose (2020 – 2023)				
Year	**Whole Body (mSv)**	**Skin (mSv)**	**Internal Dose (mSv)**	**Effective Dose (mSv)**
2020	140.4	502.6	331.0	471.4
2021	183.7	613.0	465.0	648.7
2022	150.1	543.7	407.1	557.2
2023	254.5	794.3	392.3	646.8

Contamination Control

PHCF is divided into three zones for contamination control purposes. Zone 1 areas (clean areas - no radioactive sources other than monitoring equipment) are clearly delineated. Whole body monitors are located at the Zone 1 boundary in the main lobby and at the Gate 12 vehicle port. In Zone 2 areas (transition areas – may contain limited amounts of uranium compounds), no visible contamination should exist and, when detected, loose contamination is promptly isolated, monitored, cleaned, and monitored again to ensure the contamination has been removed. Zone 3 areas are production areas where uranium products are expected. Zone 1 and 2 areas are monitored on a weekly schedule (lunchrooms and change houses) and rotating monthly schedule (offices) so that each office area is monitored at least once annually. Additional monitoring is done on an as-needed basis (i.e., during an investigation, when requested or where contamination is suspected). The contamination readings above the internal administration level posed no significant risk to people or to the environment.

Table 22

Summary of PHCF Internal Administration Levels and Events in 2023				
Area	Levels (Bq/cm^2)		Contamination Events	
	Alpha	Beta/Gamma	Number of Samples above Levels	Number of Samples Taken
Zone 1	0.4	0.4	0	4,359
Zone 2	0.4	3.7	197	52,335

Contamination in Zone 2 was primarily detected in close proximity to production areas. Identified contamination is flagged and promptly cleaned up. Contaminated items that were unable to be cleaned were disposed of.

Vehicle contamination check verification forms are used to record contamination checks on vehicles leaving the site. Tires, seats, floors, and pedals are checked for contamination. If necessary, vehicles are directed to the site truck wash booth to be decontaminated prior to leaving the site.

In-plant Air

The in-plant air monitoring program covers 99 permanent monitoring stations across PHCF. Portable stations are also used on an as required basis.

Monthly averages of the airborne uranium activity concentration for each plant/area are reported as a fraction of the administrative level (AL) or derived air concentration (DAC). The DAC is based on the solubility class and particle size of uranium compounds found in the various plants.

Table 23 shows the average annual derived air concentration per work area for the 2019 through 2023 period.

It is important to note that in addition to the two plants having very different processes, there are several reasons for the differences in the total number of 1 DAC exceedances in the UF_6 and the UO_2 plants. The UF_6 plant is a larger building (10 floors versus 4 floors) which requires more fixed air monitoring locations (55 versus 25) than the UO_2 plant, and the UF_6 plant operates continually, while the UO_2 plant operates 5 days a week, with samples collected daily during production. This results in a total number of data points for DAC in the UF_6 plant being approximately three times the number of data points in the UO_2 plant.

The DAC is based on the solubility class and particle size of uranium compounds found in the operating plants. The latest studies summarized in the "Internal Dosimetry Program – Technical Basis Document", show the average DAC values of 340 µgU/m^3 and 100 µgU/m^3 for the UF_6 and UO_2 plants, respectively. PHCF is taking a conservative approach by using the 100 µgU/m^3 as the DAC value across the site which means that for the UF_6 plant, PHCF is being more conservative than is required by the Technical Basis Document.

Table 23

Airborne Activity Concentration								
Year	Annual Average (DAC) and Number of Samples >DAC							
	UF_6		UO_2		Waste Recovery		CUP	
	Average	>DAC[1]	Average	>DAC[1]	Average	>DAC[1]	Average	>DAC[1]
2019	0.09	196	0.02	1	0.02	1	0.01	0
2020	0.09	253	0.03	2	0.02	0	0.02	2
2021	0.09	231	0.03	3	0.01	0	0.01	0
2022	0.08	120	0.02	1	0.02	0	0.01	0
2023	0.12	361	0.03	0	0.02	0	0.02	0
[1]Number of air samples greater than 1 DAC								

Gamma Surveys

Plant gamma surveys using hand-held meters are done on a routine basis throughout the site. The frequency of the readings and the number of readings taken in each area varies based on the area and the historical results from that area. Table 24 summarizes the results taken in each area in 2023.

The general processes and operations at the PHCF are well defined and stable, and the external gamma radiation levels were fairly constant in 2023. Gamma readings in the

flame reactor areas and the drop line filter areas are highly variable and strongly dependent on the operational conditions of the UF_6 plant.

Areas with elevated gamma dose rates (i.e., flame reactors) require additional controls such as wearing direct reading dosimeters (DRDs) for routine work or radiation work permits for non-routine and project work to ensure worker's exposures are kept as low as reasonably achievable (ALARA).

Table 24

Summary of Plant Gamma Readings by Area (µSv/h)				
Building Number	**Location**	**Average**	**Minimum**	**Maximum**
2	1st Floor	1.01	0.48	1.66
	2nd Floor	0.74	0.45	1.11
	3rd Floor	0.52	0.17	0.90
5B	1st Floor	0.08	0.02	0.13
5C	1st Floor	0.18	0.08	0.38
7	1st Floor	0.68	0.38	0.94
12	1st Floor	7.83	0.63	19.2
24	1st Floor	3.87	0.68	9.69
	2nd Floor	1.53	0.13	3.83
	3rd Floor	0.78	028	1.49
	4th Floor	2.57	0.56	6.79
50	1st Floor Flame Reactor Area	109.5	48.1	183
	1st Floor Tote Bin Area	3.56	3.28	3.83
	1st Floor Cylinder Filling Area	24.7	0.39	49.0
	1st Floor Effluent Area	32.15	4.00	60.3
	2nd Floor Tower	2.64	0.12	4.72
	2nd Floor Flame Reactor Area	81.8	22.1	152
	3rd Floor Tower	5.77	1.73	12.1
	3rd Floor Flame Reactor Area	34.1	11.0	47.1
	3rd Floor Cold Trap Area	0.29	0.29	0.29
	4th Floor Tower	3.61	2.73	4.70
	4th Floor Flame Reactor Area	7.14	5.04	8.69
	5th Floor Tower	3.73	2.54	6.62
	5th Floor Flame Reactor Area	4.64	2.61	6.57
	6th Floor Tower	3.20	0.22	6.83
	7th Floor Tower	3.60	0.37	8.57
	8th Floor Tower	2.31	0.93	3.86
	9th Floor Tower	1.11	0.24	2.00

2.3.2 Conventional Health and Safety

This safety and control area covers the implementation of a program to manage conventional workplace health and safety hazards and to protect personnel and equipment.

The health and safety management program fosters and promotes a strong sustainable safety culture. Under the Operational Excellence initiative, we strive for a safe, healthy, and rewarding workplace. Cameco has five key principles in safety that form the framework of how safety is managed. These are:

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

Occupational health and safety (OH&S) efforts at PHCF are supported by one joint committee, the Conversion Safety Steering Committee (CSSC). The CSSC, created in 2013, incorporates the previously existing Policy Health and Safety Committee (PHSC) and Workplace Health and Safety Committee (WHSC) into one committee. Time is allotted, actions are reviewed, issues discussed, and minutes are maintained separately to address interests of both the WHSC and PHSC.

The CSSC reviews and discusses matters involving OH&S policies, procedures and programs, safety performance, safety program performance, internal responsibility system, safety related projects, and joint union/management OH&S issues that may arise from time to time. The CSSC meets 2 days per month to improve safety performance on site and creating a sustainable safety culture. Each employee representative of the CSSC dedicates an additional day a month for safety dedicated duties.

The Canada Labour Code requirement is nine meetings per year. The CSSC is active in promoting continuous safety improvement and is effectively meeting the expectations of its mandate. In 2023, the CSSC met for 10 regulatory meetings and 9 regular meetings. There was a total of 10 inspections completed which covered all areas of the site.

The health and safety of workers at PHCF is assured through site-specific safety and health management programs. These programs set 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

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

The PHCF site program undergoes several review processes, including scheduled procedure reviews, program audits, and annual management review. Conformance to the program is also tested through various inspection programs, incident investigations, and ongoing analysis by the CSSC. (Refer to the Management Systems section of this report for further details).

The effectiveness of the conventional OH&S system can be evaluated by the responsiveness of the site to leading safety activities such as audits, inspections, evaluations, reviews, benchmarking, training and employee participation and engagement. The PHCF was successful in meeting the expectations of these various initiatives.

Audits and inspections are conducted at PHCF to ensure regulatory compliance and compliance to Cameco's policies and procedures. Audit and inspection results are discussed with the managers responsible for the areas inspected and entered CIRS for resolution or management.

The PHCF has tracked leading and lagging safety indicators for many years. These consist of, but are not limited to, tracking safety meeting attendance, tracking the percentage of safety inspections completed and safety performance. This data is reviewed by site and divisional management in effort to improve the overall safety performance at the facility.

The PHCF follows a systematic evaluation method for its safety culture self-assessments which are generally completed every five years. The most recent self-assessment was completed in 2021. Cameco uses these assessments to shape the safety program improvements at each site.

Table 25 compares the safety statistics for the PHCF over the past five years. The number of first aid injuries, medical diagnostic procedures, medical treatment injuries, lost time injuries, lost time frequency and lost time injury severity were consistent with previous years and exhibited variation year over year. Reviews of the safety incidents have been evaluated several different ways and preceding annual objectives are designed to combat and reduce risk and injury in these areas.

There were no lost time injuries recorded in 2023. Site Total Recordable Injury Rate (TRIR) increased from 1.32 in 2022 to 3.31 in 2023.

Table 25

2019 – 2023 Safety Statistics					
Year / Parameter	**2019**	**2020**	**2021**	**2022**	**2023**
First Aid Injuries	70	41	34	46	49
Medical Diagnostic Procedures	9	3	2	7	18
Medical Treatment Injuries	11	8	2	4	13
Other – Recordable	0	1	0	0	1
Lost Time Injuries	0	0	0	0	0
Lost Time Injury Frequency	0.00	0.00	0.00	0.00	0.00
Lost Time Injury Severity	0.00	0.00	0.00	0.00	0.00
Site TRIR	2.46	2.21	0.52	1.32	3.31

All reported Occupational Health and Safety incidents are registered in CIRS for tracking and management. Incidents captured by the Canada Labour Code (Part II) definition of hazardous occurrences fall under categories III-V of the CIRS system.

The medical diagnostic procedures were:

- Standard threshold shift (hearing) (18 events)

The medical treatment/other injuries were:

- Strain to right wrist
- Pain to right arm/shoulder
- Foreign body to right eye
- Strain to right arm/shoulder
- Twisted left ankle
- Pain to right ankle
- Tingling in right wrist/fingers
- Steam burn to abdomen
- Twisted left knee
- Strain to back
- Contusion right knee
- Rolled right ankle
- Pain to left shoulder/arm
- Irritation to left eye

A critical component of injury prevention continues to be the tracking of near miss reporting. In 2023, there were 118 near misses reported and tracked through CIRS.

The site OH&S program continued to be effective in 2023 with new initiatives being introduced when possible.

- CSSC meetings were performed to meet the required regulatory requirements of a minimum of 9 per year.
- Safety announcements continued to be utilized on internal TV monitors. This included regulatory changes and highlighting safety procedure edits.
- A "Caught Working Safely" activity was executed. Employees were able to recognize each other for safe working activities and enter to win a variety of prizes.
- The CSSC continued the partnership with site management resulting in sponsorship of safety awareness activities and the CSSC actively leading or participating in at least one event in each fiscal quarter.
- A vendor show was held in the fourth quarter. Employees were able to meet with a variety of vendors related to PPE, tools/equipment, and health related services.
- Site recorded 130 Safety Wins (employee lead actions implemented to improve safety, prior to and not because of an injury or incident).
- The site Total Recordable Incident Rate was finalized at 3.31.
- The site reached 4,690,577 hours worked (5 years) without a Lost Time Injury in September.
- Continued deployment of the site industrial hygiene program including PAPR training program, area and personal noise dosimetry sampling, respirator program training revisions, fluorine study, welding safety plan developed and asbestos remediation activites.
- Continued management of personal fluorine monitors and relevant troubleshooting.
- Completed internal Safety, Health, Environment and Quality self-assessments.
- Increased digital and electronic management of safety forms and processes.

2.3.3 Environmental Protection

This safety and control area covers the 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. The PHCF's environmental monitoring program is comprised of the following components:

- water and air emissions
- gamma levels
- groundwater
- soil and vegetation

The program ensures that applicable provincial and federal requirements are met.

The key characteristics of the operation and activities that can have a significant environmental impact are monitored and measured and are described in the EMP and associated procedures. These documents identify all 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.

The performance of the Environmental Protection Program is tracked using KPIs. The KPIs for this program include but are not limited to risk control, training and awareness, objectives and targets, operational controls, certification, and monitoring.

Audits and inspections were performed in accordance with licence conditions. Refer to the Management Systems section of this report for further details.

Cameco has established action levels, which have been accepted by the CNSC, for key environmental parameters. An exceedance of an action level does not pose a risk to people or the environment.

Though the environmental programs have been demonstrated to be effective, the PHCF advanced several improvements to the environmental protection program in 2023.

Program Improvements included:

- Waste management projects implemented portions of the long-term waste management plan to dispose of contaminated materials at appropriately licensed hazardous waste facilities.

Procedural updates included:

- CAP ENV 17 Groundwater Monitoring Program for the Port Hope Conversion Facility
- PHF-PLAN-SPC Spill Prevention and Contingency Plan for the PHCF
- PHF-PLAN-EE1 Environmental Emergency Plan for the PHCF

The following environmental targets were in place for 2023:

- For all water discharged from an approved discharge point, maintain performance within regulatory limits and action levels. (This target was not met due to the sanitary sewer action level exceedances in 2023.)
- Satisfy historical benchmarks for groundwater recovery. (Target met)

The environmental initiatives planned for 2024 include the following:

- Continue improvements to the PHCF sanitary sewer system.
- Continue to implement portions of the FSD waste management plan.
- Continue implementation of Vision in Motion to remove legacy wastes and contamination from the site.

Dose to Public

The Operating Release Level (ORL) is based on the releases of uranium and external gamma radiation to the environment that ensures the dose to the public from the PHCF is below 0.3 mSv/year with the air and water components each being less than 0.05 mSv/year and gamma component being less than 0.3 mSv/year to ensure the dose to the public remains well below the annual regulatory dose limit for a member of the public of 1.0 mSv.

An ORL equation has been developed to account for all public dose exposure pathways – gamma, air, and water. In accordance with the requirements of the CNSC, the ORL for the PHCF was updated in 2016 and subsequently accepted by the CNSC. The 2016 report resulted in changes to dose calculations related to releases to water and the fenceline gamma locations used for reporting the dose to the public. These changes included calculating dose to the public from facility discharges to the sanitary sewer, as well as including a fenceline monitoring location closer to the operating facility than previously used in the dose to the public calculations and calculating two doses to a member of the public, one for a resident near Site 1 and the other for a resident near Site 2. Changes to the ORL are incorporated into PHCF reporting effective the first quarter of 2017 and represent a more conservative estimate of dose to the public that can be used throughout the Vision in Motion project.

ORL equations for Site 1 and Site 2 have been derived and are expressed in the form shown below.

Public Dose = Dose $_{Air}$ + Dose $_{Water}$ + Dose $_{Gamma}$ < 0.3 mSv/y

The annual dose from Site 1 and Site 2 are based on monitoring results for each dose component as shown in Table 26. This table illustrates the individual contributions from air, water, and gamma as well as the total public dose from each site.

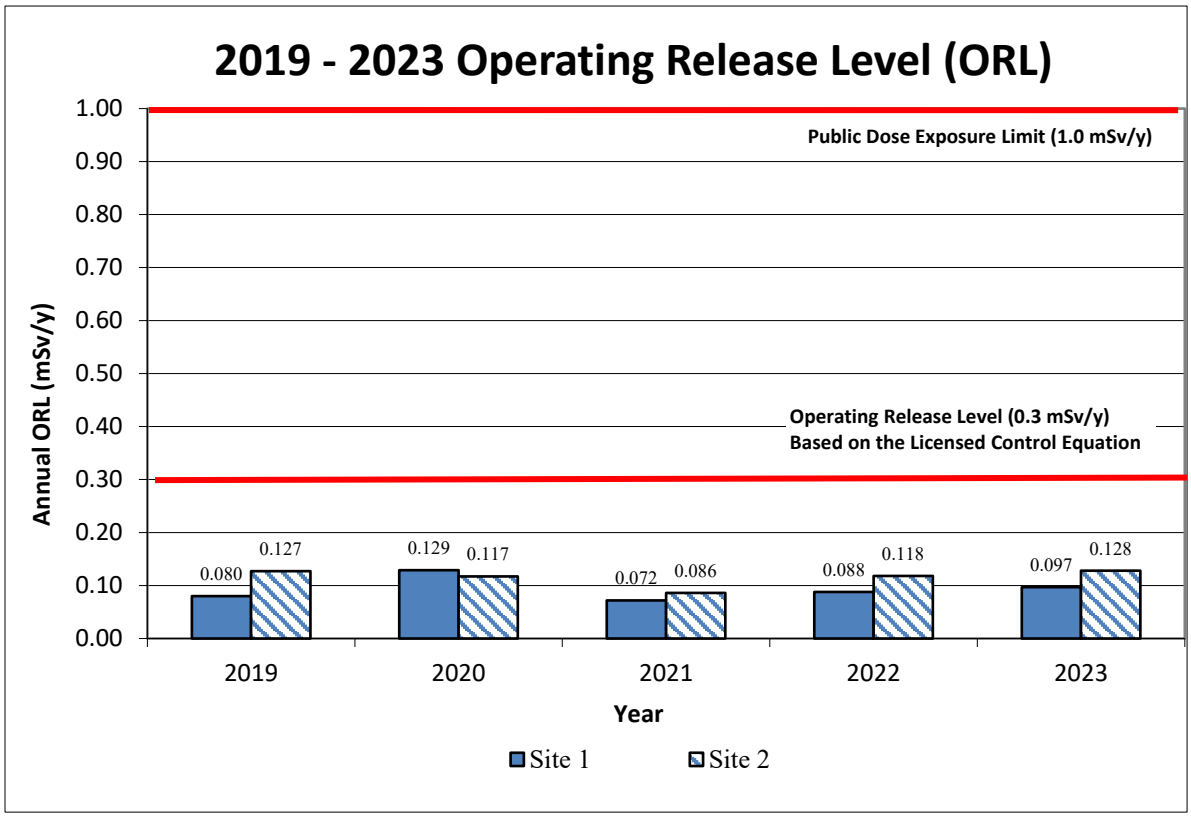
Note that as of July 1, 2019, TLD 13 has been replaced by TLD 10 in the gamma dose calculation for Site 1 due to the removal of the Centre Pier from the licensed property.

