Nuclear Energy Canada Inc.

1160 Monaghan Rd.
Peterborough, Ontario Canada

ANNUAL COMPLIANCE MONITORING REPORT

January 1- December 31 2022

The information contained in this report concerns the performance and operation of BWXT Nuclear Energy Canada Inc.'s (BWXT NEC) Class IB nuclear fuel facility located in Peterborough, Ontario. This report is prepared to meet nuclear fuel facility licence FFL-3620.00/2030 condition 3.2. The content demonstrates adherence to the BWXT NEC commitment to operate a safe Class IB nuclear fuel facility, as well as demonstrate compliance with applicable regulations and licence conditions specified by the Canadian Nuclear Safety Commission.

Revision	Description	Prepared by Date	Approved by Date
00	Initial Issue	C. Davidson 2022-03-29	D. Snopek 2022-03-30

Signing Authority Contact Information:

David Snopek, Director, EHS & Regulatory

1160 Monaghan Road

Peterborough, ON K9J 0A8

Phone number: 1-855-696-9588

Email: questions@bwxt.com

Submitted To:

J. Amalraj, CNSC Project Officer on 2023-03-31

1 EXECUTIVE SUMMARY

BWXT Nuclear Energy Canada Inc. (BWXT NEC) has been involved with the Canada Deuterium Uranium (CANDU®) industry from its earliest years. BWXT NEC produces nuclear fuel bundles used by the CANDU fleet to generate clean electricity that powers homes, business and the Canadian economy. BWXT NEC operates in three plant locations: Arnprior, Toronto and Peterborough, Ontario. BWXT NEC's Toronto and Peterborough facilities are Class IB nuclear facility operations. The operating licence issued by the Canadian Nuclear Safety Commission (CNSC) authorizes BWXT NEC to operate and modify its nuclear fuel facility to produce natural and depleted uranium dioxide (UO_2) pellets and to produce and test fuel bundles in Peterborough at 1160 Monaghan Rd. The facility is additionally authorized to receive, repair, modify and return contaminated equipment from off-site nuclear facilities.

The purpose of this annual compliance report is to demonstrate that BWXT NEC Peterborough has successfully met the requirements of the Nuclear Safety and Control Act, associated regulations and the Class IB Nuclear Fuel Facility Licence FFL-3620.00/2030 issued by the CNSC on January 1, 2021, and expiring on December 31, 2030. This report is prepared based on the CNSC's *Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class I A & B Nuclear Facilities* and regulatory document 3.1.2 *Reporting Requirements, Volume I: Non-Power Reactor Class 1 Nuclear Facilities and Uranium Mines and Mills*. Appendices containing confidential, proprietary and prescribed information are submitted to the CNSC separately.

BWXT NEC is committed to continuously improving systems to protect employees, the environment and communities against environmental, health and safety hazards. We work to implement programs to conserve natural resources, prevent pollution and minimize waste. Maintaining a safe and healthy work environment for our employees is a top business priority. BWXT NEC has implemented a business management system that defines the requirements for the licensed activity, which ensures applicable buildings and facilities, equipment, and processes used in support of licensed activities are conducted in accordance with the Nuclear Safety and Control Act, associated regulations, applicable CNSC requirements, jurisdictional requirements and compliance best practices.

BWXT NEC has established CNSC accepted Action Levels for various radiological and environmental parameters. An Action Level is defined in the *Radiation Protection Regulations* "as specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program, and triggers a requirement for specific action to be taken." Action Levels are also applied to environmental protection. Action Levels are facility-specific and set below regulatory limits; however, exceedances are CNSC reportable events. Accordingly, BWXT NEC has established Internal Control Levels for various radiological and environmental parameters that are set even lower than Action Levels to act as an early warning system. Internal Control Level exceedances result in internal investigation and correction and are not CNSC reportable events.

Employee workplace radiation exposures are measured by CNSC approved methods and systems. Overall, dose trends have increased slightly over a five-year window but are down year over year compared with 2021. 2022 saw a reduction in total bundle production which had an associated reduction in exposure. Dose reduction continues to remain a priority, with ongoing efforts towards shielding, material movement, improving ALARA awareness (e.g. use of leaded blankets on product), and TLD wear and storage compliance. All measured radiation exposures received by personnel in the reporting period were within regulatory limits and action levels.

BWXT NEC has established conventional health and safety programs to manage the non-radiological workplace safety hazards to protect personnel. Key performance indicators are used to measure the success of the programs throughout the year. Following nine consecutive years without

a lost time injury, there was one during the reporting period. There was an ongoing investigation in 2022 related to beryllium limit exceedance on personal air monitors that were periodically worn by the operators. BWXT instituted a respirator requirement in affected areas and has made engineering changes to improve ventilation on specific processes. Validation of the effectiveness of these changes continues into 2023.

BWXT NEC recognizes that an effective way of maintaining public trust is to maintain environmental excellence. This requires a demonstrated commitment to operating in accordance with the highest environment, health and safety standards. The facility maintains an effective environmental management system to achieve environmental goals and objectives and keep all environmental impacts well within applicable standards and as low as reasonably achievable. This program demonstrates compliance to relevant provincial and federal legislation. The environmental protection program is also compliant with the following standards:

- Canadian Standards Associate (CSA) N288.6-12, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*
- CSA N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*
- CSA N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills.*

Air and water emissions are routinely measured to demonstrate compliance with the CNSC's environmental protection requirements and the ALARA principle. Annual releases were a very small fraction of regulatory limits and all measurements were below Action Levels. Soil samples were taken surrounding the Peterborough facility with all measurements within applicable guidelines.

An established emergency response plan is in place that describes the actions to be taken to minimize health, safety and environmental hazards to workers and local members of the public, which may result from fires, or the release of hazardous materials. The plan intends to reduce the risk of emergencies such as fires, and assist emergency staff and personnel in understanding key emergency response issues. The plan assists the facility in protecting employees, the local community and the environment through sound emergency management practices. The emergency response plan was developed in accordance with CNSC operating licence requirements.

BWXT NEC has implemented and maintains a safeguards program and undertakes all required measures to ensure safeguards implementation in accordance with International Atomic Energy Agency (IAEA) commitments and CNSC regulatory document 2.13.1 *Safeguards and Nuclear Material Accountancy.* Movement (inventory changes) of natural and depleted uranium are documented and reported to the CNSC as required. The IAEA and the CNSC jointly conduct annual verifications.

BWXT NEC safely transports dangerous goods, including Class 7 radioactive material shipments as governed by the *Transportation of Dangerous Goods Act* and regulations and the *Packaging and Transport of Nuclear Substances Regulations*. Shipments occur routinely between suppliers and BWXT NEC's Toronto and Peterborough facilities, customers and waste vendors.

BWXT NEC places great importance on its relationships with local indigenous communities, government and residents in the communities in which it operates and works to ensure there is open communication and awareness of BWXT NEC's operating activities. The public information program defines the process for providing information about BWXT NEC operations. The Community Liaison Committee (CLC), whose mandate is to provide a forum for a cross-section of neighbours and other community stakeholders to share information and ideas, continued to meet regularly.

This compliance monitoring report demonstrates that BWXT NEC has successfully met the requirements of the *Nuclear Safety and Control Act*, associated regulations and CNSC Class IB Nuclear Fuel Facility Licence conditions.

TABLE OF CONTENTS

FIGURES

TABLES

2 INTRODUCTION

The purpose of this compliance report is to demonstrate that BWXT NEC has successfully met the requirements of the *Nuclear Safety and Control Act*, associated regulations and the Class IB Nuclear Fuel Facility Licence FFL-3620.00/2030 issued by the Canadian Nuclear Safety Commission (CNSC) on January 1, 2021, and expiring December 31, 2030. This report is prepared based on the CNSC's *Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class I A & B Nuclear Facilities* and regulatory document 3.1.2 *Reporting Requirements, Volume I: Non-Power Reactor Class 1 Nuclear Facilities and Uranium Mines and Mills*. Appendices containing confidential and proprietary information are submitted to the CNSC separately.

BWXT Nuclear Energy Canada Inc. (BWXT NEC) has been involved with the CANDU® industry from its earliest years. BWXT NEC produces nuclear fuel bundles used by the CANDU® fleet to generate clean electricity that powers homes, business and the Canadian economy. BWXT NEC operates in three plant locations: Arnprior, Toronto and Peterborough, Ontario. BWXT NEC's Toronto and Peterborough facilities are Class IB nuclear facility operations. Nuclear substance use is regulated federally by the *Nuclear Safety and Control Act* and associated regulations through the CNSC.

The Peterborough facility is located in a mixed residential and industrial area in central Peterborough (Figure 1). The buildings are located on the existing General Electric (GE) plant complex. The licensed facility consists of four buildings; Building 21, 24, 26 and 28, which are leased from GE. Building 21 is a two-floor building and houses the uranium fuel bundle manufacturing operation on the first floor and office personnel on the second floor. Building 24 is a one floor warehouse used to store sealed radioactive material including completed uranium fuel bundles, drums of UO_2 powder, and contaminated equipment as required. Building 26 is principally a conventional fabrication and assembly operation. It also houses manufacturing equipment and a facility for the repair of contaminated equipment. Building 28 houses the main shipping and receiving docks for Building 26 and is directly accessible through Building 26.

Figure 1: BWXT NEC Peterborough

2.1 Processes and Materials

Fuel manufacturing operations involve the loading of fuel pellets into Zircaloy tubes, sealing, and welding of the tubes to produce fuel elements and the assembly of the fuel elements into fuel bundles. The basic assembly process is described in Figure 2 and shows the interconnections with the other BWXT NEC plants.