The ORL contributions are also shown graphically in Figure 15.

Table 26

Annual Dose (mSv/year)					
ORL Component	**2019**	**2020**	**2021**	**2022**	**2023**
Air	0.001	0.001	0.001	0.001	0.001
Water	0.001	0.001	0.001	0.001	0.001
Gamma – Site 1	0.078	0.128	0.071	0.087	0.095
Gamma – Site 2	0.125	0.115	0.085	0.116	0.126
Annual Dose – Site 1	0.080	0.129	0.072	0.088	0.097
Annual Dose – Site 2	0.127	0.117	0.086	0.118	0.128

Figure 15



Gamma Monitoring

To ensure that doses to local residents/critical receptors are ALARA and do not exceed the annual public dose limit of 1 mSv as defined in the *Radiation Protection Regulations*, environmental OSL dosimeters are strategically placed (at chest height) around the exterior perimeter of the licensed facility. The OSL dosimeters are deployed on a monthly basis. Gamma dose is measured in mSv which is then converted into a dose rate in µSv/h. Fourteen locations at Site 1 and six locations at Site 2 have been selected around the fenced perimeter to cover all potential receptors in the public. Note that the number of locations at Site 1 decreased at the end of the second quarter 2019 from 18 to 14, with the removal of Centre Pier from the Site 1 property.

As per the 2016 ORL, dose to the public critical receptor is calculated for both sites 1 and 2 using specific gamma fenceline monitoring locations. The results at stations 2 and 10 are used for Site 1 public dose calculations after July 1, 2019. The results at stations 2 and 21 are used for Site 2 public dose calculations. The results at these locations for this year are summarized and compared with regulatory action levels in Tables 27 and 28.

Table 27

2023 Monthly Public Dose Gamma Monitoring Results (µSv/h)			
Month	**Station**		
	2	**10**	**21**
January	0.21	0.01	0.06
February	0.15	0.03	0.05
March	0.17	0.03	0.03
April	0.19	0.03	0.02
May	0.23	0.03	0.05
June	0.22	0.01	0.04
July	0.20	0.00	0.06
August	0.17	0.00	0.04
September	0.14	0.00	0.02
October	0.15	0.00	0.00
November	0.17	0.02	0.02
December	0.09	0.02	0.00
Action Level (µSv/h)	**0.40**	**0.40**	**0.25**
Licence Limit (µSv/h)	**0.57**	**0.61**	**0.26**

Table 28

Maximum Monthly Public Dose Gamma Monitoring Results							
Station Number	**2019**	**2020**	**2021**	**2022**	**2023**	**Action Level (µSv/h)**	**Licence Limit (µSv/h)**
2	0.20	0.20	0.21	0.23	0.23	0.40	0.57
13*/10	0.00*/0.05	0.11	0.02	0.01	0.03	0.10*/0.40	0.40*/0.61
21	0.06	0.09	0.03	0.06	0.06	0.25	0.26
*Denotes values for station number 13							

Some fluctuations in the gamma results are expected for stations 13 and 21 given that the values are near background levels of 0.08 µSv/h. Historical waste material stored at Centre Pier buildings was removed in 2018 (station 13). Some of the material was used as shielding inside building 40. Temporary shielding in the form of sea containers was installed to minimize the impact on fence line gamma while activities were carried out in building 40. Buildings 40, 41 and 42 were demolished and Center Pier was handed over

to CNL in July 2019. Waste inspection/characterization and removal activities were carried out at Site 2, Dorset Street property, with no significant impact to public dose.

Discharge to Air

The air quality monitoring program at PHCF is divided into source air monitoring and ambient air monitoring. The source air monitoring program collects and analyzes daily samples from the main stacks on the UF_6 and UO_2 operating plants. Both stacks are continuously sampled for uranium.

The total uranium emissions to air from PHCF in 2023 were approximately 46.6 kg U. These uranium loadings include both the UF_6 and UO_2 main stacks, plant building ventilation and facility point sources. Table 29 illustrates PHCF uranium loading to air for the period of 2019 to 2023. The PHCF uranium loading to air was slightly increased compared to previous years based on production days and volumes.

Table 29

Total Uranium Emissions (kg U)					
Emission	**2019**	**2020**	**2021**	**2022**	**2023**
Air	48.5	44.4	39.0	42.7	46.6

A stack monitoring program is used to determine the airborne uranium emission rates on a daily basis from the main stacks of the UF_6 and UO_2 plants. The licensed action level for the UF_6 plant main stack is 40 g U/h. The licensed action level for the UO_2 plant main stack is 10 g U/h.

No licensed action levels were exceeded for uranium emissions from the UF_6 plant main stack in 2023. The annual daily average uranium emissions in 2023 remained comparable to the previous year based on production days and volumes.

No licensed action levels were exceeded for uranium emissions from the UO_2 plant main stack in 2023. The annual daily average uranium emissions in 2023 remained comparable to the previous year based on production days and volumes.

Fluoride emissions from the UF_6 main stack are sampled and analyzed on a continuous basis using an on-line analyzer and the data is collected on the plant computer system. No licensed action levels were exceeded for fluoride emissions from the UF_6 plant in 2023. The annual daily average HF emissions in 2023 remained comparable to the previous year based on production days and volumes. The total fluoride emissions to air (as HF)

from the PHCF in 2023 were approximately 481 kg HF. These fluoride loadings include the UF_6 main stack, UF_6 plant building ventilation and facility point sources.

The UO_2 main stack is also continuously sampled for ammonia to determine the ammonia emission rate from the UO_2 plant main stack.

All other stacks are sampled on an occasional or as requested basis. Source emission action levels and maximum limits are indicated in the appropriate tables and figures throughout this report.

The 2023 annual average and maximum stack emissions from the UF_6 plant main stack and the UO_2 main stack are presented in Table 30 and Figure 17 through to Figure 20.

Table 30

2019 - 2023 Main Stack Emissions									
Plant	**Parameter**	**Licence Limit**	**Action Level**	**Value**	**2019**	**2020**	**2021**	**2022**	**2023**
UF_6	Uranium g U/h	280	40	Annual Daily Average	2.7	2.5	2.2	2.5	2.4
				Annual Daily Maximum	13.3	8.2	6.7	44.7	10.7
	Hydrogen Fluoride g HF/h	650	230	Annual Daily Average	18	28	29	20	12
				Annual Daily Maximum	266	273	191	236	197
UO_2	Uranium g U/h	240	10	Annual Daily Average	0.8	0.6	0.5	0.5	0.8
				Annual Daily Maximum	2.9	2.5	2.3	1.4	2.9
	Ammonia kg NH_3/h	58	10	Annual Daily Average	2.1	2.0	2.0	2.4	2.0
				Annual Daily Maximum	4.8	4.9	5.1	7.7	4.6

* Note that the daily emission data is available to CNSC during site inspections.

No regulatory action levels were exceeded for ammonia for the UO_2 plant main stack in 2023. The average annual ammonia emissions from the UO_2 plant main stack in 2023 are comparable to levels observed in previous years. The total ammonia emissions to air from

PHCF in 2023 were approximately 33t NH_3. These ammonia loadings include the UO_2 plant main stack, the UO_2 plant point sources and facility point sources.

Figure 17

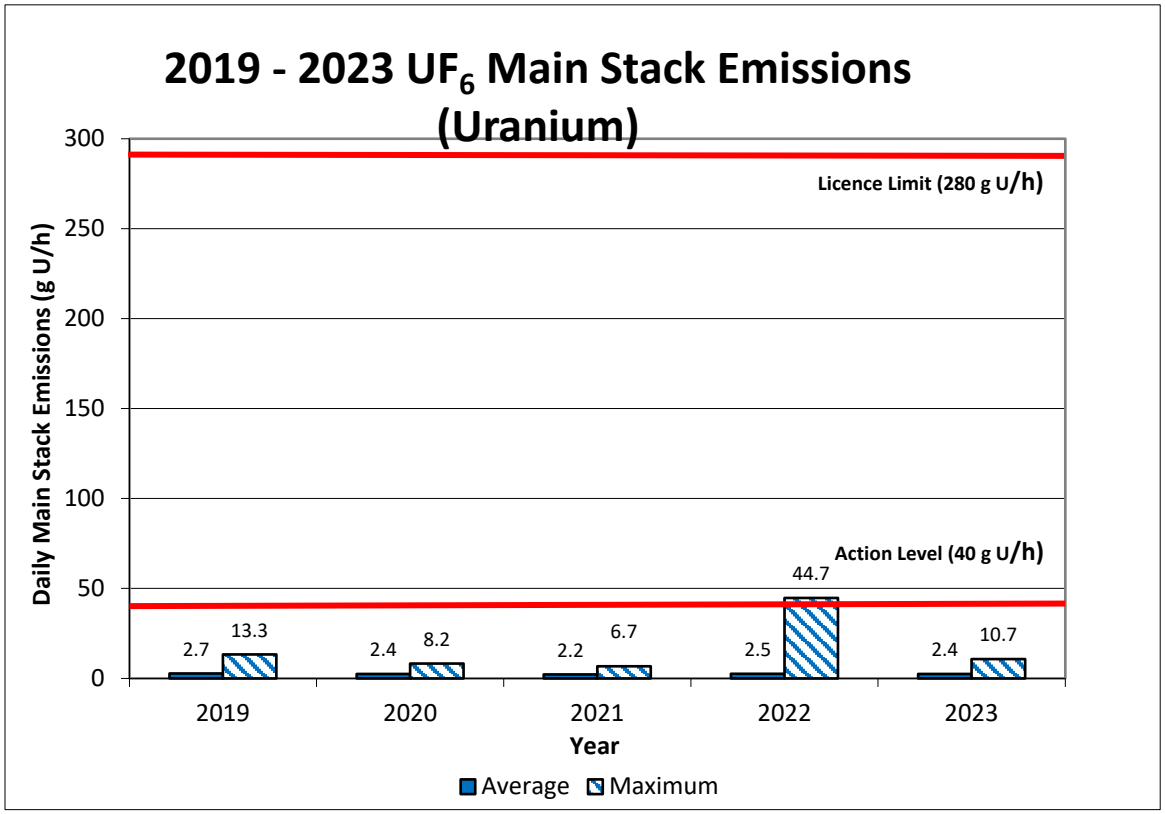


Figure 18

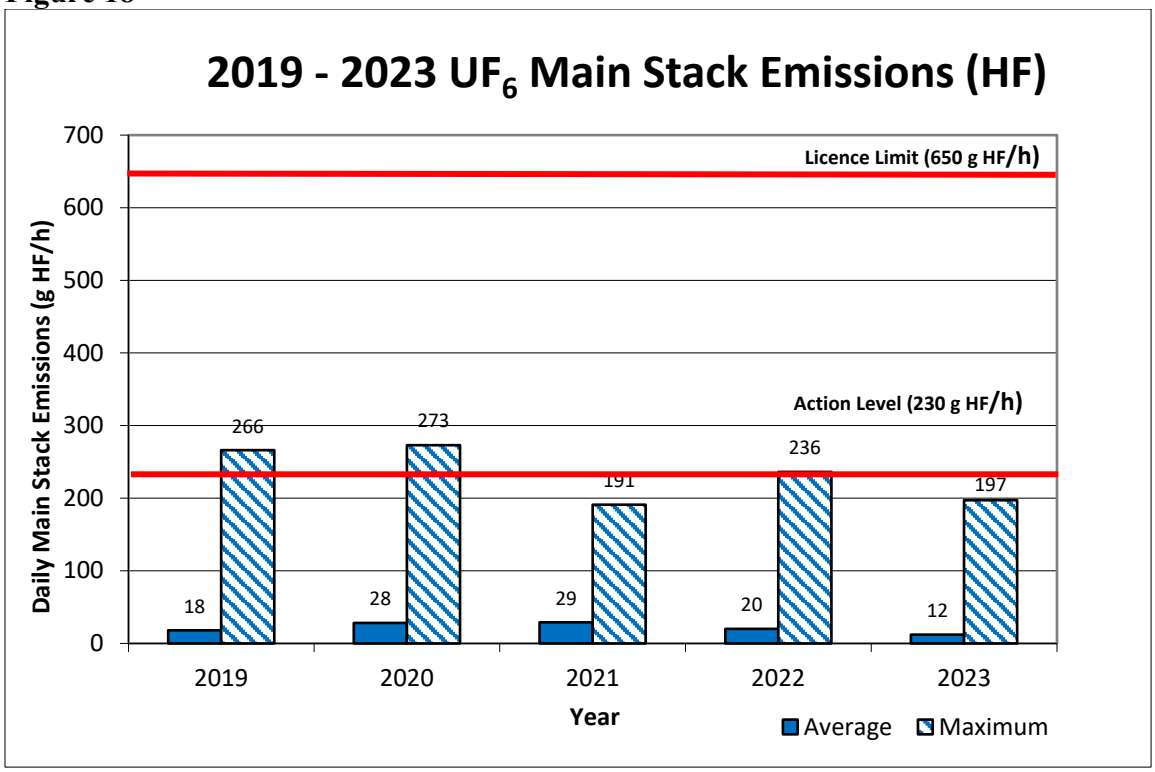


Figure 19

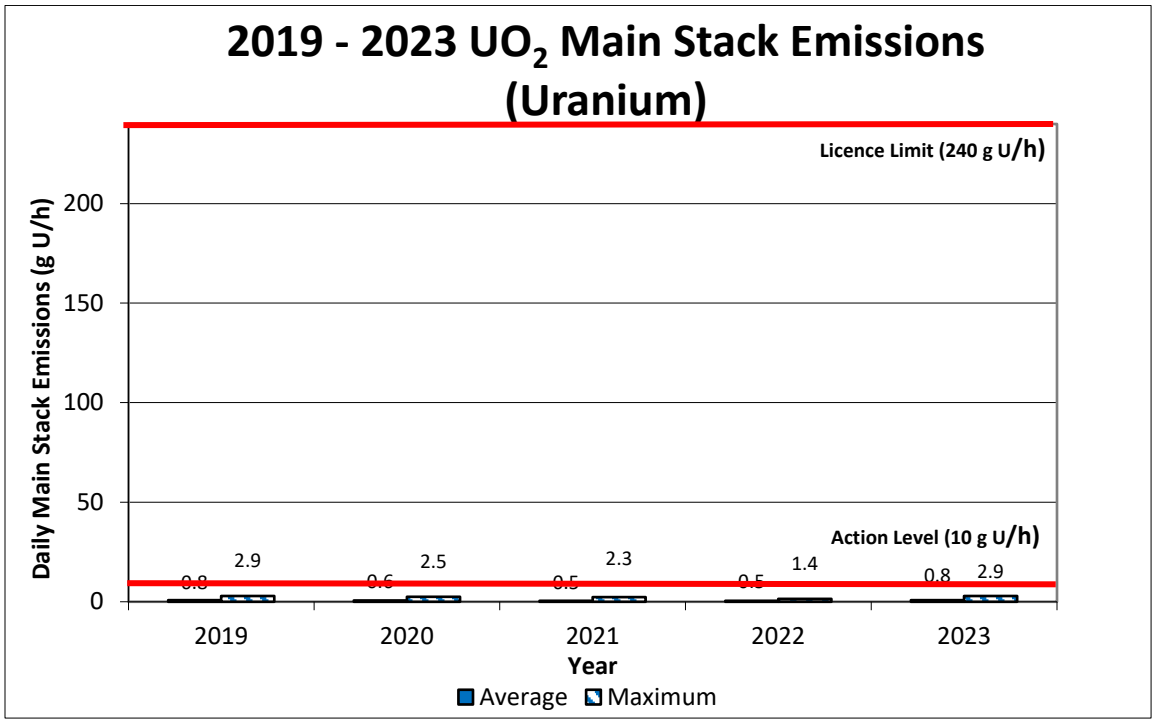
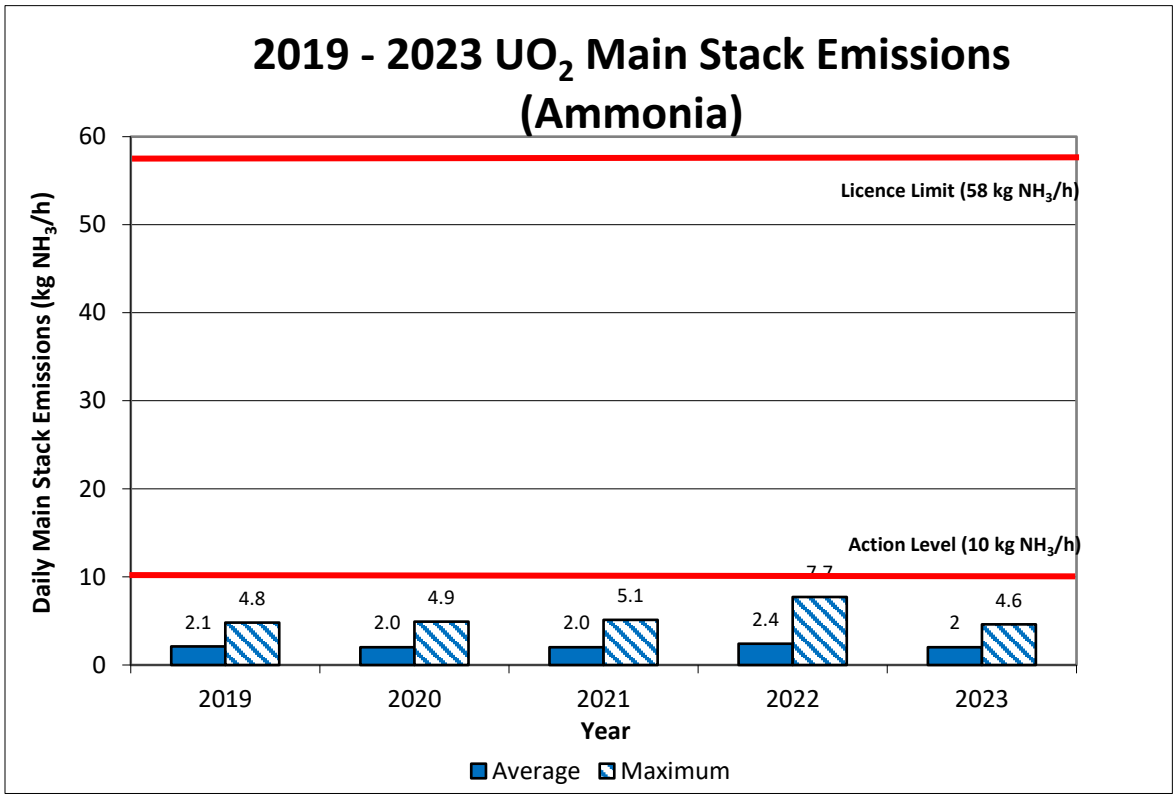