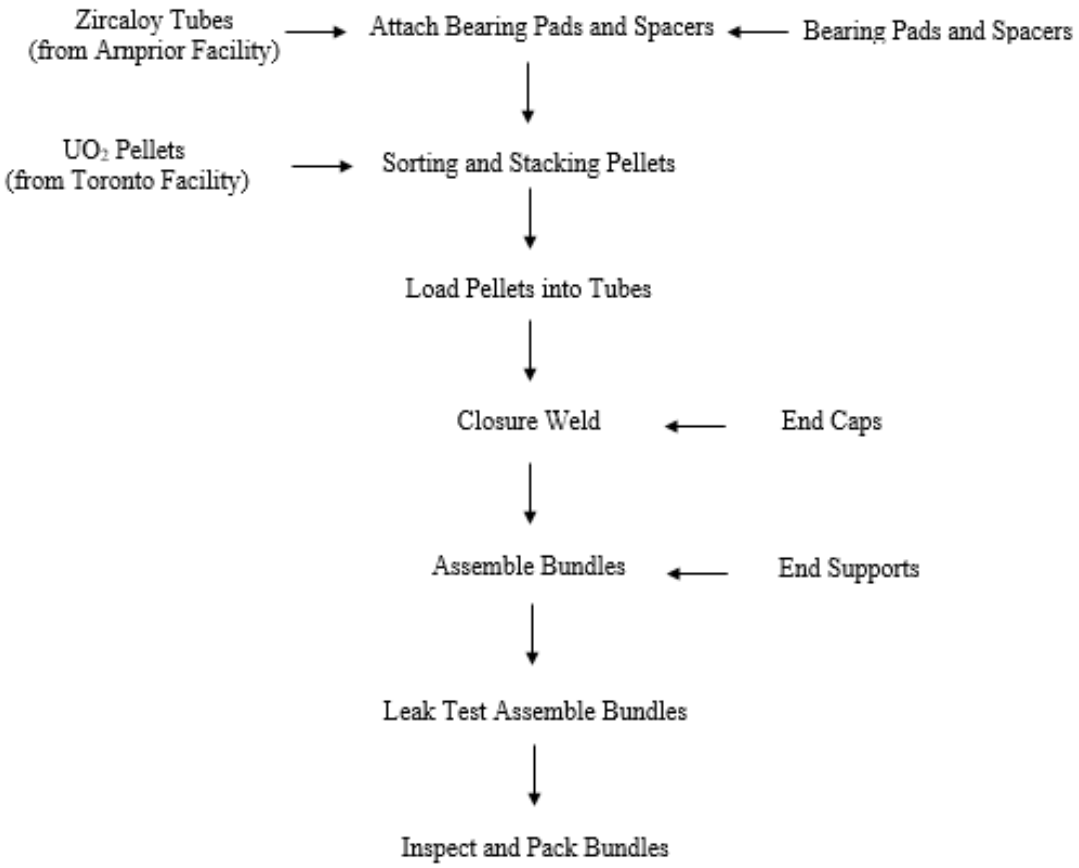

Figure 2: Fuel Bundle Fabrication Process

In addition to fuel fabrication, contaminated equipment from off-site nuclear facilities may be periodically received at the facility for repair and/or modification. No contaminated equipment was received in the reporting period.

BWXT NEC is federally regulated for health and safety. The federal health and safety legislation is the *Canada Labour Code Part II* and the *Canada Occupational Health and Safety Regulations*. The *Canada Labour Code* is enforced by Employment and Social Development Canada. The purpose of Part II of the *Canada Labour Code* is to prevent accidents and injury to health arising out of, linked with or occurring in the course of employment. BWXT NEC is additionally regulated environmentally through municipal sewer use bylaws and provincially by the Ontario Ministry of the

Environment, Conservation and Parks (MECP). The BWXT NEC facility is also regulated federally by Transport Canada.

BWXT NEC is committed to the establishment and continuous improvement of a healthy safety culture. Safety culture refers to the core values and behaviours resulting from a collective commitment by our Company's leaders and individuals to emphasize safety, quality, ethics, and security over competing goals to ensure protection of people and the environment. The Environment, Health and Safety (EHS) Mission Statement defines it as a top business priority to continuously improve our EHS systems to protect fellow employees, the environment, and our communities against known and potential environmental, health and safety hazards. The BWXT NEC management team reviews, prioritizes and controls workplace hazards and ensures compliance with the pertinent regulatory requirements, applicable codes and company policies.

The primary radiological hazard from uranium is the inhalation of UO_2 particles. A lesser radiological hazard exists in the form of low-level external gamma and beta radiation exposure to employees. Measurements are performed for various parameters to confirm hazards are mitigated. Measurements for airborne and surface traces of uranium are an indicator of process containment efficiency. Urine samples provided by employees are used to indicate if inhalation may have occurred. Whole body, skin and extremity dose measurements are conducted to demonstrate compliance with the dose limits specified in the *Radiation Protection Regulations* and the ALARA principle. All measurement results for employees were below regulatory limits and Action Levels.

Air and water emissions are routinely measured to demonstrate regulatory compliance and the ALARA principle. Annual releases were a small fraction of regulatory limits and all measurements were below Action Levels. Table 1 defines the acronyms used in this report.

Table 1: Definition of Acronyms

Acronym	Definition
ALARA	As Low as Reasonably Achievable
ATS	Action Tracking System
BWXT NEC	BWXT Nuclear Energy Canada Inc.
CANDU®	CANadian Deuterium Uranium
CCAB	Canadian Council for Aboriginal Business
CCME	Canadian Council of Ministers of the Environment
CLC	Community Liaison Committee
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
CTS	Critical-to-Safety
dpm	Disintegrations per minute - unit of measure for radioactivity 1 dpm = 0.017 disintegrations per second
EHS	Environment, Health and Safety
FHA	Fire Hazards Analysis
IAEA	International Atomic Energy Agency
MECP	Ministry of the Environment, Conservation and Parks

Acronym	Definition
MP	Member of Parliament
MPP	Member of Provincial Parliament
mSv	milliSievert – unit of measure for radiation dose 1 mSv = 0.001 Sv = 1,000 µSv
NEW	Nuclear Energy Worker
PAR	Progressive Aboriginal Relations
PDP	Preliminary Decommissioning Plan
POI	Point of impingement
ppm	Parts per million
SSC	Systems, structures and components
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
UO_2	Uranium Dioxide
µSv	microSievert – unit of measure for radiation dose 1 µSv = 0.001 mSv = 0.000001 Sv
WSC	Workplace Safety Committee

3 SAFETY AND CONTROL AREAS

3.1 Operating Performance

The "Operating Performance" Safety and Control Area covers an overall review of the licensed activities.

BWXT NEC has successfully implemented and maintained a program for safe operation of the facility and reflects the Facility Safety Analysis. BWXT NEC has established essential documentation (as specified by the Business Management System) including procedures describing the program or system process and work instructions outlining the steps required to complete an individual or set of tasks. This includes the written work instructions for handling of radioactive materials by workers to ensure activities are conducted in a manner that is protective of workers, the public and the environment; as well as full and accurate records to show the acquisition of nuclear substances, inventory of all radioactive nuclear substances and the disposition of all nuclear substances acquired for use or processed by BWXT NEC.

Over the reporting period, BWXT NEC continued to operate in a manner that supports the company mission to continuously improve EHS systems to protect fellow employees, the environment, and communities against known and potential environmental, health and safety hazards. Operating performance is monitored with key performance indicators and program goals. Reporting of EHS-related concerns is encouraged through a rewards program. These are assigned and tracked to completion in the Gensuite® software system and is used as a measure of employee engagement. In accordance with EHS program requirements, internal audits and self-assessments are conducted routinely to assess conformance to internal and external requirements. Licensed activity audits and self-assessments are summarized in subsequent sections.

The BWXT NEC management team continued to review, prioritize and control workplace hazards and ensure compliance with the pertinent regulatory requirements, applicable codes and company policies. Facility operations continued routinely and safely. Fuel pellets were assembled into CANDU® reactor fuel bundles and were then safely shipped to customers. Plant personnel followed procedures satisfactorily, as reflected in internal and external audits, self-assessments, radiation surveys, contamination monitoring, air sampling measurements and other safety inspections. Details are provided in subsequent sections of this report. There were no Action Level exceedances during the reporting period. Additionally, there were no significant modifications made to the facility in 2022.

The President of BWXT NEC is responsible for all activities within the company. The various functional groups, such as Human Resources, EHS, Quality and Communications report directly or indirectly to the President. Senior Management accountability for the effectiveness of the management systems is defined. The Director, EHS & Regulatory is responsible for the overall EHS program. During the reporting period, the Director of OPEX and Quality departed the business with responsibilities passing to the Quality Manager Peterborough. The company organization structure are shown in Figure 3 below.

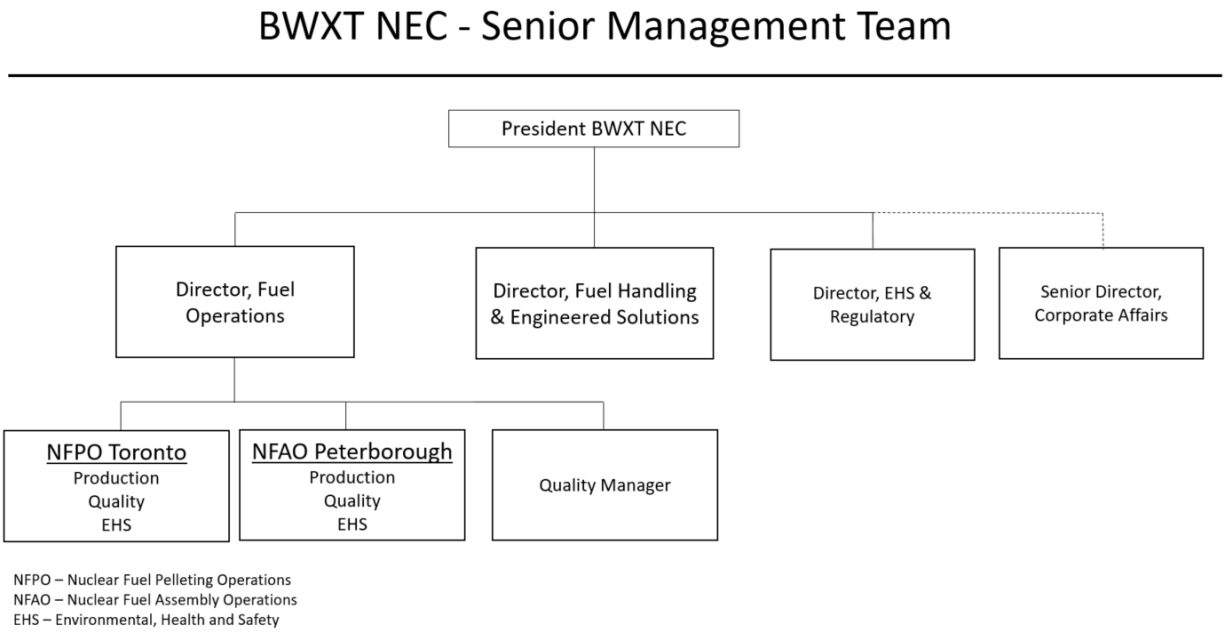

Figure 3: BWXT NEC Organization Structure

BWXT NEC Peterborough maintains five EHS related committees that review activities including proposed changes to ensure safe plant operations. They are:

- Health and Safety Policy Committee - comprised of unionized workers and management to contribute to making the company as safe as possible by promoting health and safety awareness, making recommendations to workers and management regarding policies and procedures for safe working practices
- Workplace Safety Committee (WSC) - comprised of unionized workers and management to prevent accidents and occupational illness by promoting health and safety awareness, making recommendations to workers and management regarding safe work practices and monitoring health and safety issues until resolved

- As Low as Reasonably Achievable (ALARA) Committee - comprised of unionized workers and management to continuously improve the radiation safety program and implement ALARA practices where practical to ensure that radiation doses are as low as reasonably achievable.
- Beryllium Safety Committee – comprised of unionized workers and management to continuously improve the beryllium safety program and reduce potential beryllium hazards to workers.
- Ergonomics Committee - comprised of unionized workers and management to develop, monitor and administer the ergonomic procedure and recognize, reduce and where possible eliminate physical and cognitive ergonomic risk factors.