Figure 20

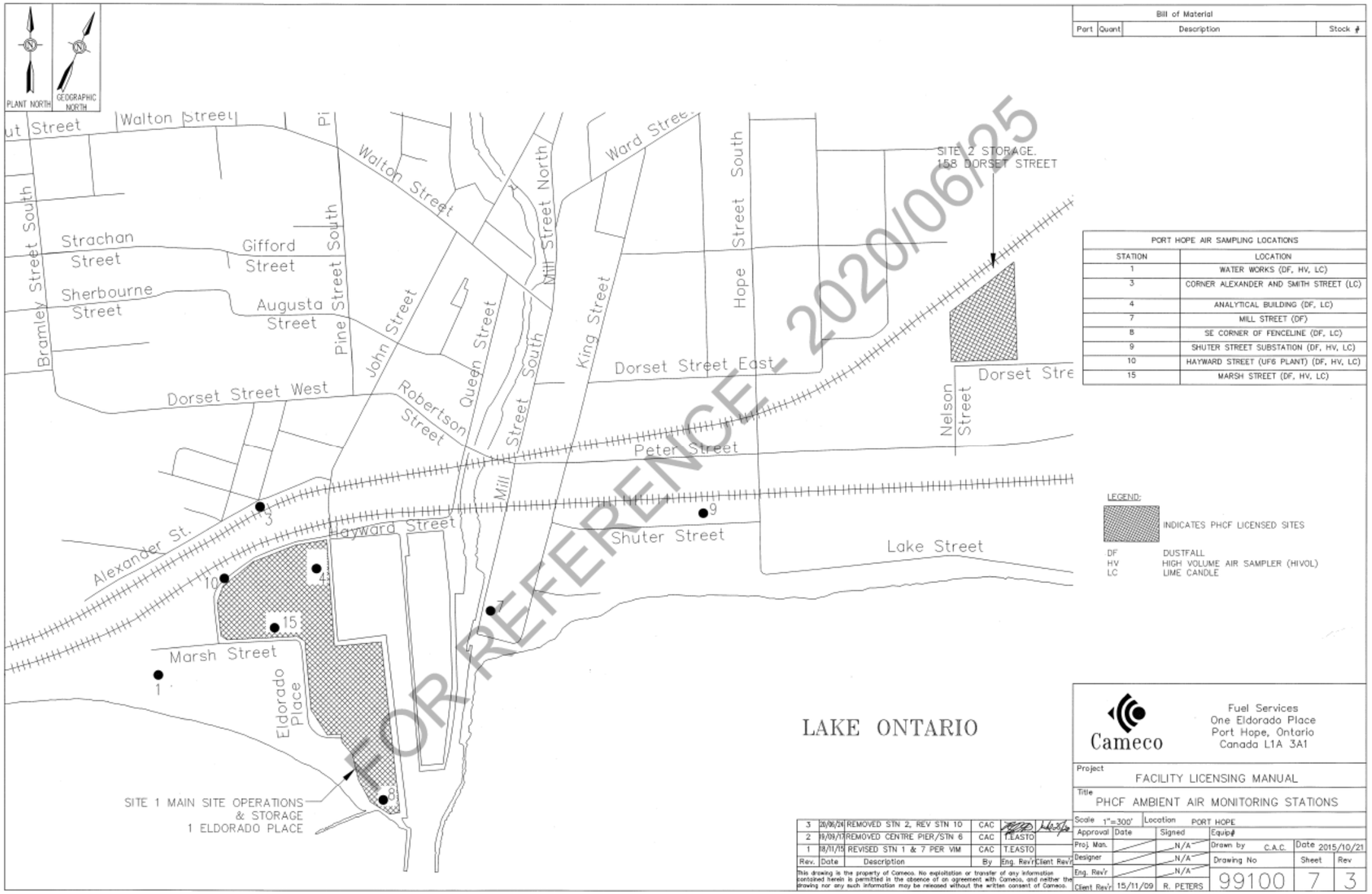


Ambient Air Monitoring

In support of the source sampling program, an ambient air program has been established to measure air quality near the PHCF. Samples from the site and the community are collected and analyzed for a variety of parameters. The facility's fluoride and uranium emissions have the greatest potential environmental impact and therefore are the primary focus of ambient air program.

PHCF ambient air monitoring station locations for dustfalls, lime candles and high-volume air samplers are shown on Figure 21.

Figure 21


PLANT NORTH
GEOGRAPHIC NORTH
Walton Street
Strachan Street
Gifford Street
Sherbourne Street
Augusta Street
Bramley Street South
Pine Street South
John Street
Queen Street
Mill Street North
Mill Street South
King Street
Ward Street
Hope Street South
Dorset Street West
Dorset Street East
Robertson Street
Peter Street
Nelson Street
Alexander St.
Hayward Street
Shuter Street
Lake Street
Marsh Street
Eldorado Place
SITE 2 STORAGE.
158 DORSET STREET
SITE 1 MAIN SITE OPERATIONS
& STORAGE
1 ELDORADO PLACE
LAKE ONTARIO
FOR REFERENCE - 2020/06/25
Bill of Material
Part | Quant | Description | Stock #
PORT HOPE AIR SAMPLING LOCATIONS
STATION | LOCATION
1 | WATER WORKS (DF, HV, LC)
3 | CORNER ALEXANDER AND SMITH STREET (LC)
4 | ANALYTICAL BUILDING (DF, LC)
7 | MILL STREET (DF)
8 | SE CORNER OF FENCELINE (DF, LC)
9 | SHUTER STREET SUBSTATION (DF, HV, LC)
10 | HAYWARD STREET (UF6 PLANT) (DF, HV, LC)
15 | MARSH STREET (DF, HV, LC)
LEGEND:
INDICATES PHCF LICENSED SITES
DF DUSTFALL
HV HIGH VOLUME AIR SAMPLER (HIVOL)
LC LIME CANDLE
3 24/06/24 REMOVED STN 2, REV STN 10 CAC
2 19/09/17 REMOVED CENTRE PIER/STN 6 CAC T.EASTO
1 18/11/15 REVISED STN 1 & 7 PER VIM CAC T.EASTO
Rev. | Date | Description | By | Eng. Rev'r | Client Rev'r
This drawing is the property of Cameco. No exploitation or transfer of any information contained herein is permitted in the absence of an agreement with Cameco, and neither the drawing nor any such information may be released without the written consent of Cameco.
Cameco
Fuel Services
One Eldorado Place
Port Hope, Ontario
Canada L1A 3A1
Project
FACILITY LICENSING MANUAL
Title
PHCF AMBIENT AIR MONITORING STATIONS
Scale 1"=300' Location PORT HOPE
Approval | Date | Signed | Equip#
Proj. Man. N/A
Designer N/A
Eng. Rev'r N/A
Client Rev'r 15/11/09 R. PETERS
Drawn by C.A.C. Date 2015/10/21
Drawing No 99100 Sheet 7 Rev 3

Cameco monitors ambient uranium concentrations in the field using dustfall jars, high volume air samplers and soil samples. The results for these programs are provided below.

Dustfall monitoring is a measurement of deposition rate and is obtained by collecting particulate matter in a container, termed a dustfall jar. The particulate matter is collected over a one-month period and analyzed to determine the uranium deposition rate. There is no regulated standard for uranium content in dustfall. Cameco has established an internal administrative screening level of 10 mg U/m^2/30 days that would be indicative of abnormal conditions.

No uranium dustfall results exceeded the internal administrative screening level in 2023. The facility uranium in dustfall results averaged less than 0.2 mg U/m^2/30 days in 2023, which slightly above levels detected in previous years. It should be noted that dustfall uranium results observed from 2019 to 2022 are near method detection levels.

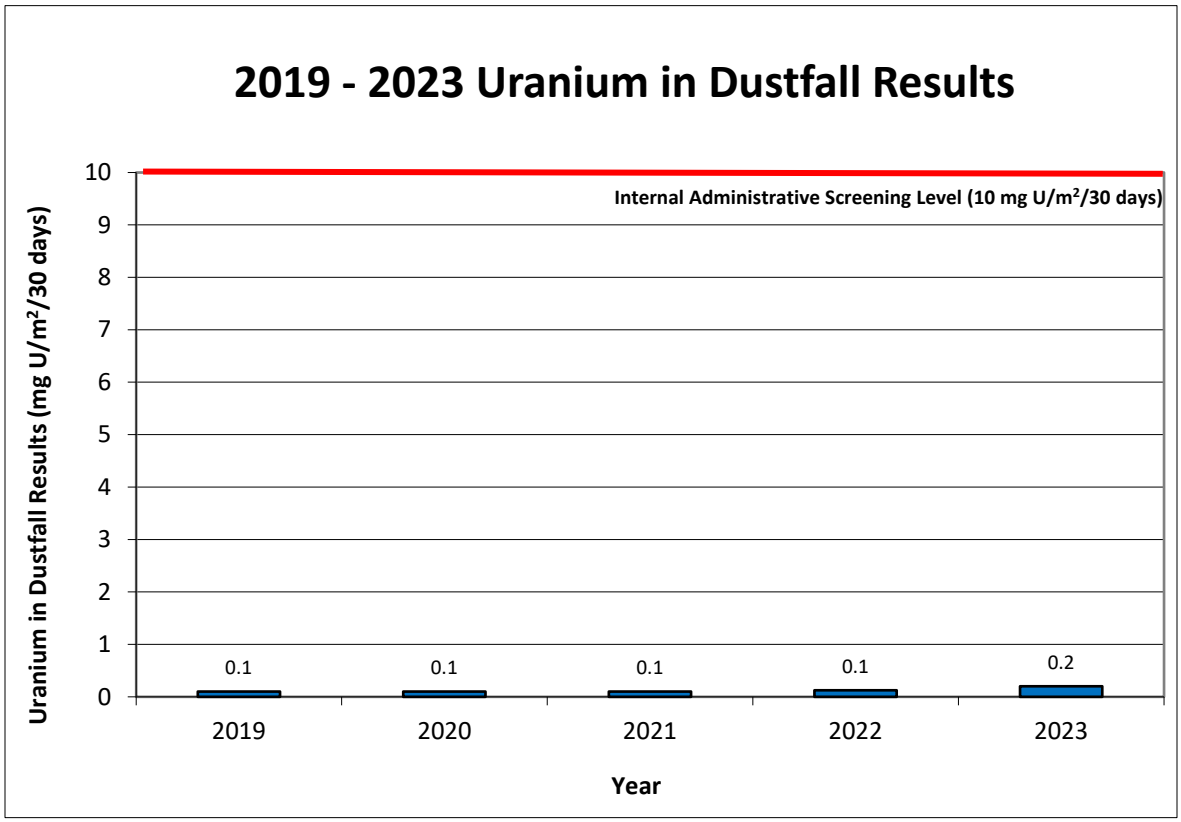
The annual all-station average uranium content in dustfall jars at and near the site in 2019 through 2023 is presented in Table 31.

Table 31

Comparison of Uranium in Dustfall Results (mg U/m^2/30 days)					
Period	**2019**	**2020**	**2021**	**2022**	**2023**
First Quarter	0.1	0.0	0.0	0.0	0.0
Second Quarter	0.1	0.1	0.0	0.1	0.1
Third Quarter	0.1	0.1	0.1	0.2	0.3
Fourth Quarter	0.1	0.1	0.1	0.2	0.3
Average	**0.1**	**0.1**	**< 0.1**	**0.1**	**0.2**
Cameco Internal Administrative Screening Level = 10 mg U/m^2/30 days					

Figure 22 shows the average uranium dustfall results from 2019 through 2023.

Figure 22



The high volume (hi-vol) air-sampling program monitors the concentration of uranium suspended in the air near the facility. There are four monitoring stations located at Marsh Street at the fence line just south of the UF_6 plant, east of the Port Hope Waterworks, Hayward Street and Shuter Street.

Approximately 40 cubic feet per minute of air is passed through and collects on a filter over a 24-hour period. The regulatory criteria for uranium content in ambient air varies by period and particulate size. Cameco uses TSP (total suspended particulates) hivols at the PHCF. The Ambient Air Quality Criteria (AAQC) for U in TSP are 0.3 µg U TSP/m^3 (24 hr) and 0.06 µg U in TSP/m^3 (annual). These U in TSP criteria are compared against the maximum and average PHCF hivol U in TSP results, respectively.

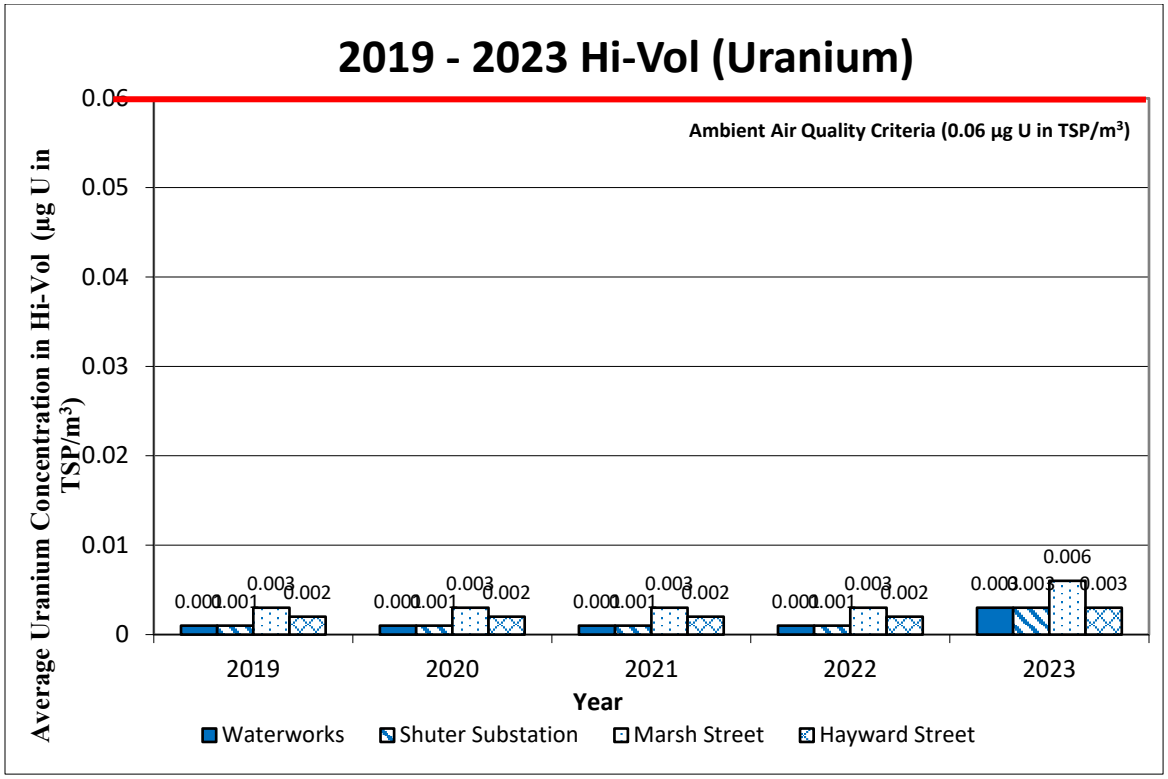
Table 32 shows the average and maximum uranium hi-vol results from 2019 through 2023. Average and maximum results are slightly elevated compared to levels observed in the previous years.

Figure 23 shows the average uranium hi-vol results from 2019 through 2023.

Table 32

2019 – 2023 Annual Uranium-in-Air Concentration at Hi-Vol Stations (µg U in TSP/m^3)					
Year	**Result**	**Waterworks**	**Shuter Substation**	**Marsh Street**	**Hayward Street**
2019	Average	0.001	0.001	0.003	0.002
	Maximum	0.011	0.009	0.016	0.033
2020	Average	0.001	0.001	0.003	0.002
	Maximum	0.007	0.009	0.221	0.010
2021	Average	0.001	0.001	0.003	0.002
	Maximum	0.025	0.011	0.071	0.011
2022	Average	0.001	0.001	0.003	0.002
	Maximum	0.017	0.036	0.031	0.015
2023	Average	0.003	0.003	0.006	0.003
	Maximum	0.381	0.409	0.132	0.066
Average <0.06 µg U in TSP/m^3 (annual) AAQC Maximum <0.3 µg U in TSP/m^3 (24 hr) AAQC					

Figure 23



The concentration of fluoride emissions from Cameco in the ambient environment are monitored in the field using dustfall, lime candle and vegetation sampling. The results from these programs are provided below.

In addition to the uranium analysis discussed above, the fluoride content of the collected dust provides information of fluoride in air near the facility. There is no regulated standard for fluoride content in dustfall. However, Cameco has established an internal administrative screening level of 20 mg F/m^2/30 days that would be indicative of abnormal conditions.

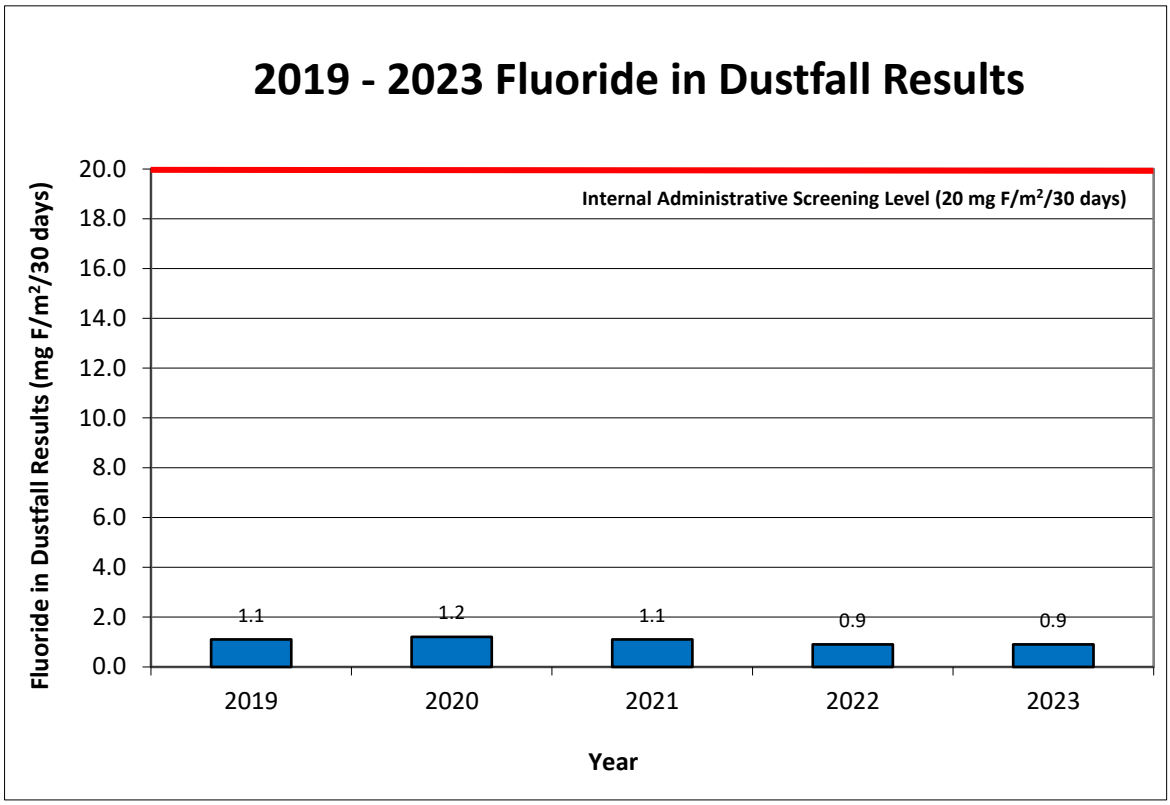
No fluoride dustfall exceeded the internal administrative screening level in 2023. The annual all-station average fluoride content in dustfall jars at and near the PHCF in 2018 through to 2023 is presented in Table 33. The dustfall fluoride levels observed in 2023 are comparable to levels observed in the previous year when production was operational and are within acceptable data range variation.

Table 33

Comparison of Fluoride in Dustfall Results (mg F/m^2/30 days)					
Period	**2019**	**2020**	**2021**	**2022**	**2023**
First Quarter	0.8	1.1	1.3	0.9	0.6
Second Quarter	1.2	1.1	1.2	1.5	1.1
Third Quarter	1.0	1.1	0.6	0.4	0.8
Fourth Quarter	1.4	1.4	1.1	0.8	1.0
Average	**1.1**	**1.2**	**1.1**	**0.9**	**0.9**
Cameco Internal Administrative Screening Level = 20 mg F/m^2/30 days					

Figure 24 shows the average fluoride dustfall results from 2019 through 2023.

Figure 24



Soil Monitoring

The terrestrial sampling program, including soil and vegetation components, is carried out at frequencies specified in the individual procedures to supplement results from the PHCF air emissions monitoring programs and to monitor the long-term effects of facility air emissions, namely uranium and fluoride, in the areas surrounding the PHCF.

The soil monitoring program currently consists of two monitoring locations beyond the facility fence line. One of these locations is within a 0 to 500 m radius zone from the facility, while the remaining location is within the 1000 to 1500 m radius zone. Location 2 is no longer sampled as it has been impacted by the CNL remediation work zone established at the West Beach to the west of the municipal water treatment facility.

Figure 25 illustrates the general placement of soil monitoring locations beyond the PHCF. The 2023 soil sampling program was completed November 30, 2023. The soil sampling approach includes the sampling of 15 cm cores, which the contract laboratory

separates into composite 0-5 cm, 5-10 cm and 10-15 cm core segments for uranium analysis.

The 2019 through 2022 uranium in soil data is provided in Table 34 for the clean plot monitoring location (location 2) that was positioned adjacent to the municipal water treatment plant. Location 2 was not sampled in 2023 as a function of the aforementioned CNL remedial work. Reference is made to Table 35 for 2023 individual sampling location uranium in soil monitoring data.

All individual sampling location values were below the Canadian Council of Ministers of the Environment (CCME) agricultural and residential/parkland land use soil quality guideline of 23 mg/kg (ppm).

Concentrations of uranium in shallow soils at locations 12 and 19 are expected to be influenced by historic fill placements within the community. Small scale variability in shallow soils can be observed and the heterogenous nature of fill materials can influence uranium trending at discrete monitoring locations. At both locations, demolition fill materials have been observed in shallow core samples over time.

Following completion of the Port Hope Area Initiative, Cameco will review and modify soil monitoring locations as appropriate. The siting of revised monitoring locations will consider among other items, CNL clean fill placements.

Figure 25: Soil Monitoring Locations

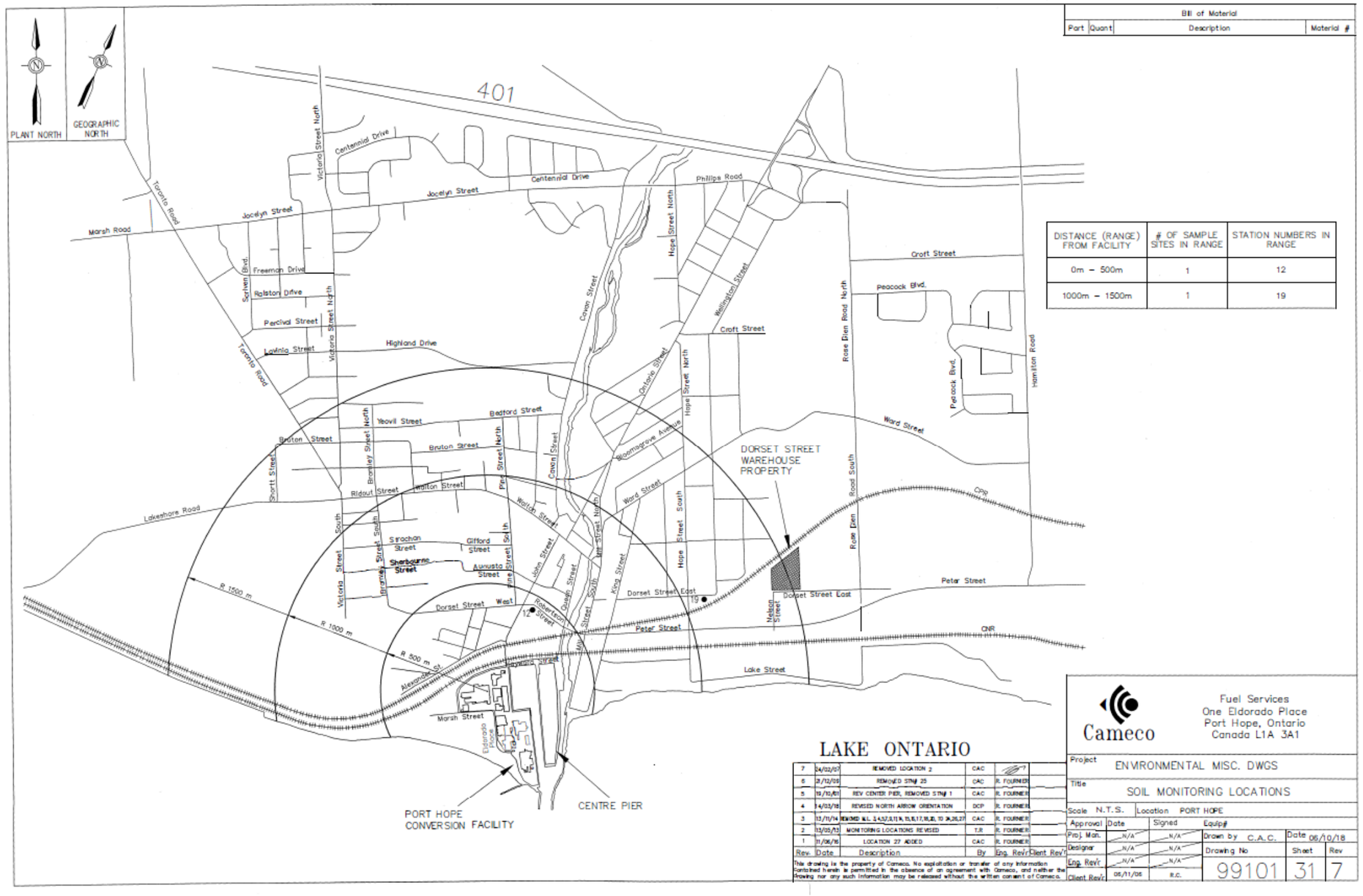


Table 34

Clean Fill Soil Plot (µg/g U)					
Depth (cm)	**2019**	**2020**	**2021**	**2022**	**2023**
0-5 cm depth	0.82	0.91	0.87	1.1	N/A
5-10 cm depth	0.74	0.84	0.80	1.0	N/A
10-15 cm depth	0.80	0.81	0.80	0.92	N/A

Table 35

2023 Soil Data (µg/g U)			
Depth (cm)	**Location 2 (Clean Plot)**	**Location 12**	**Location 19**
0-5 cm depth	N/A	4.9	4.6
5-10 cm depth	N/A	5.9	4.8
10-15 cm depth	N/A	5.6	4.9

Fluorination rate is an indirect measurement of the gaseous fluoride concentration in the ambient air. An established method for measuring the fluoride concentration in ambient air is to expose lime coated filter papers, commonly called lime candles, for a fixed period of time. The fluoride reacts with the lime and the analysis of the lime candles provides a time-averaged fluoride concentration. Lime candles consist of a 10 cm x 10 cm filter paper that is soaked with a saturated calcium oxide (CaO) solution housed in a louvered shelter sampling station with a hinged top.

The lime candles are prepared, deployed, and collected on a specified frequency and are analyzed. The period is normally 30 days; however, shorter terms of weekly periods are also used. These shorter-term results are used to assess impact in a timelier manner, and effect process changes to ensure that the monthly results are in compliance. Monthly and weekly lime candles are operated throughout the year. The MECP Ambient Air Quality Criteria (AAQC) for fluoridation are 40 µg F/100 cm^2/30 days from April 1 to October 31 and 80 µg F/100 cm^2/30 days from November 1 to March 31. These criteria are based on the protection of foraging animals.

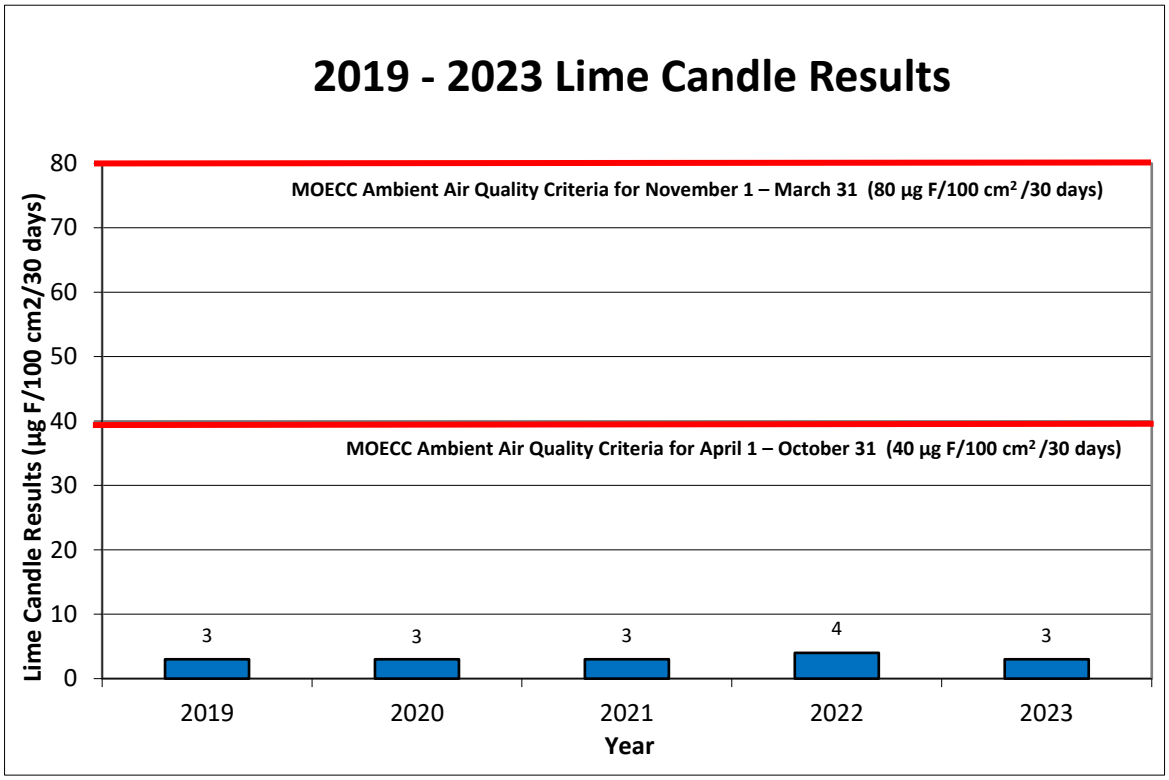
The quarterly average lime candle monitoring results are shown in Table 36 for 2019 through 2023. There were no lime candle results above the MECP AAQC in 2023. The 2023 lime candle annual average is comparable to levels observed in previous years.

Table 36

Comparison of Monthly Lime Candle Results by Quarter (μg F/100 cm^2/30 days)					
Period	**2019**	**2020**	**2021**	**2022**	**2023**
First Quarter	2	3	3	4	3
Second Quarter	4	3	5	4	3
Third Quarter	2	4	3	4	3
Fourth Quarter	3	2	3	2	4
Average	**3**	**3**	**3**	**4**	**3**
The desirable ambient air quality criteria for lime candles are to protect forage crops consumed by livestock. During the summer growing season April 1 to October 31, the criteria is 40 µg F/100 cm^2/30 days, changing to 80 µg F/100 cm^2/30 days in winter November 1 to March 31.					

Figure 26 shows the average lime candle results from 2019 through 2023.

Figure 26



Vegetation Sampling

The focus of the vegetation monitoring program is foliar fluoride concentrations within the Municipality of Port Hope. Although the emissions control systems minimize the discharge of fluorides to the environment, the PHCF is an anthropogenic source of fluoride to the local environment.