3.1.1 Possession and Processing

All possession and processing limits, as specified in the CNSC facility operating licence were met. Production data is proprietary and is provided separately to the CNSC in Appendix A.

Production shutdowns were scheduled throughout the year for engineering projects, equipment maintenance and continuous improvements. Shutdowns in the reporting period included one week in the first quarter, three weeks in the third quarter, and one week in the fourth quarter.

3.1.2 Regulatory Inspections

Excluding safeguards related inspections, which are described in section 3.13 of this report, there were three regulatory inspections during the reporting period.

1. An inspection was completed in February, focused on the Environmental Protection Program. No non-compliances and no recommendations were issued.
2. An inspection was completed in March, focused on Fitness for Service. No non-compliances and one recommendation was issued relating to the tracking of actions that arise from contractor inspections.
3. The third inspection was completed in August, focusing on the Packaging and Transport Safety and Control Area, Radiation Protection, Conventional Health and Safety, and Environmental Protection. Three non-compliances were issued, two of which were regarding packaging, and the third relating to use of TLDs. Two recommendations were identified regarding personal protective equipment. All non-compliances and recommendations are of low safety significance and do not pose immediate risk to people or the environment.

When applicable, all corrective and preventive actions related to Non-compliances are submitted to the regulator and tracked to closure.

3.2 Management System

The "Management System" 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 management system is a set of policies and procedures designed to ensure applicable buildings and facilities, process equipment, and processes used in support of licensed activities, are conducted in accordance with the *Nuclear Safety and Control Act* and associated regulations, applicable CNSC requirements, jurisdictional requirements and compliance best practices. A graded

approach is used in the application of the management system program elements, such that the requirements are applied in a manner commensurate with the safety significance of the licensed activity, system, component or structure.

The management system is comprised of the following core program elements:

1. Organization and Responsibilities
2. Personnel Capability
3. Use of Experience
4. Work Planning Control
5. Work Processes Control
6. Verification
7. Problem Identification and Resolution
8. Corrective Action
9. Change Control
10. Document Control and Records
11. Audits
12. Management Self-Assessment
13. Management Program Review
14. Supply Chain

The President of BWXT NEC is responsible for all activities within BWXT NEC. Operations and the various functional groups, such as Human Resources, Environment Health and Safety, and Quality Assurance, report directly or indirectly to the President.

Senior Management accountability for the effectiveness of the management systems has also been defined. For example, the Quality Manager has been assigned the responsibility for monitoring and assessing the effectiveness of the business licensed activity management system and is responsible for identifying problems, initiating or recommending solutions, and confirming their implementation and effectiveness. The company senior management organization structure is shown in Figure 3.

The management system is fully implemented and compliant with CSA N286-12, *Management System* Requirements *for Nuclear Facilities*. All management system documentation required by licence condition 2.1 is in place. The EHS Policy establishes the direction for the management system. Continuous improvement is achieved through several review processes, including self-assessments, audits, and management reviews. There were no major changes to the management system or responsibilities during the reporting period.

BWXT NEC's corporate policy describes BWXT NEC's commitments to the establishment and continuous improvement of a safety culture. The safety culture refers to the core values and behaviors resulting from a collective commitment by BWXT NEC leaders and individuals to emphasize safety, quality, ethics and security over competing goals to ensure protection of people and the environment.

BWXT NEC is committed to maintaining a strong safety culture and clearly states the expected safety culture behavior. For example, the promotion of a standard set of human error reduction tools for job-site workers and knowledge workers, which include:

1) Procedure Use and Adherence;

2) Questioning Attitude;

3) Situational Awareness;

4) Self-Checking.

BWXT NEC's commitment to a strong safety culture is measured by tools such as employee concerns, incident investigations, audits and self-assessments, use of experience and corrective action program metrics that measure the effects of safety culture improvements. External agencies such as the CNSC audit BWXT NEC operations against CSA standards, which include safety culture requirements (e.g., CSA N286-12).

In the reporting period, there were no major program changes. Where required, revised documents were submitted to CNSC staff in accordance with the requirements in the licence conditions handbook.

3.2.1 Licensed Activity Related Self-Assessments

The Self-Assessment program governs a proactive process for self-critical, candid and objective evaluation of performance by a functional area measuring their process performance against internal procedures, expectations, goals established from business plans or external benchmarking standards. The Self-Assessment Program is a management tool used to engage the workforce in early and proactive detection of organizational or systematic weaknesses. It is a functional manager's opportunity to take a structured look at their own function. Self-Assessments help identify low level issues or trends for early resolution before more significant problems occur.

A Self-Assessment schedule is prepared annually and ensures that each program element is reviewed periodically based on a risk-related approach. A summary of self-assessments conducted in the reporting period is provided in Table 2. The identified non-conformances were of low consequence, with the majority related to improvements in documentation accuracy and compliance, as well as record keeping. All identified non-conformances are assigned and tracked to closure. There were no systemic deficiencies identified. The assessed program elements were determined to be effective.

In addition to the Self-Assessment program, routine compliance reviews are periodically completed against regulatory EHS requirements, such as general environmental, water management, safety management and emergency response.

Table 2: Summary of Self-Assessments

Program Element	Number of Non-Conformances
CTS Calibration	1
CTS Procurement	2
Respiratory Protection	3
Change Control	5
Emergency Preparedness	1
Radiation Protection (incl Dosimtery)	2
Total	**14**

3.2.2 Licensed Activity Internal Audits

Internal auditing is an independent, objective activity designed to add value and continuously improve programs. Periodic assessment of program effectiveness is conducted through systematic internal audits that are planned and carried out on behalf of management to measure performance, the effectiveness of the program element processes and to promote continuous improvement. An audit schedule is prepared annually and ensures that each licensed activity program element is audited at least once every three years. Table 3 provides a summary of internal audits conducted in the reporting period. The identified non-conformances were of low consequence, with the majority related to the accuracy and detail in documentation and procedural adherence. All identified non-conformances are assigned and tracked to closure. There were no systemic deficiencies identified. The assessed program elements were determined to be effective.

In addition, a summary review of all the non-conformances is conducted as part of the management review to determine if any systemic deficiencies have been identified. Based on the review, continuous improvement opportunities are discussed and documented in meeting minutes with actions tracked to closure.

Table 3: Summary of Internal Audits

Audit Scope	Number of Non-Conformances
Environmental Management System (ISO-14001:2015)	0
Dangerous Goods Shipping	2
Management Programs	0
Radiation Protection (Internal Hazards)	0
Total	**2**

3.2.3 Management Reviews

Management reviews for EHS program elements are conducted annually before the end of April to review the previous calendar year activities. The EHS management reviews encompass the following items:

- Status and follow-up of actions from previous management reviews;
- Results of applicable external agency audits;

- Open regulatory compliance obligations;
- Results of “Reg Auditor” (Gensuite) compliance evaluations;
- Results of licensed activity management system internal and external audits (where applicable);
- Results of licensed activity management system management self-assessments;
- Trends in non-conformances (Gensuite Action Tracking System items) for closure metrics;
- EHS related quality assurance program actions;
- Trends in Incident and Measurement (Gensuite) items for root cause;
- Status of EHS training activities;
- Procurement process;
- Extent to which Environmental, Health and Safety and ALARA objectives and targets have been met;
- Radiation dose trends;
- Communications and changes in the needs and expectations of interested parties, including complaints;
- Changing external and internal issues, including compliance obligations;
- Changes in risks and opportunities;
- Opportunities for continual improvement;
- Evaluation of the effectiveness and continuing suitability of the EHS Mission Statement and the Environment, Health and Safety Program, which includes the EHS management system and hazard prevention program.

The above inputs are reviewed to ensure continuing suitability, adequacy and effectiveness of the management system. The criteria for these are:

- **Suitable**: Does the system satisfy the requirements and represent the best way of doing things for our business?
- **Adequate:** Is the system fit for its current purpose?
- **Effective:** Does the system enable the right things to be done? Is it driving continuous improvement?

Formal meeting minutes are prepared. The previous management review meeting resulted in five actions that were formally issued for follow-up by the applicable functional lead(s), and were tracked to closure in the Action Tracking System (ATS). Three actions were related to improved communication and/or review of data. These included one action to add a year over year review of the number of non-conformances from self-assessments and audits for future management review meetings, another action to change the order of items in the EHS mission statement to convey the importance of nuclear safety culture, and third, to create a formal event sharing process to ensure sites are learning lessons from each other’s incidents. The fourth action was to revise a chart included in the management review and the fifth was to develop a means to trigger the separation of Fuel Handling & Engineered Solutions details in future years. No systemic deficiencies were noted. Overall, the implemented management system for the licensed activity program was considered suitable, adequate and effectively implemented. Continuous improvement remains a priority.

3.3 Human Performance Management

The "Human Performance Management" Safety and Control Area covers activities that enable effective human performance, through the development and implementation of processes that ensure that BWXT NEC staff members are sufficient in numbers in all relevant job areas, and have the necessary knowledge, skills and tools in place to safely carry out their duties.

The training program is outlined in the licensed activity management system manual, and business-wide training procedures. Qualifications and training requirements are identified and personnel are given the appropriate training to ensure they are competent at the work they do. This training includes on-the-job training, radiation protection and safety risk assessment training. Workers only perform functions for which they are qualified. Compliance to regulatory training completion is a key performance indicator that is tracked throughout the year. Key EHS course completion details are provided in Table 4. Note: N/A indicates that zero employees required the course during the reporting period.

Table 4: Key Training Course Completion Summary

Course Name	% Complete
Aerial Lift Practical	100%
Aerial Lifts	100%
Authorized Person Security	100%
Compressed Gas Safety	100%
Electrical Hazards: Shock, Electrocution, Arc Flash & Arc Blast	100%
Electrical Safety 2.0 – Canada	100%
Emergency and Disaster Preparedness – Canada	100%
Emergency Response Awareness	100%
Fall Protection Advanced	100%
First Aid (Standard)	100%
Indoor Hoisting and Rigging – Canada	100%
Lockout Tagout (LOTO) Procedure	100%
Lockout Tagout (LOTO) Try-Out Demonstration	96%
Lockout/Tagout 2.0 – Canada	100%
Manufacturing Area Hazards Awareness (includes Radiation, Beryllium, Asbestos, and General Health & Safety)	100%
Overhead Cranes Level 1 Practical	100%
Overhead Cranes Level 2 Services & Practical	100%
Portable Fire Extinguisher Training (Practical)	100%
Portable Fire Extinguishers – Canada	100%

Course Name	% Complete
Powered Industrial Truck Safety with Propane Handling	100%
Powered Walkie Stacker Safety	100%
Radiation Instrumentation	100%
Respirator Selection Use and Care	N/A
Respiratory Protection 2.0 - Canada	100%
Security Awareness - Peterborough	100%
Transportation of Dangerous Goods	100%
Uranium Transportation Emergency Response Assistance	100%
Workplace Hazardous Materials Information System (WHMIS)	100%

*The courses that were less than 100% complete by December 31, 2022 were completed by January 31st, 2023.

During the reporting period there were several opportunities to simplify and improve training. Examples of these include:

- The Canada Labour Code II course for Supervisors was updated to include a Skillsoft online course in Success Factors
- WSC and Policy Committee members completed a half-day course offered by WSPS on Canada Labour Code Part II roles and responsibilities with a focus on safety committee duties.

The Peterborough facility is staffed with a sufficient number of qualified workers as well as the minimum number of responsible people to carry on the licensed activities safely and in accordance with the *Nuclear Safety and Control Act* and associated regulations. EHS and other staff are available after business hours as needed through cell phones and paging devices.

3.4 Safety Analysis

The "Safety Analysis" Safety and Control Area covers the maintenance of the safety analysis which supports the overall safety case for the facility. The safety analysis is a systematic evaluation of the potential hazards associated with the conduct of an activity or facility, and considers the effectiveness of preventive measures and strategies in reducing the effects of such hazards. The safety analyses utilize a combination of What-if Analysis, Hazards and Operability and Quantitative Risk Analysis and documents a systematic evaluation of hazards associated with the licensed facility.

Modifications to the facility are made in accordance with the business-wide Change Control program, which requires review of EHS parameters for new or modified facilities, processes, and new or relocated machinery, apparatus and equipment. Under this process, a proposed modification is screened for potential impact on the facility safety analysis. Where screening identifies a potential impact, a more detailed review of the proposed modification is conducted to identify if the change impacts a safety system, or the basis of the safety assessment (e.g. materials, quantities, locations, etc.). Third-party reviews or regulatory approvals are conducted as required. In this way, impacts on the safety analysis are identified and the safety analysis is validated and updated, where necessary.

During the reporting period, no updates of the safety analysis report were made. The safety analysis report concludes that the engineered and administrative controls provide protection over a broad range of operating conditions that both restricts the likelihood of events and adequately protects the public and environment.

3.5 Physical Design

The "Physical Design" Safety and Control Area relates to activities that impact on the ability of systems, structures and components (SSC) to meet and maintain their design basis, given new information arising over time and taking into account changes in the external environment.

Changes made to the physical facility, equipment, processes, procedures or practices that could adversely affect product quality, employee health and safety, the environment or the public as a result of the operation are assessed through the Change Control program. Any changes to the design basis are identified and assessed by key stakeholders through this program, including third-party reviews as required. Adequate mitigations are applied including modification of the proposed change, up to rejection of the proposed change.

During the reporting period, there were no modifications to the physical facility that altered the design basis. During the reporting period new fans were installed in two of the beryllium ventilation systems and additional ventilation was provided at process equipment.

3.6 Fitness for Service

The "Fitness for Service" 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 function when called upon to do so.

A Critical to Safety (CTS) program is in place. CTS items are those hardware items that directly ensure the safety of workers, protection of the environment, or regulatory compliance in the following three categories:

- Equipment and infrastructure identified as Safeguard Measures in the Facility Safety Analysis reports;
- Respiratory personal protective equipment; and
- Instrumentation generating data to demonstrate Regulatory Compliance.

BWXT NEC documentation describes the CTS program for the production of nuclear fuel, including CTS items common to both business units, Fuel Manufacturing and Fuel Handling and Engineered Solutions. Equipment identified on the CTS list is governed by a number of assurance procedures.

The CTS program elements include the following:

- Process to identify CTS equipment;
- CTS inventory list revision control;
- Procurement controls governing ordering and incoming verification to confirm CTS equipment received matches the CTS equipment list requirements;
- Requirements in the established change management program to adequately capture new additions and ensure sufficient detailed review of changes to existing CTS equipment; and
- The factors determining the preventive maintenance schedule of CTS Equipment.

The facility is using an asset management and preventive maintenance software system. Maintenance Connection® is a web-based maintenance management software for work order and

asset management. Maintenance Connection assists BWXT NEC in efficiently managing preventive maintenance tasks as well as to control and identify maintenance on CTS and Critical-to-Quality assets and components. Preventive maintenance tasks on CTS equipment are designated in this system as described in the business wide *Enterprise Asset Management Program Procedure*.

Certain CTS tasks have associated immediate independent post-maintenance verification or testing. For example, independent verification is in place on the beryllium ventilation systems during filter changes.

All CTS tasks issued in the reporting period are closed. In the reporting period, 98% of CTS tasks issued were completed within 14 days of the target completion date.

Preventive maintenance is considered during the assessment of changes as part of the business-wide Change Control program. Additionally, in the event of a near miss, incident, injury, inspection or suggestion, the preventive maintenance program for related equipment is reviewed as applicable. As a result, during the reporting period, the following improvements were implemented:

- Water level sensors and audible alarm system was installed in the beryllium acid rinse tank overflow compartment and surrounding floor area.
- Improvements were made in the beryllium area and uranium handling area cleaning & decontamination duties.
- Increased inspection of the integrity of sound insulation and pro-active tri-annual replacement of sound insulation on punch presses.
- Replacement of sprinkler heads in building 24 and on the first floor of building 21.

Managing aging means ensuring the availability of required safety functions throughout the service life of the plant, with account taken for changes that occur with time and use. Aging management applies to SSCs that can, directly or indirectly, have an adverse effect on the safe operation of the plant. The asset management program accounts for aging through the CTS program inspection, testing and maintenance tasks. These processes provide warning signs and initiate corrective and preventive maintenance activities. Items identified for replacement are assessed through the Change Control program.

The preventive maintenance program is periodically assessed through self-assessments and internal audits, discussed in section 3.2 of this report. Key performance indicators are in place and are routinely reviewed. The program is adequate and effective and is continually improved.

3.7 Radiation Protection

The "Radiation Protection" Safety and Control Area covers the implementation of the radiation protection program, in accordance with the *Radiation Protection Regulations*. BWXT NEC has a well-established and effectively implemented radiation protection program, which includes a commitment to ALARA and continuous improvement. The program addresses the radiation hazards associated with UO_2. This program ensures that surface/airborne contamination and radiation doses to employees and the public are monitored and controlled. The Director, EHS & Regulatory, has oversight of BWXT NEC's radiation protection program.

Internal radiation hazards exist in the form of loose uranium which may enter the body by inhalation, ingestion or absorption. As a result, air monitoring is conducted at various work stations within the facility as appropriate. Workstation air monitoring is a key performance indicator that speaks to effective administrative and engineered controls. A respiratory protection program is in place in accordance with CSA Z94.4-18, *Selection, use, and care of respirators.* Additionally, surface contamination measurements (swipes) are conducted in manufacturing areas to monitor and reduce the amount of loose radioactive material available for potential internal exposure of employees. As

these monitoring processes produce large quantities of data, trending of data is performed at least annually and reviewed by the ALARA committee.

Additionally, urine samples are regularly provided by employees to indicate if inhalation may have occurred. Sampling frequency is once per three months, based on established criteria such as job function and worker location within the facility. Criteria which determine the frequency of urine sampling for an employee are documented in the radiation protection program.

A second radiological hazard exists in the form of low-level external gamma and beta radiation doses to employees. Routine gamma surveys are conducted and Nuclear Energy Workers (NEWs) are issued thermoluminescent dosimeters (TLDs) to measure whole body, skin and extremity dose to ensure compliance with the regulatory radiation dose limits and the ALARA principle. Dose results are reviewed by EHS staff on receipt from the licensed dosimetry service provider. In addition, the ALARA Committee reviews trending data from radiation monitoring results through routinely scheduled meetings and provides recommendations to improve ALARA implementation.

As external radiation hazards from the storage and use of radioactive materials may result in radiation doses to workers, routine gamma radiation surveys are conducted within the facility using real-time portable handheld radiation detectors. Measured dose rates are compared to established dose rate targets for a given area based on area classification and occupancy. When necessary, items are moved to alternative storage locations and/or shielded. Areas that appear routinely higher than target dose rates are investigated for permanent improvements, such as shielding or reconfiguration.

A component of the radiation protection program is area classification. Areas of the facility are classified into four different categories for the purpose of controlling the spread of radioactive contamination, and ensuring appropriate engineered and administrative controls are in place. These classifications are defined in the *Radiation Protection Manual* as follows:

- Unclassified Area - these areas do not involve nuclear substances and are considered public domain. Incidental contamination does not exceed the unclassified area Internal Control Levels.
- Active Area - these areas are designed for handling materials with loose contamination that is potentially above unclassified area Internal Control Levels. External radiation hazards are not of significant concern.
- R1 Area - these areas are designed for operations where only external radiation is of concern, and loose contamination is below R1 area Internal Control Levels.
- R2 Area - these areas are designed for operations involving exposed non-dispersible nuclear substances, where external radiation is of concern and loose contamination may be above R1 Internal Control Levels.

BWXT NEC has established CNSC accepted Action Levels for various radiological and environmental parameters. An Action Level is defined in the *Radiation Protection Regulations* as “a specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee’s radiation protection program, and triggers a requirement for specific action to be taken.” Action Levels are established in accordance with the CNSC regulatory document G-228, *Developing and Using Action Levels*, which are accepted by the CNSC and specified in the licence conditions handbook (refer to Table 5). Although Action Levels are set below regulatory limits, exceeding an Action Level is considered a CNSC reportable event in which BWXT NEC must notify the Commission within 24 hours of becoming aware that an Action Level has been exceeded. Accordingly, BWXT NEC has established Internal Control Levels for various radiological and environmental parameters that are set even lower than Action Levels to act as an early warning

system. An Internal Control Level exceedance results in internal investigation and corrective and preventive action. During the reporting period, all measurements were below Action Levels and regulatory limits.