Samples of fluoride-sensitive vegetation are collected in August or early September for fluoride analysis and assessed for visible foliar damage. The monitoring program is completed in conjunction with the MECP, and samples are obtained from locations adjacent to PHCF and within the surrounding community. Substitute trees are added to the program where required and available as target tree locations may be inaccessible at the time of sampling or observed to have died off or been removed between sampling events.

The vegetation sampling program was modified in 2017 in coordination with the MECP, including notable changes in the sampling approach as well as number and placement of monitoring locations. Sampling locations were standardized to Manitoba maple locations, clusters of trees were sampled as composite samples versus single location sampling, and locations were redistributed within the community based on Manitoba maple availability and placement. The 2017 program modification included an overall net increase in monitoring locations from 13 to 17 locations.

The sampling program was further modified in 2021 in coordination with the MECP. Locations 38, 39, 40, 41 were removed from the monitoring program. The locations in questions were added to the program in 2017 when the program was last significantly modified. Consistent with MECP feedback, results obtained from these locations were not adding value to the program and the locations were not positioned in primary areas of focus. Cameco contract laboratory results reported between 2018 and 2020 for the locations in question were all reported below the contract laboratory detection limit of 5 µg/g.

Location 32 trees were all replaced in 2021 as the previous cluster was removed in association with area CNL remedial work. Single trees from monitoring locations 29 and 33 were replaced in 2021, and single trees were substituted at location 31 in both 2022 and 2023. Lastly, locations 9 and 28 required single tree substitutions in 2023.

The sampling program currently consists of 13 cluster locations and the 2023 vegetation sampling program was completed August 29, 2023. Replicate composite samples otherwise continue to be sampled at each cluster location. Reference vegetation monitoring location clusters are illustrated in Figure 27.

Table 37 provides the soluble fluoride replicate composite sample results by location. Figure 28 illustrates the mean vegetation survey results for 2019 through 2023.

As a number of individual 2023 sample results (17 of 26) were reported less than the contract laboratory detection limit of 5 µg/g, the detection limit skews the plotted annual mean value when utilizing the detection limit value in place of the less than results. Of the values reported above the detection limit, a maximum value of 13 µg/g was reported for both location 31 replicate samples. Location 31 is positioned well east of the PHCF, directly adjacent to an active foundry. The 2022 maximum value was similarly recorded at this location.

Figure 27: Vegetation Monitoring Locations

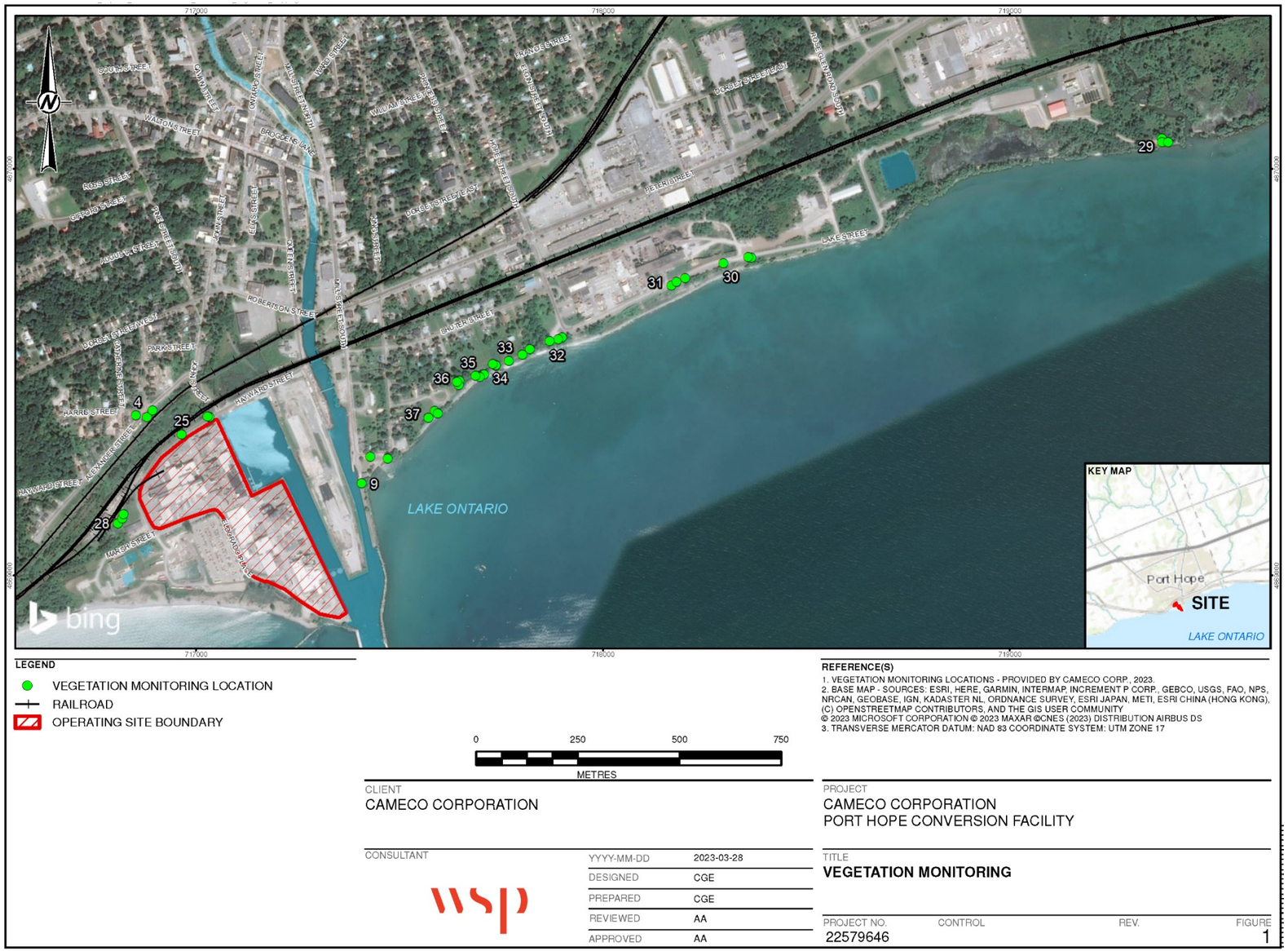
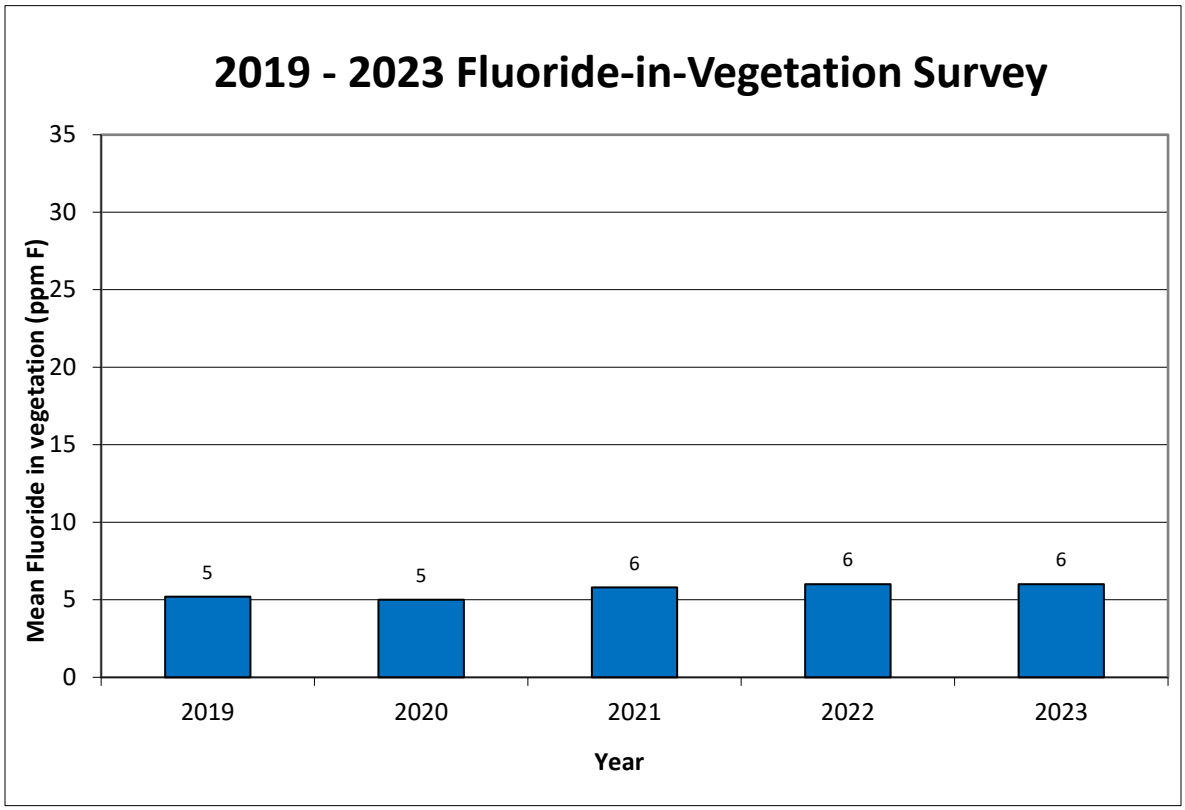


Table 37

2023 Vegetation Survey Results	
Vegetation Site	**Fluoride Result (µg/g)**
4A	< 5
4B	< 5
9A	11
9B	11
25A	< 5
25B	< 5
28A	< 5
28B	5
29A	< 5
29B	< 5
30A	< 5
30B	< 5
31A	13
31B	13
32A	< 5
32B	< 5
33A	< 5
33B	< 5
34A	6
34B	< 5
35A	< 5
35B	5
36A	5
36B	5
37A	< 5
37B	< 5

Figure 28



Discharge to Water

This section summarizes the PHCF liquid discharges and associated monitoring programs. Liquid discharge monitoring at the PHCF is divided into the following categories: Port Hope harbour water intake quality; liquid discharge monitoring; and sanitary sewage monitoring.

There were four types of point source discharges from the PHCF operations that were monitored on prescribed intervals in 2023: production facility cooling water returns, the combined facility sanitary sewage discharge, the combined backwash stream associated with the harbour water intake mechanical pre-treatment operations, and storm sewer outlets.

A UF_6 plant closed loop cooling water system was commissioned in July 2023, eliminating remaining monitoring requirements related to the harbour water intake and associated once-through cooling water system discharges.

The municipal sewage treatment plant processes the sanitary sewer discharges from the PHCF, and sewage quality is defined by municipal sewer use by-law 30/94. Primary facility inputs to this discharge include greywater and blackwater sources (excluding laundry effluent), Powerhouse effluent (such as boiler blowdown and softener regeneration effluent streams) and condensates. It should also be noted that a portion of the sanitary sewer discharge from PHCF originates upstream of the facility, primarily from the municipal water treatment facility. Figure 29 illustrates the combined sanitary sewage monitoring location positioned immediately upstream of the municipal system.

A 2023 summary of select water quality data relating to the PHCF harbour water intake and UF_6 Plant/Building 2 (UO2N) cooling water return are shown in Table 38. The monitoring locations in question are illustrated on Figure 29. The former UO_2 plant cooling water return was not operational in 2023, the production facility transitioned to a closed loop cooling system in 2022. The 2023 cooling water works monitoring data is reflective of the January to July operational period.

Elevated mean and maximum uranium concentrations are noted at the UF_6 Plant/Building 2 (UO2N) cooling water return for 2023 as a function of elevated cooling water intake trending. A general decrease in uranium trending was noted from December 2021 through to February 2022 in relation to the interruption of Canadian Nuclear Laboratories (CNL) remedial work within the inner Port Hope harbour over the winter period. Following resumption of inner harbour dredge activities in March 2022, a corresponding increase in uranium trending was observed. Elevated mean and maximum conditions were subsequently observed through the balance of the 2022 calendar year and into 2023 as a function of on-going inner harbour remedial work. Though 2023 trending generally decreased between January and the cessation of once-through cooling water works operations in July 2023, conditions remained well above typical background concentrations.

SCI and UO2N mean fluoride results were both below the CCME water quality guideline of 0.12 mg/L and all daily fluoride results were well below the CCME aquatic biota toxicity benchmark of 11.5 mg/L from which the generic guideline value is derived.

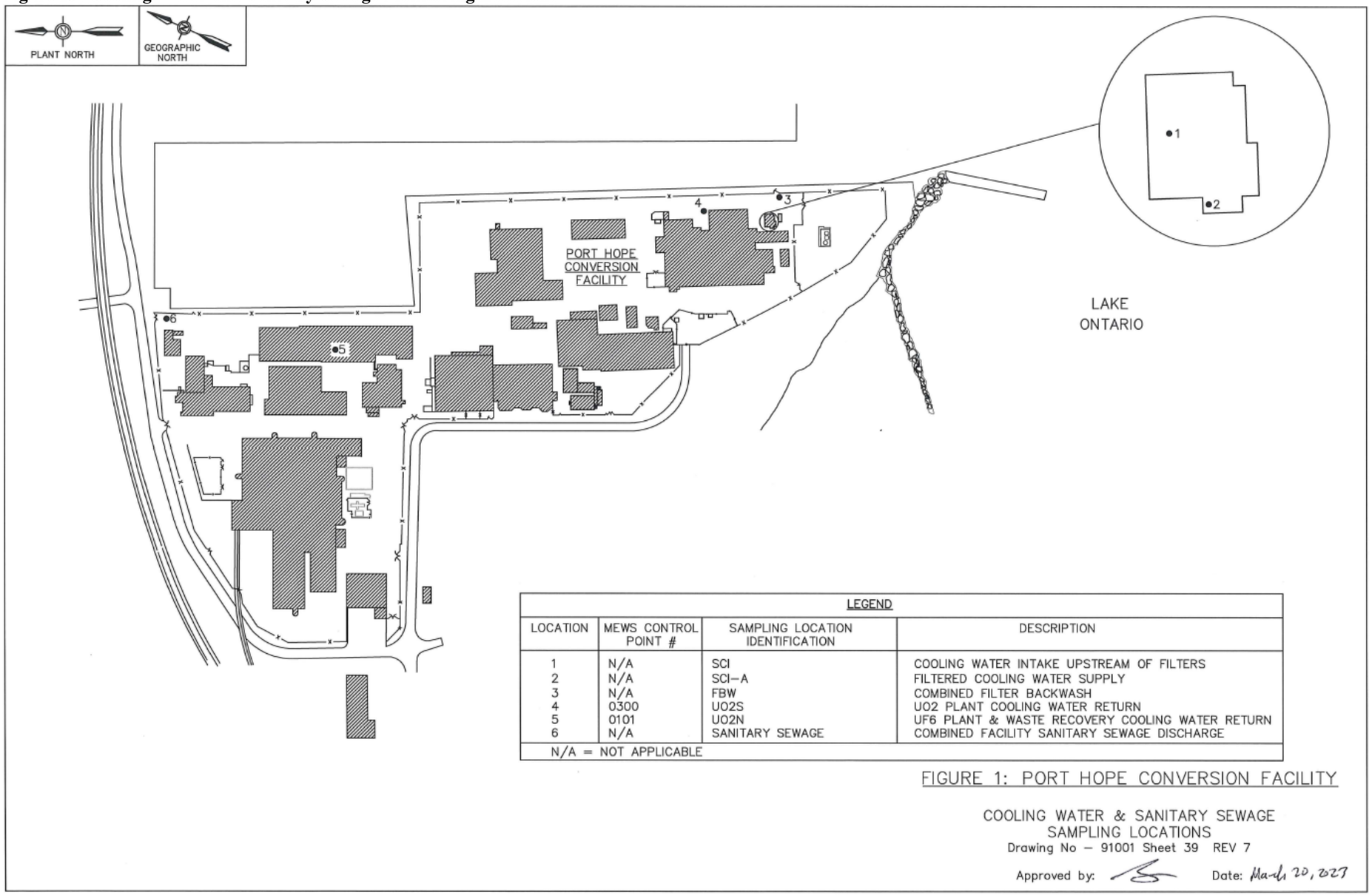
Ammonia was not a parameter of concern with respect to UF_6 plant heat exchanger operations. Maximum conditions were attributed to the accumulation and decomposition of surface water organic matter within the PHCF once-through cooling water works.

Table 38

Facility Water Quality Sampling Program										
Source	**Uranium (µg U/L)**		**Fluoride (mg F/L)**		**Ammonia + Ammonium (mg N/L)**		**Nitrate (mg N/L)**		**pH**	
	Avg	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Min**	**Max**
SCI	240	740	0.10	0.14	0.022	0.14	1.3	2.1	8.10	8.47
UO2N	221	730	0.10	0.18	0.069	0.46	1.1	1.9	8.14	8.51
Note: Values are reported below the method detection limit, where applicable, to satisfy MECP reporting requirements										
SCI - Cooling Water Intake UO_2N – UF_6 plant + Building 2 Cooling Water Return * SCI and UO_2N were inactive as of July 14, 2023.										

Flow was monitored at cooling water discharge points upstream of the harbour in accordance with MECP ECA requirements. Flow rate trending for UO2N for the period of 2019 through 2023 (partial year) are presented in Figure 30. In 2023, the average daily flow rate at the UO2N sampling point through July 13 was 12,725 m^3/day. The UO2S sampling point was not operational in 2023.