Table 5: Summary of Action Levels for the Radiation Protection Program

Nuclear Energy Worker	**Period**	**Action Level (mSv)**	
Effective dose	Quarter of a year	4.0	
Effective dose	1 year	12.0	
Effective dose	5 years	60.0	
Skin dose	1 year	100	
Extremity dose	1 year	200	
Pregnant NEW	Balance of the pregnancy	3.5	
Parameter		**Action Level**	
Urinalysis		10 µg/L for any period	
Nuclear Substance and Form	**Action Level**		
Uranium in Airborne Contamination	Unclassified Area	R1 Area	R2 Area
	12 dpm/m^3	12 dpm/m^3	36 dpm/m^3

BWXT NEC has a well-established integrated management system for environmental, health and safety program excellence. The radiation protection program is effectively implemented. BWXT NEC has an established *EHS Mission Statement* that is reviewed and signed annually by the President of BWXT NEC. The *EHS Mission Statement* includes a commitment to ALARA and continuous improvement. Elements of the radiation protection program such as dose monitoring, contamination monitoring, and radiation field surveys, etc. are conducted by qualified workers and reviewed internally by EHS staff and Committees on a regular basis. Details of the reviews are recorded in meeting minutes.

An internal audit and self-assessment of the radiation protection program, with a focus on elements of radiation protection program effectiveness and compliance, is conducted annually. Non-conformances are addressed and tracked to completion in accordance with program requirements.

In accordance with the *Radiation Protection Regulations* and CNSC Guidance Document G-129, *Keeping Radiation Exposures and Doses As Low As Reasonably Achievable*, BWXT NEC has implemented a radiation protection program. This document establishes the radiation protection program in place and identifies corresponding procedures to ensure that radiation exposures and doses are kept ALARA.

Key components of the radiation protection program include:

- Compliance with all relevant regulatory requirements;
- The setting of ALARA goals and objectives;
- Hazard recognition, risk assessment and change control processes;
- A comprehensive worker training program; and

- Documented safety concerns, near misses and incidents with appropriate root-cause analysis, preventive and corrective actions.

The radiation protection program includes all worker radiation safety elements that demonstrate compliance to relevant regulations, codes and standards:

- EHS policy commitment to ALARA
- Area classifications and requirements
- Material handling
- Non-routine or high-risk work controls
- Internal and external radiation hazard assessments
- Internal and external radiation monitoring and recording

Continuous improvement is achieved through several review processes, including site inspections, reported safety concerns, near miss and incident investigations, self-assessments, internal and external audits.

The radiation protection program is well-established and effective. While radiation dose trends are showing an increasing trend, these are likely as a result of slightly increased inventory, increased product handling, as well as personnel staffing challenges. The company maintains its commitment to ALARA. Dose reduction continues to remain a priority, with ongoing efforts towards shielding, material movement, improving ALARA awareness (e.g. use of leaded blankets on product), and TLD wear and storage compliance. Program goals are monitored through the site's ALARA Committees as summarized in section 3.7.1.

3.7.1 ALARA Committee Performance

The ALARA committee works to review and continuously improve elements of the radiation safety program, and implement ALARA practices where practical in order to ensure that radiation dose levels are as low as reasonably achievable. Committee members consist of both unionized and management employees. The ALARA committee targets quarterly meetings at a minimum. The committee met four times during the reporting period. Dose results, radiation protection related events, audits, and employee concerns were reviewed and discussed. Actions are assigned and tracked as part of the meeting minutes. Committee activities are communicated to all workers via email distribution and employee notice board postings.

ALARA Committee goals and results for the reporting period are provided in Table 6. Goals that are not achieved are informally reviewed by the ALARA Committee to discuss probable causes. The feasibility of achievement is discussed and implementation plans revised as needed. As radiation doses continue to be well below the regulatory dose limits, dose reductions become increasingly challenging.

All Committee goals were partially completed this year. TLD audits are conducted periodically to ensure workers are wearing and storing their dosimeters as required to ensure accurate measurements. Overall, the site achieved 99.3% compliance that demonstrates a strong adherence to requirements. Shielding was installed on the north wall of the tech area. The ALARA awareness campaign was rolled out only with the ALARA committee. Staffing changes limited a broader roll out of the initiative.

The results of swipes, air sampling, urinalysis, gamma surveys and radiation dose monitoring was reviewed with the Committee. No areas of concern were noted. Monitoring continues in accordance with the radiation safety program requirements.

Table 6: ALARA Committee Goals and Results

2022 ALARA Committee Goals	Actual	Result
>99% compliance in TLD audits	99.3%	Achieved
Complete one shielding project by year end	1/1	Achieved
Implement an ALARA awareness campaign	Incomplete	Not Achieved

2023 ALARA Committee goals are established as follows:

1. >99% compliance in TLD audits
2. Complete a shielding project by year end
3. Implement an ALARA awareness campaign
4. Review the visual presentation of the radiation metrics for improved meaning and understanding on the shop floor.

3.7.2 Radiation Protection Training Program and Effectiveness

Radiation protection training programs are compliant with the Systematic Approach to Training (SAT) methodology. An internal or external specialist in radiation protection periodically provides classroom training to new and continuing NEWs or those working in areas with radioactive materials. Online training is also available to employees with computer access. Testing is performed on completion of the training to demonstrate employee understanding. Radiation protection training is rolled into the site-wide Manufacturing Area Hazards Awareness course. Course content includes general shop floor rules, radiation fundamentals, sources of ionizing radiation, health effects, emergency response and other safety-related content. Training completion is monitored using a learning management software system, which tracks and triggers retraining as required. Course completion details are provided in section 3.3. Training effectiveness is monitored through radiation dose results, internal inspections, self-assessments and audits as well as incident investigations.

3.7.3 Radiation Device and Instrumentation Performance

Radiation detection instrument error can occur due to a variety of factors: drift, environment, electrical supply, addition of components to the output loop, process changes, etc. The facility maintains a system for managing radiation detection instrument calibrations. Calibration is conducted to ensure accurate indication during field use. Calibrations are performed under environmentally controlled conditions suitable for the inspections, measurements, and tests being performed, as determined by the equipment manufacturer. Calibration intervals are established, so that calibration occurs before any anticipated significant changes occur in measurement capability. Radiation detection equipment calibrations are conducted within 12 months of the previous calibration as required by regulation.

All active radiation devices and instruments were maintained in a state of safe operation. Where calibration is expired or where detectors fail calibration, they are removed from service until they are repaired and meet radiation calibration expectations.

There were no changes to the calibration program during the reporting period.

3.7.4 Contamination Control Data

When radioactive material is handled in a non-sealed container, there is the potential for it to be spread onto other objects. This is known as radioactive contamination. Radioactive contamination refers to small amounts of nuclear substances on surfaces or within the air, where its presence is unintended or undesirable.

Surface contamination measurements (swipes) are conducted in manufacturing areas of the facility. Contamination by itself is not necessarily an indicator of exposure potential but can be used as an indicator of housekeeping conditions; however significant amounts of loose surface contamination has the potential to become airborne. If this occurs, the air monitoring results will reflect the increased airborne concentration and appropriate corrective action is then taken. Internal Control Levels are applied to each area classification. In the event a swipe measurement exceeds an Internal Control Level; the area is cleaned and re-swiped to verify cleanliness. Trends are monitored. There were no significant personnel contamination events during the reporting period.

Routine surface contamination measurement results are summarized in Table 7. Surface contamination remains very low. Surface contamination results are reviewed by EHS staff and discussed if necessary at ALARA Committee meetings. Overall, 99.6% of routine swipes were within Internal Control Levels, indicative of effective contamination control measures and cleaning schedules.

The exceedance in the R2 area was found on the handle of a lift truck and was attributed to contaminated gloves that were not changed before operating the equipment. The R2 area is rigorously cleaned and is expected to have potential surface contamination. Retraining supported by sampling in this area throughout the remainder of the year shows that the program is working. Exceedances of the internal control level occurred on a fork lift tire and on a piece of analytical equipment where uranium containing elements are tested. Upon cleaning and resampling no further issues were found.

Table 7: Summary of Surface Contamination

Surface Contamination					
Classification and Area Description	**Internal Control Level**	**2021**		**2022**	
		Number of Samples	**Number Samples Exceeding Internal Control Level (%)**	**Number of Samples**	**Number Samples Exceeding Internal Control Level (%)**
R2 - Pellet Loading, Element Welding and Pellet Storage	2,200 dpm/100 cm^2	617	0 (0%)	637	1 (0.2)
R1 - Bundle Assembly, Inspection, Receiving, Building 24	220 dpm/100 cm^2	116	0 (0%)	128	0 (0%)
Active - Met Lab, Waste Room	220 dpm/100 cm^2	104	0 (0%)	90	1 (1.1%)
Unclassified - Items, Main Hallway	220 dpm/100 cm^2	585	0 (0%)	431	1 (0.2%)

3.7.5 Air Monitoring

As part of a well-established and implemented industrial hygiene program, breathing air is sampled for measurement of uranium content. Workstation air monitoring is a key performance indicator that speaks to effective administrative and engineered controls. A respiratory protection program is in place. Non-routine work functions, such as machine maintenance, modifications, etc. are controlled by EHS Work Permits. These processes specify protective measures, including those to reduce exposure to airborne UO_2. This may or may not include air monitoring and/or respirator use.

Each process workstation where open UO_2 pellets are handled are periodically monitored during routine operations for airborne UO_2. All filter papers are analysed in-house and verified by an independent external laboratory using delayed neutron activation analysis. Workstation air sampling results are summarized in Table 8. Average and maximum workstation air monitoring results continue to remain negligible and well below Internal Control Levels.

Table 8: Workstation Air Monitoring Summary

Workstation Air Monitoring	2018	2019	2020	2021	2022
Number of Different Workstations Sampled	4	4	4	6	6
Total Number of Samples Collected	49	47	47	81	46
Total Number of Samples Exceeding Internal Control Level (facility and area specific)	0	0	0	0	0
Total Number of Samples Exceeding Action Level (facility and area specific)	0	0	0	0	0
Average Concentration (dpm/m^3)	0.05	0.04	0.03	0.09	0.19
Maximum Value Recorded (dpm/m^3)	0.15	0.12	0.17	0.67	0.85

3.7.6 Facility Radiological Conditions

Radiation fields from use and storage of radioactive materials may result in external radiation doses to workers. In order to ensure that radiation dose rates are ALARA, routine gamma radiation surveys are conducted periodically using calibrated portable handheld radiation detectors. Measured dose rates are compared to targets for areas based on area classification and occupancy. When necessary, items are moved to alternative storage locations and/or temporarily shielded. Areas that appear routinely higher than target dose rates may be investigated for improvements, such as permanent shielding or reconfiguration. Routine dose rate measurements are summarized in Table 9. Dose rates remain low and steady. The gamma surveys focus on radioactive material handling and storage areas and adjacent occupied locations. Variability due to the timing of the surveys is a factor in the results, as production levels and movement of materials vary over the course of a day.