Figure 29: Cooling Water and Sanitary Sewage Monitoring Locations



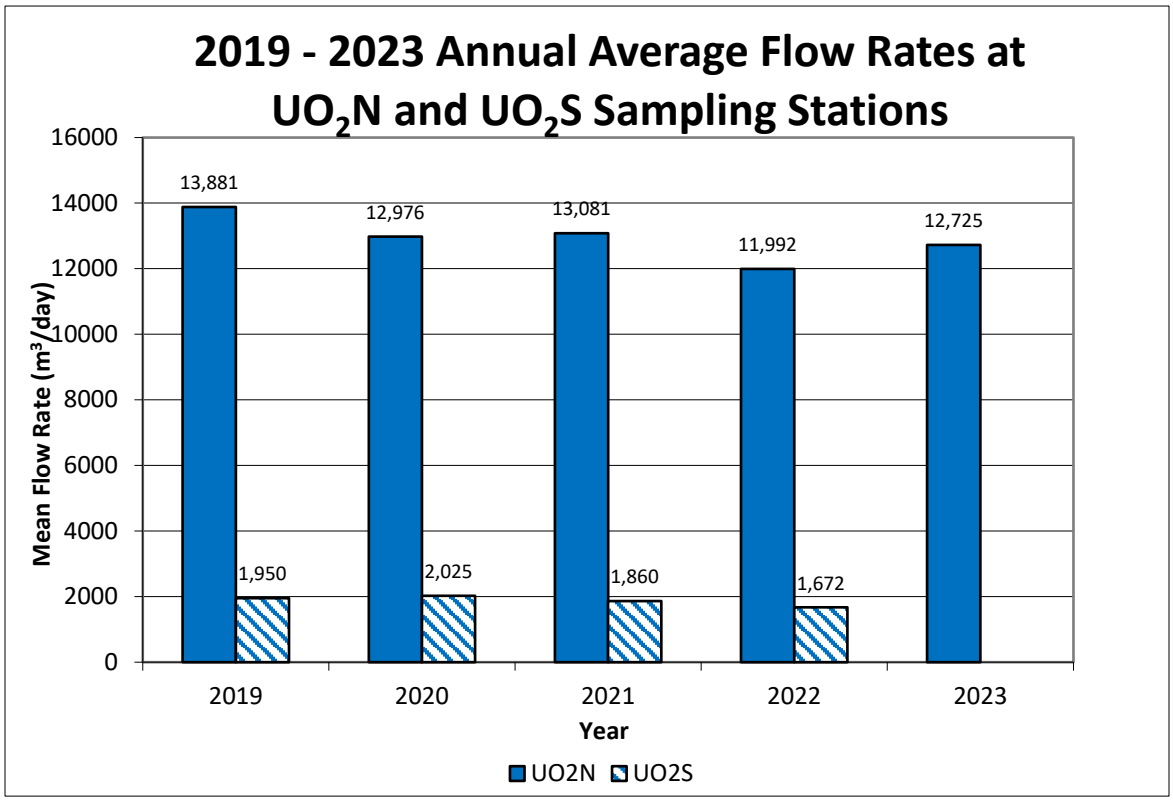
LEGEND			
LOCATION	MEWS CONTROL POINT #	SAMPLING LOCATION IDENTIFICATION	DESCRIPTION
1	N/A	SCI	COOLING WATER INTAKE UPSTREAM OF FILTERS
2	N/A	SCI-A	FILTERED COOLING WATER SUPPLY
3	N/A	FBW	COMBINED FILTER BACKWASH
4	0300	U02S	U02 PLANT COOLING WATER RETURN
5	0101	U02N	UF6 PLANT & WASTE RECOVERY COOLING WATER RETURN
6	N/A	SANITARY SEWAGE	COMBINED FACILITY SANITARY SEWAGE DISCHARGE
N/A = NOT APPLICABLE			

FIGURE 1: PORT HOPE CONVERSION FACILITY

COOLING WATER & SANITARY SEWAGE
SAMPLING LOCATIONS
Drawing No – 91001 Sheet 39 REV 7

Approved by: Date: March 20, 2023

Figure 30



Amended ECA 0899-BULJQX, which was replaced by ECA 1310-CK5MMH, required specific sampling of the SCI, filtered cooling water supply (SCI-A), FBW and cooling water returns (UO_2N and UO_2S).

Overviews of ECA monitoring results with comparison to cooling water quality objectives and limits, among other items, are compiled in a separate annual performance report to fulfill additional CofA requirements. Annual performance reports are submitted to the MECP within 90 days of the end of each calendar year.

The combined PHCF sanitary sewer return is sampled on a continuous basis using daily composite sampling. The combined sanitary sewage monitoring location is illustrated on Figure 29. Table 39 summarizes the annual average uranium concentration and uranium loadings to the Municipality of Port Hope's sanitary sewer system. Uranium loadings are also illustrated in Figure 31. Table 40 summarizes the monthly averaging results for uranium concentration in sanitary sewer discharges for 2023.

In 2016 and early 2017, as part of the relicensing process, a daily sanitary sewer discharge action level of 100 µg/L and a monthly mean release limit of 275 µg/L were developed and accepted.

Substantive sanitary sewer system rehabilitation and replacement work was completed beween 2017 and 2019 on a pirority basis, taking into consideration pending infrastructure upgrades. Positive water quality trending had been observed in response to the sum of the efforts as is evidenced by the reductions in the 2020 mean uranium concentration and total uranium loadings.

The daily sanitary sewer action level was reached or exceeded 11 times in 2023. Sanitary sewer discharges otherwise remained well below the facility monthly mean release limit throughout the 2023 calendar year. 2023 uranium loadings were the highest annual loadings from the 5-year trend but the loadings value is skewed high in relation to recorded and estimated discharge volumes that were biased high through the 2023 calendar year. Flow meter operational issues were experienced through the year and the instrumentation ultimately failed in late-2023. Cameco has since purchased a new flow meter system that is expected to be received and installed/commissioned in Spring 2024.

In early January, sanitary sewer trending increased corresponding to a period of unreasonably warm and rainy weather. The magnitude and frequency of precipitation events has been seen to influence sanitary sewer quality as a function of an increase in groundwater infiltration potential. The mid-January action level excursion groupings were partially influenced by Powerhouse effluent discharges. Harbour water was entering the sanitary sewer system at the Powerhouse, and harbour water trending was elevated during the period in question. The harbour water supply to the Powerhouse was ultimately isolated by January 20 and a municipal water supply displaced former harbour water uses. Uranium trending decreased following the Powerhouse remedial actions, but trending increases were subsequently observed starting in mid-March in association with warmer ambient conditions and precipitation events that exacerbated baseline groundwater infiltration conditions.

The March and April 2023 sanitary sewage uranium excursions are interpreted to have resulted from groundwater infiltration, exacerbated by precipitation events and spring thaw conditions. Uranium trending has generally decreased since April, and no uranium excursions were recorded for the balance of the 2023 calendar year.

Cameco has evaluated targeted sanitary sewer infrastructure rehabilitation, replacement and/or abandonment tasks, taking into consideration work completed to date and planned site and VIM project sanitary sewer system improvements. Near term focus items include the replacement and realignment of sewer infrastructure servicing existing facility lift stations and portions of Building 20, and the abandonment of associated inactive utilities. Rehabilitation work had also been planned for the Building 13 lateral service. Sewer contractor work had been initiated in preparation for a planned service reline, however,

it's been determined the work scope needs to be expanded to include the replacement of at least a portion of the service.

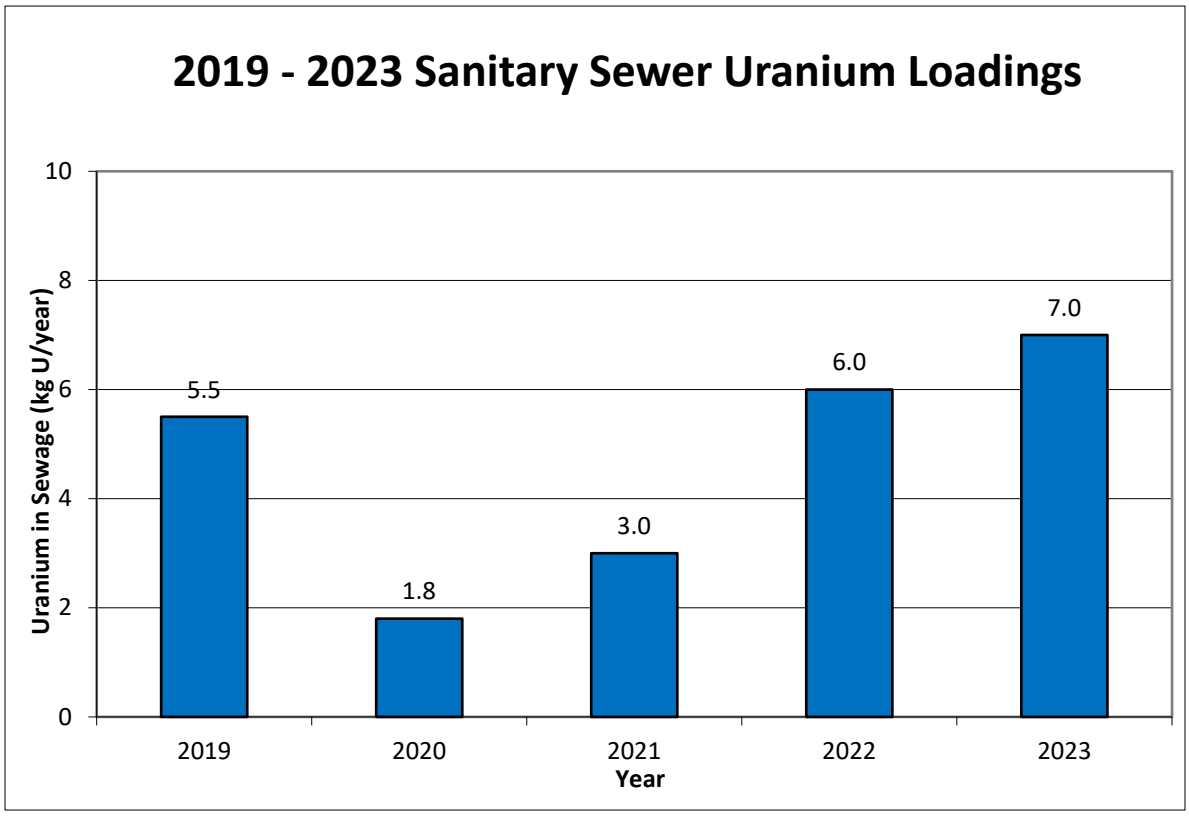
Table 39

2019 – 2023 Sanitary Sewer Discharges			
Period	**Annual Average Flow (m^3/day)**	**Annual Average Uranium Concentration (µg/L)**	**Uranium Loadings (kg/year)**
2019	444	33	5.5
2020	383	13	1.8
2021	334	23	3.0
2022	423	39	6.0
2023	1,167	21	7.0

Table 40

2023 Monthly Sanitary Sewer Discharges			
Period	**Sanitary Sewer Action Level/Release Limit**	**Monthly Average Uranium Concentration (µg/L)**	**Daily Maximum Uranium Concentration (µg/L)**
January	Action Level of 100 µg/L - daily composite sample Release Limit of 275 µg/L - monthly averaging period	60	220
February		14	30
March		40	130
April		57	100
May		45	80
June		12	25
July		6.8	14
August		6.8	20
September		2.7	4.6
October		3.0	17
November		4.7	21
December		4.0	10

Figure 31



Harbour Water Supply Monitoring

The ambient water quality program was concerned with monitoring the potential impacts of aqueous discharges into the receiving waters, namely production facility cooling water returns. Given its proximity to the harbour outlet, the cooling water intake provided a reasonable indication of the overall water quality in the Port Hope harbour under routine/baseline conditions. Exemptions to note include unusual/non-routine circumstances such as the 2018 west turning basin wall failure, CNL harbour isolation works and on-going CNL harbour remedial activities.

The cooling water intake was sampled on a continuous basis via the collection of daily composite samples from monitoring location SCI. Table 41 provides a summary of select water quality parameters results.

In line with the Table 38 discussion text, a general decrease in uranium trending was noted from December 2021 through to February 2022 in relation to the interruption of Canadian Nuclear Laboratories (CNL) remedial work within the inner Port Hope harbour over the winter period. Following resumption of inner harbour dredge activities in March

2022, a corresponding increase in uranium trending was observed. Elevated mean and maximum conditions were subsequently observed through the balance of the 2022 calendar year and into 2023 as a function of on-going inner harbour remedial work. Though 2023 trending generally decreased between January and the cessation of once-through cooling water works operations in July 2023, conditions remained well above typical background concentrations.

The 2023 mean fluoride result was below the CCME water quality guideline of 0.12 mg/L and all daily fluoride results were well below the CCME aquatic biota toxicity benchmark of 11.5 mg/L from which the generic guideline value is derived.

Ammonia was not a parameter of concern with respect to UF_6 plant heat exchanger operations. Maximum conditions were attributed to the accumulation and decomposition of surface water organic matter within the PHCF once-through cooling water works.

Table 41

2019 - 2023 Harbour Water Quality – Cooling Water Intake						
Parameter	**Value**	**2019**	**2020**	**2021**	**2022**	**2023**
Uranium (µg U/L)	Average	5.1	5.0	70	120	240
	Maximum	46	12	540	500	740
Fluoride (mg F/L)	Average	0.092	0.090	0.066	0.11	0.10
	Maximum	0.18	0.15	0.17	0.22	0.14
Nitrate (mg N/L)	Average	0.95	0.92	1.0	0.89	1.3
	Maximum	1.6	1.7	1.9	1.9	2.1
Ammonia +Ammonium (mg N/L)	Average	0.031	0.014	0.015	0.045	0.022
	Maximum	0.21	0.14	0.17	0.76	0.14
Note: Values reported below the method detection limit where applicable						

The results of the harbour water quality for 2019 through 2023 are also illustrated in Figure 32 through to Figure 35.