Table 9: Routine Dose Rate Survey Summary

Gamma Dose Rates	2018	2019	2020	2021	2022
Total Number of Locations Surveyed	384	370	366	361	380
Average Dose Rate (µSv/h) on Shop Floor	3.1	3.4	2.7	3.1	2.7
Average Dose Rate (µSv/h) in Storage Areas	4.2	5.5	4.3	5.5	4.6

3.7.7 Urinalysis Results

The presence of uranium in the urine is an indication of recent inhalation of UO_2 dust or the systemic clearance of an established thorax burden. At BWXT NEC, urinalysis is used as a screening tool to initiate further review of internal dose control measures and practices but is not used to estimate internal dose.

All employees working where exposed UO_2 material is processed (R2 classified area) for a period greater than 30 hours per quarter, or working as a roving inspector during the quarter, submit urine samples for uranyl ion analysis. Samples are analyzed by an external laboratory for uranium content using Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) with a minimum detectable concentration of 0.1 µg U/L. Results are compared to Internal Control Levels and Action Levels and entered and retained in an electronic database. Urinalysis results are summarized in Table 10.

Of all urinalysis samples processed between 2005 and 2022, <1% of samples (16/2172) have measured above the minimum detectable concentration of 0.1 µg U/L, and all were less than 0.5 µg U/L. These occurrences were well below the Internal Control Level of 5 µg U/L. This confirms that the inhalation hazards at the facility are negligible and that current engineered and administrative controls, where applicable, are adequately controlling the risk.

Table 10: Urinalysis Results Summary

Urinalysis	2018	2019	2020	2021	2022
Number of urine samples analyzed	108	88	86	103	105
Number of samples above Internal Control Level (5 µg U/L)	0	0	0	0	0
Number of samples above Action Level (10 µg U/L)	0	0	0	0	0
Maximum result (µg U/L)	<0.1	0.1	0.4	0.1	0.2

3.7.8 Radiation Doses

Radiation dose refers to the energy deposited or absorbed in materials through which it passes. Equivalent dose is used to assess how much biological damage is expected from the absorbed dose. It takes the properties of different types of radiation into account. Effective dose is used to assess the potential for long-term effects that might occur in the future. It is a calculated value, measured in milliSievert (mSv), which takes into account the absorbed dose to all organs of the body, the relative harm level of the type of radiation, and the sensitivities of each organ to radiation. All radiation exposures received by employees in the reporting period were within Internal Control Levels, Action Levels and regulatory limits. Action Levels are site specific and are accepted by the CNSC through the facility licence conditions handbook. Regulatory limits are specified in the *Radiation Protection Regulations.* Regulatory limits are listed in Table 11 and Table 12.

Table 11: Regulatory Effective Dose Limits

Effective Dose Limits		
Person	**Period**	**Effective Dose (mSv)**
NEW, including a pregnant NEW who has yet to disclose pregnancy status	(a) One-year dosimetry period (b) Five-year dosimetry period	50 100
Pregnant NEW	Balance of the pregnancy	4
A person who is not a NEW (i.e. a member of the public)	One calendar year	1

Table 12: Regulatory Equivalent Dose Limits

Equivalent Dose Limits			
Organ or Tissue	**Person**	**Period**	**Equivalent Dose (mSv)**
Lens of an eye	(a) NEW (b) Any other person	One-year dosimetry period One calendar year	50 15
Skin	(a) NEW (b) Any other person	One-year dosimetry period One calendar year	500 50
Hands and feet	(a) NEW (b) Any other person	One-year dosimetry period One calendar year	500 50

All workers are classified as either NEWs or non-NEWs. All NEWs are deemed to have a reasonable probability of receiving a dose of radiation that is greater than the prescribed limit for a member of the public (1 mSv/year) in the course of the person's work with nuclear substances or at our nuclear facility. All Fuel Manufacturing NEWs are assigned personal passive dosimeters known as TLDs (thermoluminescent dosimeter). These passive dosimeters measure the whole body and skin doses received in each monitoring period. TLD rings are worn on certain employee's hands for a one-week period each quarter. The test results and the weekly hours of contact are used to estimate the extremity dose for that quarter. TLDs are exchanged quarterly and analyzed by a CNSC licensed external dosimetry service provider. The dosimetry service provider reports the measured doses to BWXT NEC and to the Health Canada National Dose Registry. On receipt, knowledgeable staff reviews the monitoring results, and compares them to associated Internal Control Levels, Action Levels and regulatory limits. As a result of vendor challenges the fourth quarter of 2021 whole body TLDs were worn into the 1st quarter of 2022. The reported TEDE and skin doses are estimated based on the TLD wear dates and reporting dates and this carry forward from 2021 is reflected in the 2022 values. No actions levels were exceeded.

The annual dose assignment for employees consists of external dosimetry inputs, for which dose summaries are tracked for quarterly, year-to-date, five-year and lifetime. All NEWs who are monitored for radiation exposure receive an annual dose letter identifying their annual dose.

Dosimetry results are summarized in the following sub-sections. Employees are divided into workgroups based on job function for dosimetry analysis and trending. Operators are employees who directly manufacture product. Technicians are employees who support the licensed activities, (Fuel Manufacturing or Fuel Handling and Engineered Solutions) e.g. electrical, mechanical, quality control, laboratory, etc. Staff includes management and professional employees who support the operation and includes the Customer Site Representatives.

3.7.9 Total Effective Dose Equivalent (TEDE)

TEDE includes TLD monitored external dose. As a result of operations involving sintered ceramic pellets, the facility does not have any measurable internal dose; therefore, the TEDE is the measured TLD external whole body dose. Table 13 provides a summary of TEDE dosimetry measurements with monitored workers grouped in various ranges of exposure. Approximately 70% of TEDE are less than 1 mSv.

Table 13: Total Effective Dose Equivalent Distribution

Year	Total # Individuals	Total # of Individuals in Dose Range (mSv)							
		0 - 1	1 - 5	5 - 10	10 - 20	20 - 50	50 - 100	100 - 200	200 - 500
2022	69	47	17	5	0	0	0	0	0
2021	73	50	16	7	0	0	0	0	0
2020	72	53	14	5	0	0	0	0	0
2019	71	51	15	5	0	0	0	0	0
2018	78	57	19	2	0	0	0	0	0

TEDE by workgroup over the last 5 years is listed in Table 14. The average dose results include zero measurements.

Table 14: Total Effective Dose Equivalent Summary

	Year	All Workgroups	Operators	Technicians	Staff
Maximum (mSv)	2022	7.65	7.65	1.45	0.62
	2021	9.83	9.83	1.42	0.78
	2020	6.51	6.51	1.36	0.35
	2019	5.76	5.76	1.11	0.85
	2018	6.53	6.53	0.67	1.03
Average (mSv/person)	2022	1.29	2.18	0.51	0.15
	2021	1.38	2.51	0.48	0.22
	2020	1.12	2.05	0.31	0.07
	2019	1.17	2.18	0.36	0.46
	2018	1.12	2.12	0.31	0.48

The trends for maximum and average TEDE for all monitored individuals is shown in Figure 4. 2022 shows a return towards lower levels which is supported by a 12% year over year reduction in total collective dose from 100.8 mSv to 89.0 mSv. This has largely been led through a reduction in production volume and a reduction in overtime hours in the inspection work stations.

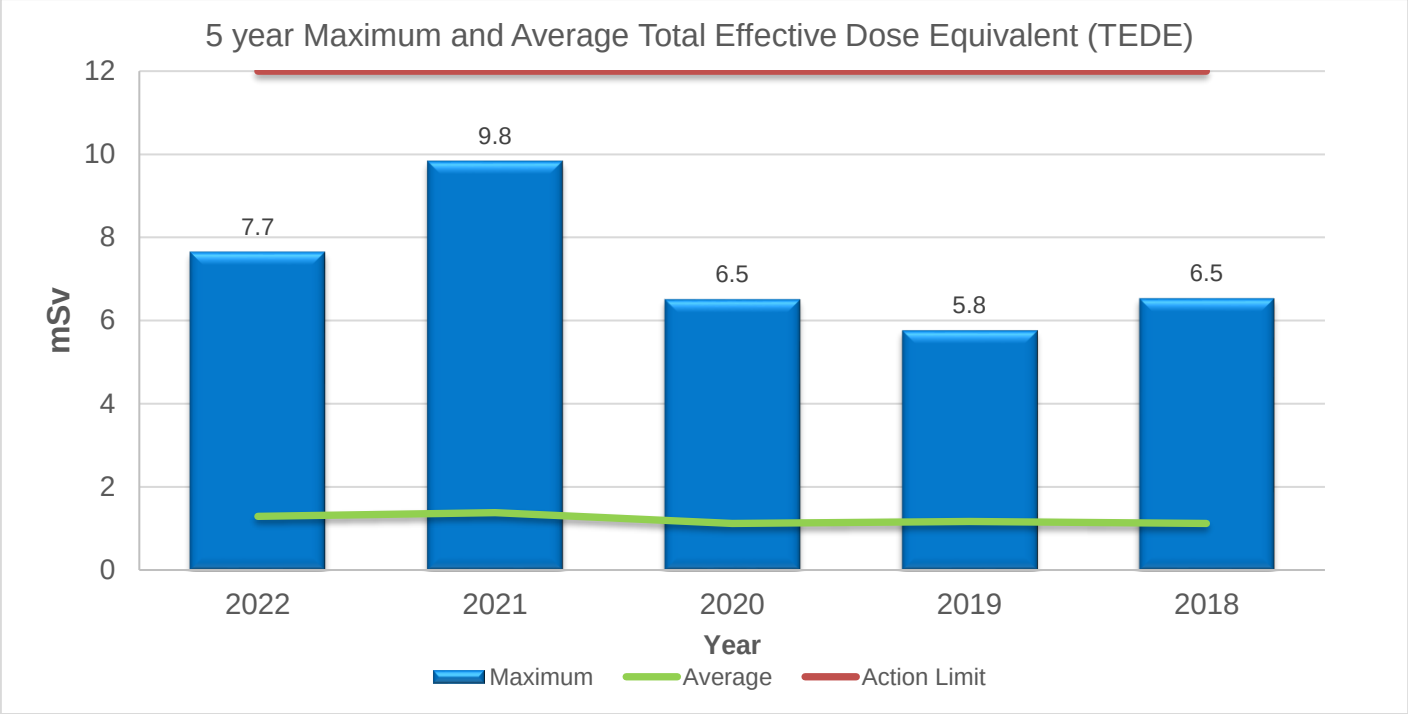

Figure 4: 5-Year Maximum and Annual Total Effective Dose Equivalent

The maximum individual five-year dose listed in Table 15 is well below the 100 mSv regulatory limit and the 60 mSv Action Level. Overall, TEDE, maximum individual dose and average does is trending slightly upwards, but appears all have declined compared to a slight increase in 2021. Increasing trends are likely as a result of slightly increased inventory, increased product handling, as well as personnel staffing challenges. Dose reduction continues to remain a priority, with ongoing efforts towards shielding, material movement, improving ALARA awareness (e.g. use of shielding blankets on product), and TLD wear and storage compliance.

Table 15: Maximum Individual 5-Year Dose

	Year	All Workgroups
Maximum Individual (mSv)	2022	32.63
	2021	28.86
	2020	23.30
	2019	24.90
	2018	20.80

3.7.10 Equivalent Skin Dose

TLDs measure the skin doses received in each monitoring period. Skin dose is the measure of the radiation dose that is absorbed by the skin from the deposition of energy from low penetrating radiation. Table 16 provides a summary of equivalent skin dosimetry measurements with monitored workers grouped in various ranges of exposure. Approximately 59% of skin doses are less than 1

mSv. Equivalent skin dose by work group is summarized in Table 17. The average annual skin dose trend for all monitored individuals is shown in Figure 5. Skin doses are trending slightly upward across all workgroups, but continue to remain a fraction of the regulatory limit and Action Level and have decreased compared to 2021.

Table 16: Skin Radiation Dose Equivalent Distribution

Year	Total # Individuals	Total # of Individuals in Dose Range (mSv)							
		0 - 1	1 - 5	5 - 10	10 - 20	20 - 50	50 - 100	100 - 200	200 - 500
2022	69	41	12	6	9	1	0	0	0
2021	73	39	18	3	12	1	0	0	0
2020	72	49	8	4	11	0	0	0	0
2019	71	47	9	4	11	0	0	0	0
2018	78	54	7	8	9	0	0	0	0

Table 17: Skin Radiation Dose Equivalent Summary

	Year	All Workgroups	Operators	Technicians	Staff
Maximum (mSv)	2022	21.67	21.67	1.94	1.85
	2021	30.87	30.87	1.97	1.66
	2020	19.01	19.01	2.12	0.37
	2019	17.44	17.44	1.91	1.08
	2018	17.87	17.87	0.92	1.69
Average (mSv/person)	2022	3.50	6.26	0.74	0.29
	2021	3.64	7.02	0.66	0.38
	2020	2.81	5.37	0.45	0.08
	2019	3.00	6.16	0.48	0.49
	2018	2.87	6.05	0.38	0.57

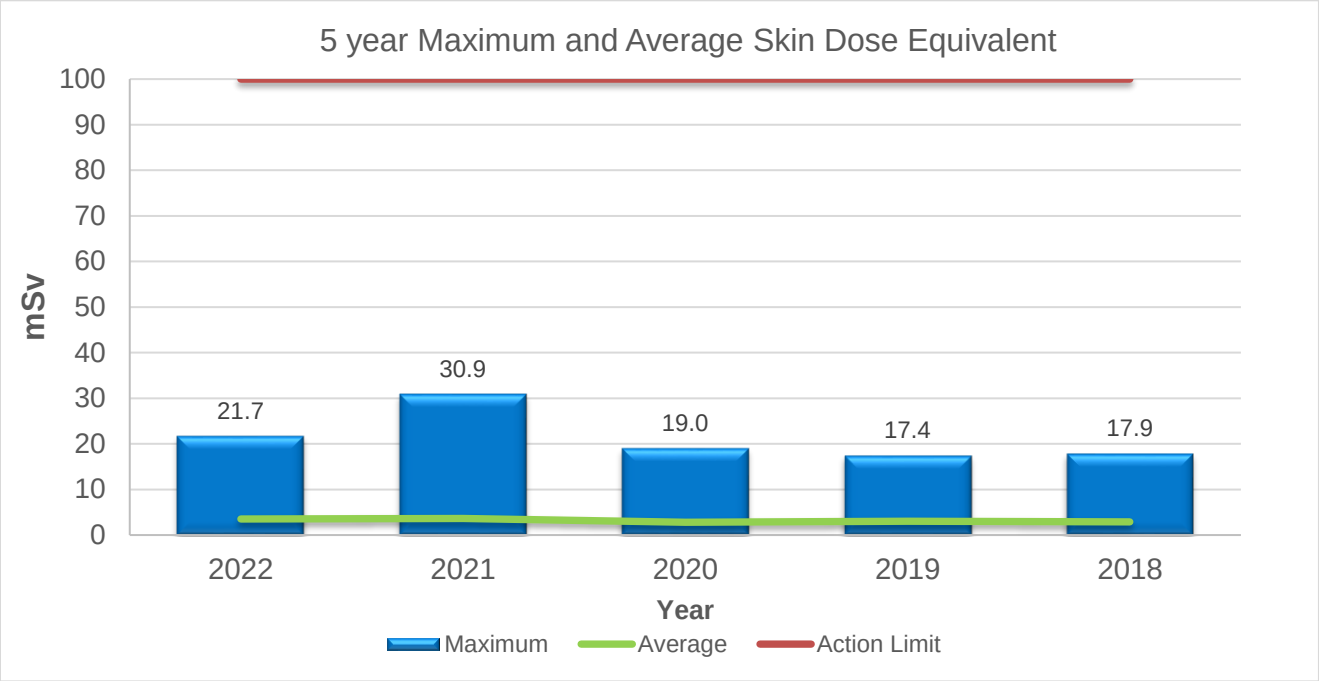

Figure 5: 5-Year Maximum and Average Skin Dose Equivalent

3.7.11 Equivalent Extremity Dose

TLD rings are worn on certain individual's hands for a one-week period each quarter to measure extremity dose. A scaling factor is calculated based on hours worked in the quarter and is provided to the dosimetry service provider each monitoring period. The dosimetry service provider applies the scaling factor to the measured dose to estimate the exposure for the quarter. Table 18 provides a summary of equivalent extremity dosimetry measurements with monitored workers grouped in various ranges of exposure. Approximately 65% of extremity doses are less than 20 mSv. Equivalent extremity dose by work group is summarized in Table 19. Staff and Technicians do not routinely participate in the extremity monitoring program since there is minimal direct handling of product. In 2022 a single employee classified as a technician participated in the extremity dosage program. The average annual extremity dose trend for all monitored individuals is shown in Figure 6. Extremity doses are trending upward on average, but have experienced a year over year decrease compared to 2021. This is partially attributed to the installation of automation that has eliminated the handling of trays of pellets in some workstations.

Table 18: Total Extremity Dose Equivalent Distribution

Year	Total # Individuals	Total # of Individuals in Dose Range (mSv)							
		0 - 1	1 - 5	5 - 10	10 - 20	20 - 50	50 - 100	100 - 200	200 - 500
2022	23	2	4	2	7	7	1	0	0
2021	19	1	1	2	8	4	3	0	0
2020	18	0	2	3	7	6	0	0	0
2019	18	1	4	4	5	4	0	0	0
2018	27	6	0	6	8	7	0	0	0

Table 19: Extremity Dose Equivalent Summary

	Year	All Workgroups	Operators	Technicians	Staff
Maximum (mSv)	2022	52.01	52.02	0.4	N/A
	2021	59.00	59.00	N/A	N/A
	2020	43.17	43.17	N/A	N/A
	2019	29.41	29.41	N/A	N/A
	2018	46.06	46.06	0.68	0.88
Average (mSv/person)	2022	15.63	16.32	0.4	NA
	2021	23.70	23.70	N/A	NA
	2020	18.77	18.77	N/A	N/A
	2019	11.30	11.30	N/A	N/A
	2018	14.34	17.52	0.49	0.88

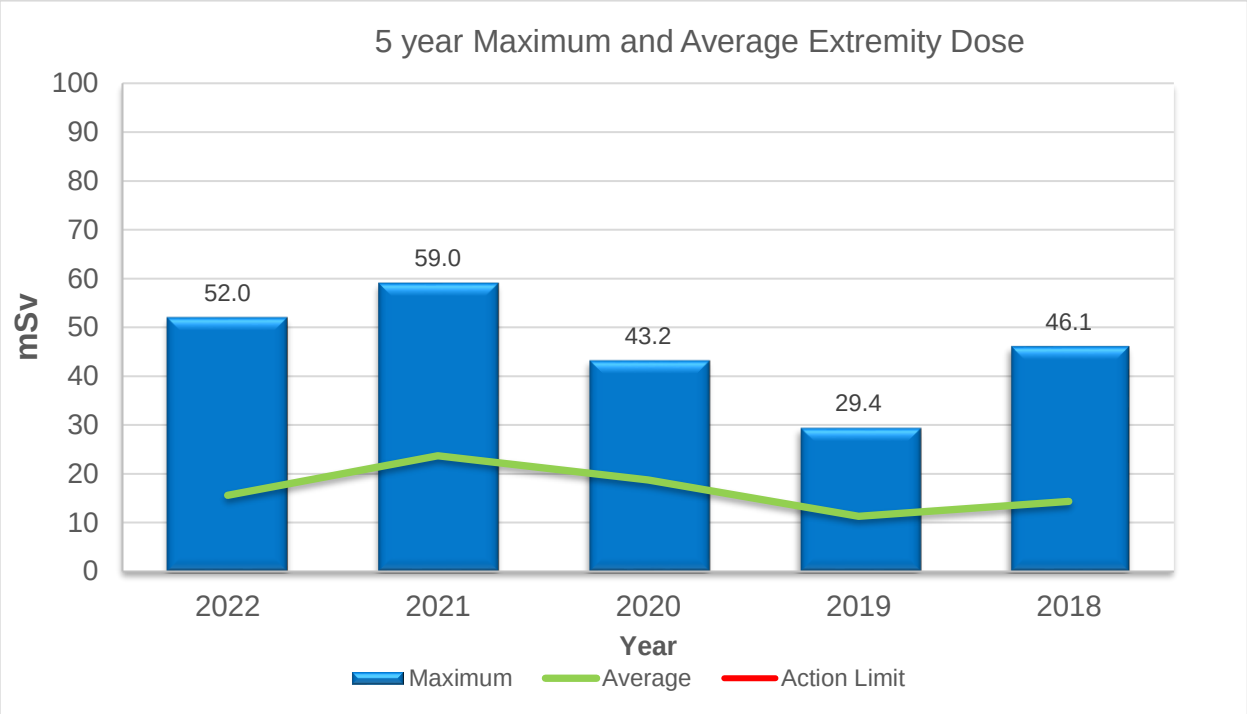

Figure 6: 5-Year Maximum and Average Extremity Dose

3.7.12 Total Estimated Doses to Members of the Public

Total effective radiation dose equivalent to members of the public are specified in the *Radiation Protection Regulations* and listed in Table 12. It is a calculated value, measured in mSv, which takes into account the absorbed dose to all organs of the body, the relative harm level of the radiation, and the sensitivities of each organ to radiation. To ensure compliance with this regulation, BWXT NEC

has established “Derived Release Limits” (DRLs) for uranium emissions to the environment. The facility DRLs account for the realistic exposure pathways as described in the facility radiation protection program to restrict dose to a member of the public to 1 mSv (1,000 µSv) per year, which is the regulatory dose limit. The DRLs assume that a member of the public occupies the BWXT NEC facility perimeter continuously (24 hours per day, 365 days per year). Note: Liquid effluent is not included in the calculation of public dose as the effluent is discharged directly to city sewer systems and is not used for drinking. Through direct correlation with the facility DRLs, the estimated effective dose as a result of air releases is calculated.