Figure 32

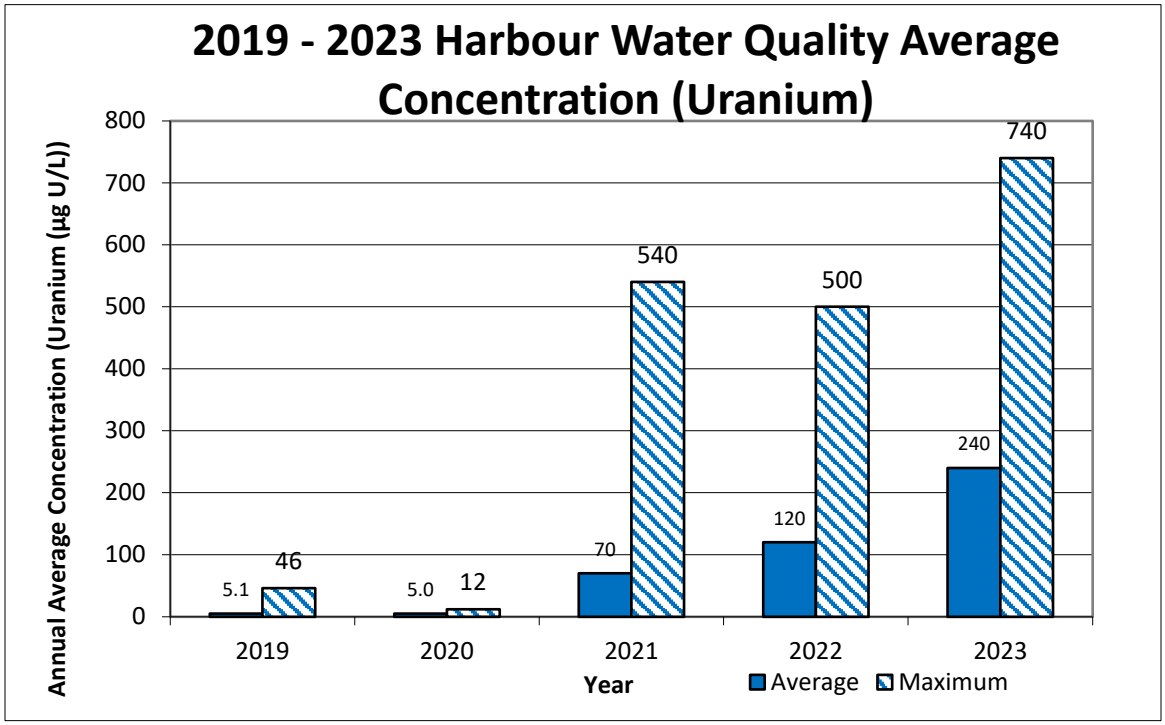


Figure 33

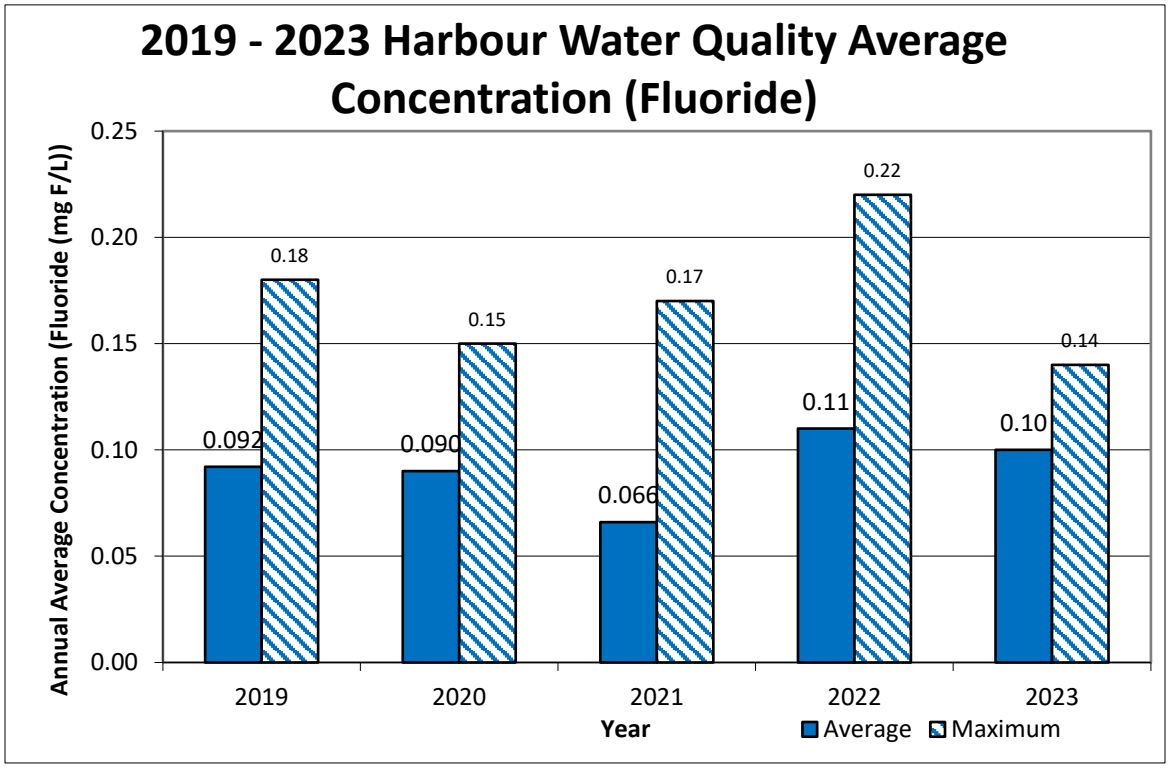


Figure 34

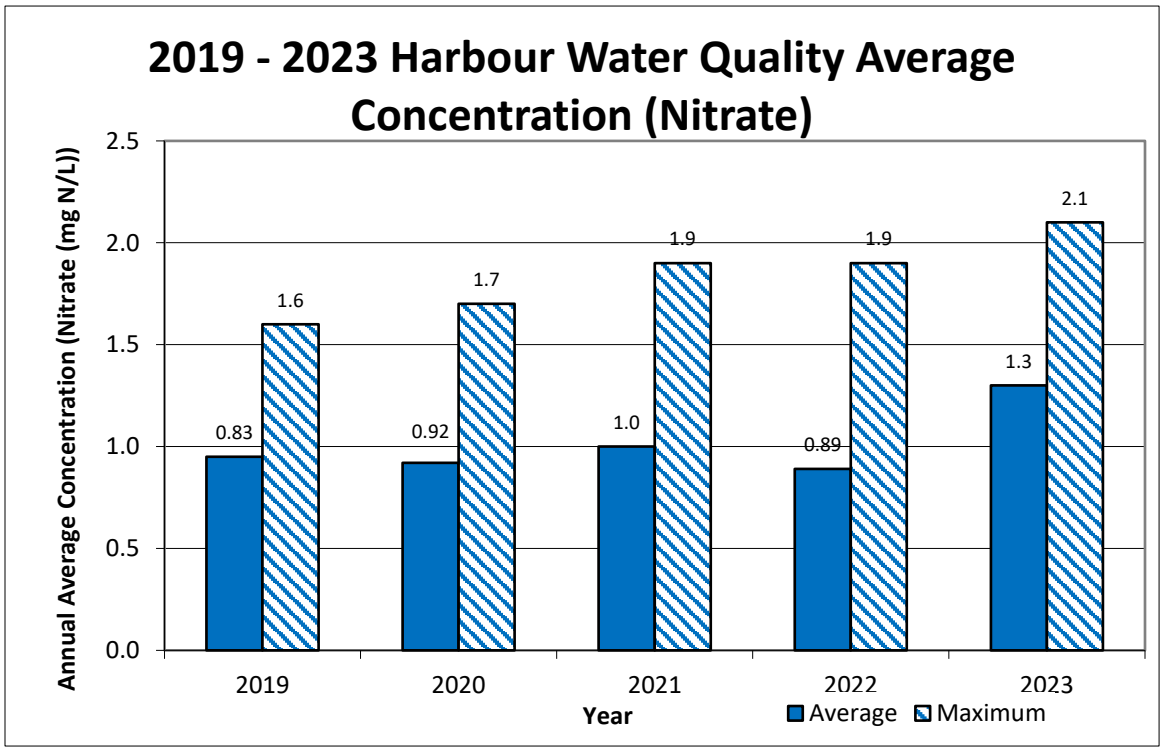
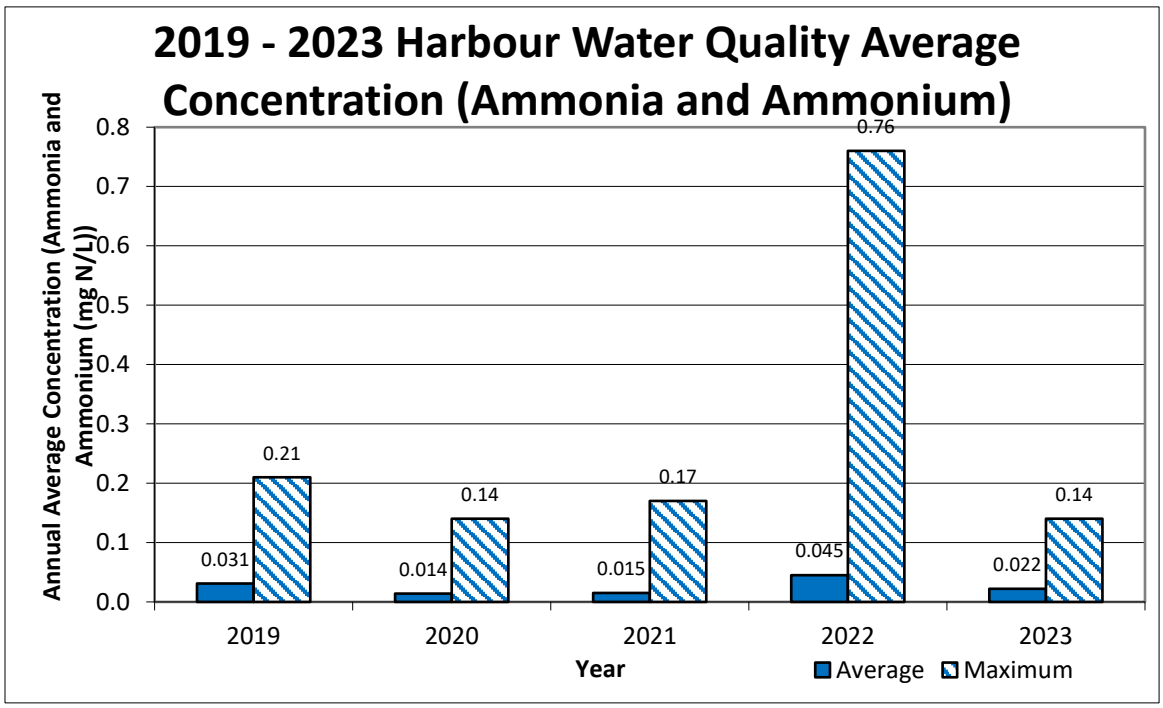


Figure 35



Storm Water Monitoring

The storm water monitoring program is currently carried out twice per calendar year.s. Targeted precipitation events are 10+ mm forecasts, preceded by 48 hours of dry weather.

Amended ECA 1310-CK5MMH, includes a stormwater monitoring program specific to planned VIM storm sewer works upgrades and associated changes to storm sewer outlet locations. The revised monitoring program will be phased in on a per outlet basis following full completion of proposed works. A new VIM outlet is now operational at the southernmost portion of the facility, however, a portion of the proposed works upstream of the outlet remains to be completed. The outstanding civil works in question are to the east of the UO_2 plant and will displace existing Outlets 14 and 15 when operational.

Grab samples are currently obtained from up to six storm sewer outlets immediately upstream of the harbour at catch basin/maintenance hole access points, subject to availability of runoff (i.e., flowing conditions) and a lack of surface water influence (i.e., harbour water surging into the storm sewer works). Outlets 2, 6, 8, 11, 13 and 15 are the focus of the current monitoring program.

Licensed facility storm sewer outlets are illustrated on Figure 36. Current monitoring locations are highlighted with markers for reference.

It is important to note that in the current storm sewer works operating condition, storm water quality is routinely highly variable and influenced by factors such as precipitation event duration and intensity as well as infrastructure deficiencies.

Table 42 provides a summary of storm water quality parameters results for the 2023 calendar year; field duplicate samples excluded.

Outlet 8 is typically dry during sampling events due to its catchment area comprising of granular cover. One Outlet 8 sample was collected on November 21. There was no outlet flow at the time of the October 20sampling event.

Despite reported variances in storm water quality for select parameters, Table 42 individual grab samples generally passed their respective *Daphnia magna* and rainbow trout acute lethality single concentrations tests in 100% effluent. The exception to note is the October 20 Outlet 13 sample that failed the rainbow trout single concentration test. Although stormwater monitoring program acute lethality test failures are not common, they have occasionally been recorded.

The contract laboratory conducted a review of available October 20 analytical data, with comparisons to available lethality threshold data, to identify potential mortality

contributors. It's been suggested un-ionized ammonia was the primary cause of rainbow trout mortality in the Outlet 13 sample.

A biological source of toxicity has been assumed given the sample *E.coli* count was elevated, the total coliform count could not reported due to coliform overgrowth, and the sample biological oxygen demand was elevated. It's suspected excess bird waste/droppings had accumulated in the Outlet 13 catchment area due to dry summer and early fall conditions that preceded the sampling event.

As part of the planned VIM civil works upgrades, all historic site outlets are planned for abandonment. Existing infrastructure realignments and upgrades will take place upstream of active outlets and a reduced number of new harbour outlets will be installed with oil and grit separator systems. In the interim, all historic facility storm sewer outlets continue discharge to the CNL harbour work zone bounded by the wave attenuator installations.

Figure 36: Storm Sewer Outlets

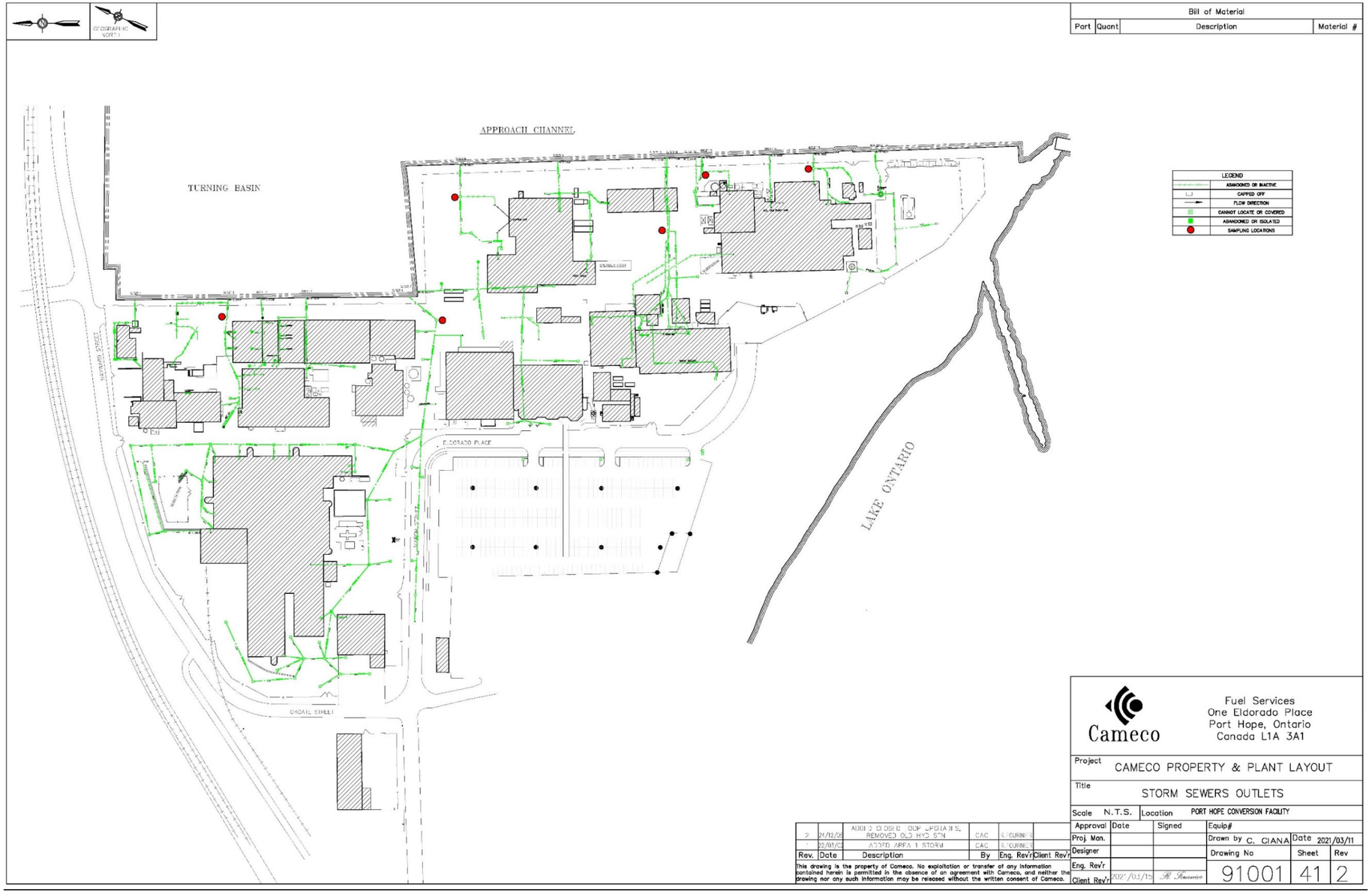


Table 42

2023 Storm Water Monitoring Results								
Sample Location	Date	Uranium	Fluoride	Ammonia + Ammonium	Nitrate	Arsenic	Acute lethality	
							Daphnia magna	Rainbow trout
		mg/L	mg/L	as N mg/L	as N mg/L	mg/L	% Mortality	% Mortality
Outlet 2	October 20, 2023	0.561	1.12	0.1	0.88	0.0077	0.0	0.0
	November 21, 2023	0.217	0.49	<0.1	0.30	0.0078	0.0	0.0
Outlet 6	October 20, 2023	0.198	0.69	0.2	0.48	0.0024	0.0	0.0
	November 21, 2023	0.153	0.54	0.2	0.33	0.0028	0.0	0.0
Outlet 8	October 20, 2023	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	November 21, 2023	0.549	0.75	1.0	0.13	0.53	13.3	0.0
Outlet 11	October 20, 2023	0.388	0.52	3.1	0.53	0.0022	0.0	30.0
	November 21, 2023	0.429	0.90	0.2	0.53	0.0038	0.0	0.0
Outlet 13	October 20, 2023	0.175	0.21	29.1	<0.06	0.0037	0.0	100
	November 21, 2023	0.217	0.43	7.7	1.25	0.0026	0.0	10.0
Outlet 15	October 20, 2023	0.0505	0.11	0.1	0.25	0.0046	0.0	0.0
	November 21, 2023	0.102	0.20	0.2	0.60	0.0076	0.0	0.0

Groundwater Monitoring

The PHCF long-term groundwater monitoring program includes groundwater level monitoring and groundwater sampling at select wells. Groundwater level monitoring is completed on a quarterly or annual basis.

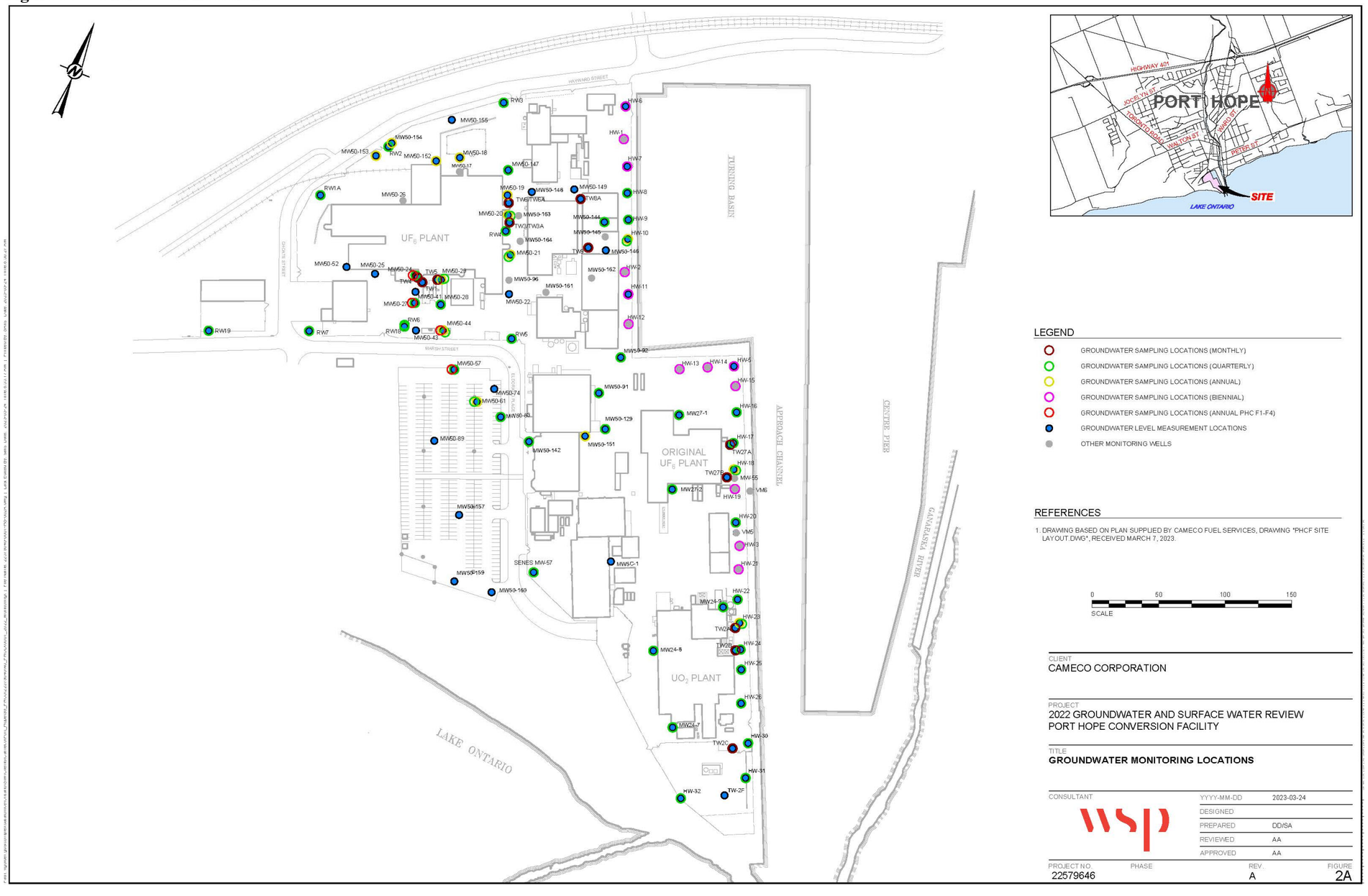
Groundwater is sampled under the following schedules: monthly sampling of the operating recovery wells; quarterly sampling of select monitoring wells; annual sampling of select bedrock monitoring wells; and biennial sampling of select harbour area monitoring wells. Areas of focus include the UF_6 plant area (east and south); the waste recovery building/warehouse areas; the former UF_6 plant area; and the UO_2 plant area.

Recovery of contaminated groundwater for treatment from the east and south perimeters of the UF_6 plant began in the first quarter 2008, while pumping well locations between the UF_6 plant and the harbour, as well as one pumping well to the east of the UO_2 plant (TW2A), were on-line as of the fourth quarter 2008.

Four additional pumping wells commenced operation during the fourth quarter of 2011. These installations are located to the east of the former UF_6 plant (TW27A and TW27B) and to the east/southeast of the UO_2 plant (TW2B and TW2C).

Up to twelve pumping wells were in operation during the 2023 calendar year. Figure 37 illustrates the PHCF groundwater monitoring program well locations.

Figure 37 – Onsite Well Locations



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 are that at least 90% of planned samples are collected and analyzed to meet the data acceptance criteria.

- Water samples (i.e., cooling water, sanitary discharge) – 98.9% of planned samples were collected.
- Stack samples (i.e., stacks) – 97.6% of planned samples were collected.
- Environmental Samples (i.e., surface water, groundwater, hivol, dustfall, lime candle, fenceline gamma, soil, vegetation) – 97.2% 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 45 instances where samples were flagged for issues with laboratory quality control. Of these 45 were reviewed and/or repeated and deemed acceptable for use in accordance with the laboratory quality program. There were no sample analysis not included in the annual reporting due to analytical issues.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 and any results of emergency exercise participation.

The fire protection and security group have focused efforts to refine training to site specific chemicals, needs and responses for both emergency and medical requirements.

This activity and associated records are subject to various audits and are incorporated into the PHCF annual management review.

There were a number of internal drills and exercises conducted, which tested the effectiveness of the site and the emergency response organization. The following is a general list of the internal drills and activities in which the emergency response organization participated in 2023:

- Hazardous materials response drills, to include HF, PCB, ammonia, nitric acid, and hydrogen fire response
- Flood diversion drills
- Fire alarm response drills
- Medical assistance drills
- Lockdown drills

- Census drills
- Confined space drills
- Building evacuation drills
- ERT recall drills

All drills and exercises are documented, and deficiencies are tracked to ensure that appropriate corrective actions are taken.

The emergency response and training assistance agreement between Cameco and the Municipality of Port Hope, continues to ensure that the two response organizations are provided the opportunity to train together in order to prepare for emergencies that could require a joint response. Also, as part of the agreement, Cameco continues to provide Port Hope Fire and Emergency Services (PHFES) with the necessary equipment and training to effectively respond to emergencies at the PHCF.

Cameco and PHFES continue to find opportunities to bring the organizations together for training and other activities. Additionally, Cameco has supported the PHFES for responses in the municipality and for non-emergency related initiatives. An example of the interactions in 2023 included: PHFES was invited to attend all ERT training in Norwood and a few PHFES instructors instructed with Cameco ERT instructors to provide new learning experiences.

Emergency preparedness and response training is provided on an ongoing basis to ensure that responders have the knowledge and skills necessary to provide for an effective emergency response.

The PHCF Fire Protection program (FPP) has been designed to promote fire safety within the site and minimize the likelihood and frequency of fire as well as the potential impact on the health and safety of the employees, contractors, the public, the environment and Cameco's assets and continuity of operations.

There were no significant changes or improvements to the emergency preparedness program or to the fire protection program in 2023.

In order to confirm the effectiveness of the Fire Protection Program, the following third-party verifications were conducted in 2023:

- Annual Facility Condition Inspection
- SHEQ Audit
- Annual Sprinkler Inspections Testing and Maintenance
- Annual Alarm Inspection and Verification.

The third-party verifications listed above are documented and deficiencies are tracked to ensure that appropriate corrective actions are taken.

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.

PHCF has a focus on reducing the inventory of accumulated radioactive waste and disposing of all eligible materials at the LTWMF. Under the Vision in Motion project, approximately 288 dump trucks of eligible wastes, 1,346 super sacks, 2,034 drums and 76 other items were transferred to the LTWMF.

Solid wastes contaminated by 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 appropriate disposal options are available.

Wastes at the facility are segregated at the point of generation into contaminated and non-contaminated. Non-contaminated waste is either recycled or transferred to a suitable facility. Contaminated waste is stored in appropriate containers pending assessment of recycling or disposal options.

In 2023, a total of 57.7 tonnes of non-contaminated wastes were sent to a local landfill. A total of 26.5 tonnes of non-contaminated materials were sent to a recycling facility for recovery.

PHCF produces two by-products at the facility. These include ammonium nitrate which is sold to a fertilizer company and fluoride product which is sent for uranium recovery at a licensed facility. The amount of ammonium nitrate recycled in 2023 was 1,608 m^3. A total of 3,093 drums of fluoride product were generated in 2023.

In 2023, PHCF generated 68.7 tonnes of contaminated combustible materials (CCM), and 2.0 tonnes of CCM was shipped to the BRR for incineration. During the same period a total of 67.9 tonnes were shipped to appropriately licensed hazardous waste facilities.

PHCF recycled 126,136 kg of metal after decontamination to free release criteria. PHCF recycled 8,848L of waste oil in 2023.

Waste reduction activities associated with Vision in Motion are discussed in further detail in section 3.1.3 Improvement Plans and Future Outlook.

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.

PHCF maintains a comprehensive security program which meets the requirements of the General Nuclear Safety and Control Regulations, the Nuclear Security Regulations and other CNSC requirements.

The 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, this document is considered prescribed information and is subject to the requirements of the General Nuclear Safety and Control Regulations.

PHCF ensures that security operations and procedures are reviewed (and revised as needed) in order to maintain compliance with General Nuclear Safety and Control Regulations, the Nuclear Security Regulations and other CNSC requirements.

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/IAEA Safeguards and Non-proliferation Agreement.

The PHCF participated in seven safeguard inspections/activities in 2023:

- Six short notice random inspections (January, March, April, June, August and December).
- A physical inventory verification in July.

The safeguards program is well-established and continues to be effective through the successful implementation of the obligations arising from the Canada/IAEA Safeguards and Non-proliferation Agreement.

In June 2019, a Fuel Services Safeguards Program Manual was published to document how the Fuel Services Division, including PHCF, meets the requirements in Canadian Nuclear Safety Commission (CNSC) *REGDOC-2.13.1, Safeguards and Nuclear Material Accountancy* for the establishment and maintenance of a safeguards program.

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.

Uranium dioxide (UO_2) is produced, packaged in drums, and transported by road from the PHCF to Cameco's Fuel Manufacturing Facility in Port Hope and/or other domestic fuel manufacturing facilities. UO_2 is also packaged in drums and transported by road and marine to other overseas fuel manufacturing facilities. There is also a small amount of material transported by air for customer evaluation purposes. The drums used for air transport meet the Type IP-3 packaging requirements; all other drums meet the Type IP-1 packaging requirements as specified in the CNSC *Packaging and Transport of Nuclear Substance Regulations*.

Uranium hexafluoride (UF_6) is produced and transported in Type H(M) and H(U) cylinders certified by the CNSC by road or marine from the PHCF to the USA or overseas, including but not limited to, the United Kingdom, France, Germany, Holland, and Japan.

In addition to UO_2 and UF_6, uranium scraps and by-products are transported by road from the PHCF to Cameco's Key Lake operation or to the USA for uranium recovery.

There was one reportable transportation event related to the PHCF in 2023:

- On December 6, 2023, Cameco was informed of contamination on a lid of a roll-off bin that was transported December 4, 2023, from the PHCF to the Long-Term Waste Management Facility. The lid was decontaminated and transported back to the PHCF. Due to the location on the lid, no contamination left the bin during transport.

3.0 PUBLIC INFORMATION PROGRAM

In 2023, Port Hope Conversion Facility 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
News & Information from Cameco
Cameco
spring 2023
Cameco and Bruce Power Celebrate Extension of Long-Term Arrangements for Nuclear Fuel Through 2040
Made-in-Canada partnership signals industry stability and energy security, essential to helping Ontario and Canada achieve net-zero goals

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.

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 12 emails from the public to RSVP to the annual BBQ.

Cameco received three inquiries regarding the PHCF. One was regarding noise; one was regarding the removal of building 27 and one was regarding a phone call a resident received. All inquiries were responded to in a timely manner and no further follow-up was required.

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 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.

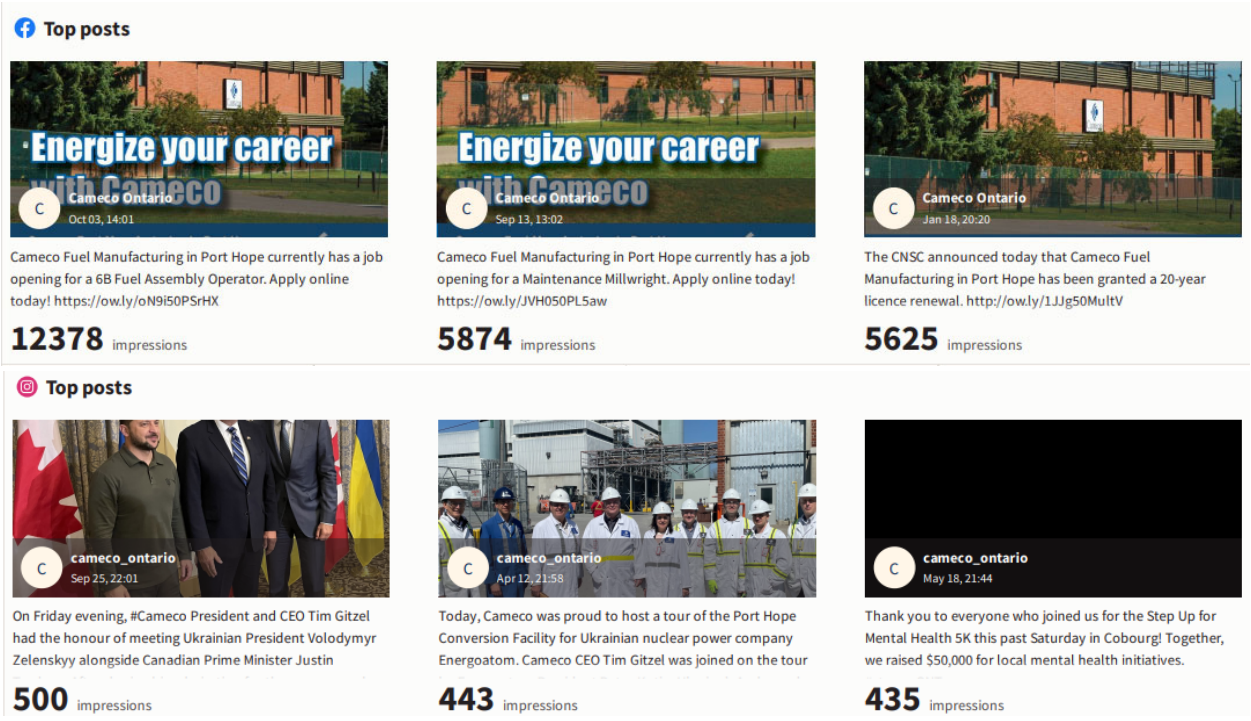
Social Media

@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 Disclosures

PHCF made 12 public disclosures in 2023. Five of the disclosures were related to sanitary sewer exceedances. Other disclosures included non-occupational transport, reportable spills and environmental releases.

Environment & Safety - Conversion: Port Hope - Fuel Services - Businesses - Cameco

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

Posting Date	July 24, 2023
Incident Date	July 22, 2023
Incident	Reportable Spill
Details	During the filling of an emergency generator tank with diesel, the flow was not shut off and approximately 2 litres of diesel overflowed out of the tank and into a dyke. Approximately 1 litre of diesel entered the sanitary system. There was no health or safety risk posed to the public, workers or the environment.
Corrective Action	The spill was cleaned up within 20 minutes. Cameco notified the Canadian Nuclear Safety Commission and the Municipality of Port Hope.
Cameco Environmental Effect Rating	1

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.

Vision in Motion

The fall, summer and winter 2023 issues of Energize provided a VIM project updates regarding the removal of building 27.

- Energize - Fall 2023 - Making a Difference - Community - Cameco Fuel Services
- Energize - Summer 2023 - Making a Difference - Community - Cameco Fuel Services.
- Energize - Winter 2023 - Making a Difference - Community - Cameco Fuel Services

Information about VIM was also made available at the community barbeque and Port Hope Fall Fair.

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.

Earned Media

Cameco received media coverage throughout the year covering a range of activities:

- **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)
- **Cameco Holds Mock Emergency at the Port Hope Facility** – October 29, 2023 – Today's Northumberland
    - Cameco Holds Mock Emergency at the Port Hope Facility - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)

Advertising

In 2023, advertising was conducted through social media platforms, local news websites and local radio.

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, among others.

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. Locally, the focus is on municipal and provincial officials.

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.

On October 16, a representative from NRCan toured the PHCF.

Tours

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

On June 22, 2023, Cameco hosted a delegation from the UK government for a tour of PHCF.

On October 16, a representative from NRCan toured the PHCF.

Website

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

Cameco updated its website with information throughout 2023 including:

- 12 Public Disclosure related to PHCF
- 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

4.0 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

5.0 SITE - SPECIFIC

The nuclear criticality safety program at the PHCF follows the criticality control principles as described in Radiation Protection Program Manual. In summary, processing of any amount of enriched material at the PHCF is governed by a criticality control committee (CCC) as described in the revised Nuclear Criticality Safety Program Manual. There were no processing activities of enriched material conducted on site in 2023.

Cameco has an accepted Preliminary Decommissioning Plan (PDP) and financial guarantee for the PHCF.

The PHCF met all other site-specific reporting requirements.

6.0 IMPROVEMENT PLANS AND FUTURE OUTLOOK

The Vision in Motion (VIM) project is a significant undertaking at PHCF with the key objective of transferring Cameco Decommissioning Waste to a long-term waste management facility (LTWMF) in Port Hope that is operated by the Port Hope Area Initiative (PHAI). The materials being transferred include buildings, equipment, contaminated soils, and stored wastes. The project is also implementing building and infrastructure modifications needed to support the remediation effort.

The VIM project is being executed in accordance with standard corporate Technical Services policies and procedures for project delivery. The project also conforms to PHCF site policies and procedures for activities carried out at PHCF.

VIM activities are detailed in the 2023 Annual VIM Supplementary Report.

The installation of a closed loop cooling water system was completed and commissioned for the UF_6 plant in July 2023.

7.0 SAFETY PERFORMANCE OBJECTIVES FOR FOLLOWING YEAR

There are no major changes planned in 2024 that could require Commission approval.

PHCF 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.

8.0 CONCLUDING REMARKS

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 both its employees and the people in neighbouring communities.

In 2023, PHCF did not exceed any CNSC regulatory limits. As a result of the effective programs, plans and procedures in place, the PHCF was able to maintain individual radiation exposures well below all regulatory dose limits. In addition, environmental emissions continued to be controlled to levels that are a fraction of the regulatory limits, and public radiation exposures are also well below the regulatory limits.

Cameco's relationship with our neighboring communities remains strong and we are committed to maintaining these strong relationships.