In addition, the contribution from gamma radiation emission to the nearest member of the public is calculated from the net sum of the nearest environmental TLD results from all monitoring periods. The calculation conservatively assumes that a member of the public occupies the nearest residence for 66% of their time for the entire year (5,781 hours in a non-leap year).

Over the reporting period, the radiation dose to members of the public surrounding the BWXT NEC Peterborough facility was a small fraction of the applicable regulatory dose limit as shown in Table 20. As a result of the facility operations, the total estimated radiation dose to a member of the public is 11.5 µSv (0.0 µSv from air emissions + 11.5 µSv from direct gamma radiation). In comparison to the 1 mSv (1,000 µSv) per year effective dose limit to a member of the public, dose from the operations is very low at 0%.

Table 20: Estimated Radiation Doses to Members of the Public

Period	Estimated Annual Public Dose (µSv)	% of Public Dose Limit (1,000 µSv = 1 mSv)
2022	11.5	1%
2021	0.0	0%
2020	0.0	0%
2019	11.5	1%
2018	0.0	0%

3.8 Conventional Health and Safety

The "Conventional Health and Safety" Safety and Control Area covers the implementation of a program to manage non-radiological workplace safety hazards and to protect personnel and equipment.

BWXT NEC has a well-established integrated management system for environmental, health and safety program excellence. This is ensured through the effective implementation of program elements. BWXT NEC has an established *EHS Mission Statement* that is reviewed and signed annually by the President of BWXT NEC. BWXT NEC’s objective is to eliminate or minimize as low as reasonably achievable both known and potential environmental, safety and health hazards which could impact our employees and the communities in which they live. EHS is a shared responsibility, top business priority and is continually improved.

Key components of the Health and Safety program include:

- Compliance with all safety and health-related regulatory requirements;
- The setting of EHS goals and objectives;

- Hazard recognition, risk assessment and change control processes;
- A comprehensive worker training program; and,
- Documented safety concerns, near misses and incidents with appropriate root-cause analysis, preventive and corrective actions.

The EHS program includes all worker safety elements that demonstrate compliance to relevant regulations, codes and standards:

- EHS Policy
- Hazard Analysis and Regulatory Compliance
- Employee Involvement
- EHS Specialist
- Accident/Incident Investigation
- EHS Training
- Housekeeping
- Personal Protective Equipment
- Contractor Safety
- Emergency Preparedness/Response
- Risk Assessments
- High Risk Operations
- Industrial Hygiene
- Chemical Management
- Ergonomics
- Lock-Out Tag-Out

Continuous improvement is achieved through several review processes, including site inspections, reported safety concerns, near miss and incident investigations. The effectiveness of the overall program is reviewed throughout the year and evaluated in the annual management review (section 3.2.3).

A CNSC report was made for an OEL exceedance due to an elevated beryllium in air sample collected on a personal air pump. This was connected to a previous OEL exceedance occurring in December 2021 and took place in the course of that investigation that was already putting corrective and preventive measures in place. BWXT instituted a respirator requirement in affected areas and has made engineering changes to improve ventilation on specific processes. Validation of the effectiveness of these changes continues into 2023.

3.8.1 Workplace Safety Committees

Ten meetings were held with quorum. A total of 42 investigations and inspections were conducted in the reporting period. This includes WSC inspections, manager inspections, and near miss, incident and injury investigations. These investigations and inspections led to a total of 37 actions logged and tracked to closure. The top finding categories were ‘housekeeping,’ ‘material handling/storage,’ and ‘egress’. Established WSC goals for the reporting period are summarized in Table 21.

Table 21: Workplace Safety Committee Goals and Results

WSC Goals	Actual	Result
Meet at least 9 times/year	10/12	Complete
WSC Inspections to include at least one positive observation each month. WSC Members to give specific feedback to employees involved.	15	Complete
WSPS Training on CLCII Employee responsibilities	1/1	Completed September 13, 2022 by WSPS in person
Inspection tour completion target of 24 out of a possible 36 (12 months x 3 areas).	29/36	Complete
Review a section of the Canada Occupational Health and Safety Regulations (SOR/86-304) each month.	10/12	Complete

2023 WSC goals are established as follows:

1. Meet at least nine times as required by the Canada Labour Code Part II
2. Beryllium Committee Guest Attendance and Discussion
3. Inspection tour completion target of 24 out of a possible 36 (12 months' x 3 areas)
4. Review a section of the Canada Occupational Health and Safety Regulations (SOR/86-304) each month)

3.8.2 Hazardous Occurrences

Under the Canada Occupational Health and Safety Regulations there are several different types of hazardous occurrences including:

- Minor Injury: any employment injury or an occupational disease for which medical treatment is provided and excludes a disabling injury.
- Disabling Injury: any employment injury or an occupational disease that results in either time loss, or modified duties. Disabling injuries can be either temporary, or permanent, depending on whether or not the employee is expected to make a full recovery.
- Loss of Consciousness: from an electric shock or a toxic or oxygen deficient atmosphere.
- Rescue / Revival or other Emergency Procedures: any incident that requires emergency procedures to be implemented, such as a hazardous substance spill, bomb threat or violence prevention procedure.

Annual reports are provided to the Minister Employment and Social Development Canada as required by regulation.

3.8.2.1 Injuries and Illness

BWXT NEC Peterborough had nine consecutive years without a Lost Time Injury (LTI) prior to 2021 (Refer to Table 22). During the reporting period, there were two lost time injuries, and two minor injuries and four first aids. The top injury categories were 'contact with sharp object/cut or abrasion,'

'falls same level'. There were 30 near misses logged following defined event classification criteria. The top noted root causes were 'human error,' 'inadequate job planning,', and 'Inadequate Mechanical Integrity / Maintenance Management.

Table 22: Lost Time Injuries

2018	2019	2020	2021	2022
0	0	0	1	2

3.9 Environmental Protection

The "Environmental Protection" Safety and Control Area covers programs that monitor and control all releases of nuclear and hazardous substances into the environment, as well as their effects on the environment as a result of licensed activities.

BWXT NEC has an effective environmental protection program in place which identifies and controls environmental aspects and drives continuous improvement to enhance performance and minimize risk to employees and the public. The facility has a well-established environmental management system to ensure effective monitoring programs are in place to achieve environmental goals and regulatory compliance. Environmental protection programs are compliant with:

- CSA N288.6-12, *Environmental risk assessments at Class I nuclear facilities and uranium mines and mills*,
- CSA N288.5-11, *Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills*, and
- CSA N288.4-10, *Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills*.

During the reporting period, there was a CNSC reportable event where tank of dilute acidic rinse water overflowed. This resulted in an internal spill, but there was no release to the environment.

3.9.1 Environmental Risk Assessment

An Environmental Risk Assessment (ERA) has been completed in accordance with CSA N288.6-12. The ERA concluded that emissions from the facility were very low and no adverse effects to human health are expected.

The emissions of non-radioactive contaminants from the facility were below the MECP point of impingement (POI) standards; and water releases are also assessed to be minimal. Hence, it was concluded that the emissions of non-radiological substances resulting from the facility poses no adverse effect to human health.

The ERA also concluded that emissions of radioactive and non-radioactive materials from the facility poses no adverse effects to non-human biota.

The ERA is available on BWXT NEC's public information website: nec.bwxt.com.

3.9.2 Environmental Management System

BWXT NEC has a well-established integrated management system for environmental, health and safety program excellence. This is ensured through the effective implementation of program elements. BWXT NEC has an established *EHS Mission Statement* that is reviewed and signed annually by the President of BWXT NEC. BWXT NEC's objective is to eliminate or minimize as low as reasonably achievable both known and potential environmental hazards which could impact our employees and the communities in which they live. EHS is a shared responsibility, top business priority and is continually improved.

An Environmental Management System is in place to identify and control environmental aspects and drive continuous improvement to enhance performance and minimize risk to the employees and the public.

Key components of the environmental protection program include:

- Compliance with all environmental-related regulatory requirements;
- The setting of environmental goals and objectives;
- Hazard recognition, risk assessment and change control processes;
- A comprehensive worker training program; and,
- Documented environmental concerns, near misses and incidents with appropriate root-cause analysis, preventive and corrective actions.

The EHS program includes all environmental protection elements that demonstrate compliance to relevant regulations, codes and standards:

- Air
- Water
- Waste
- Dangerous goods shipping
- Boundary radiation monitoring
- Soil sampling

Continuous improvement is achieved through several review processes, including site inspections, reported concerns, near miss and incident investigations, self-assessments and audits. Environmental goals performance is discussed in 3.9.4. An annual internal self-assessment and audit of the environmental protection program elements is conducted (3.2.1 and 3.2.2). Following these proactive reviews, the findings are documented, corrective actions identified and tracked to completion.

Internal inspections are completed on a routine basis and include all areas of the facility. The purpose of these inspections is to identify environmental as well as health and safety issues. WSC members carry out routine site inspections. After an inspection, the findings are documented, corrective actions identified, and submitted to responsible personnel to address. Depending on the complexity of the finding immediate action may be required (i.e. equipment shutdown), or the action may be incorporated into meeting minutes, or tracked in the ATS.

In the reporting period, the Environmental Management System was updated to current compliance obligations as a result of the updated licence and licence conditions handbook. The document was submitted to CNSC in accordance with licence requirements. In addition, minor administrative updates were made to four environmental documents.

3.9.3 Effluent and Environmental Monitoring Programs

Small amounts of radiological and non-radiological substances are released to the environment as the result of operations at BWXT NEC. Environmental protection is regulated municipally for water effluent through sewer-use by-laws, provincially for air effluent and federally by the CNSC for both air and water. Airborne and waterborne radiological and non-radiological emissions to the environment are monitored as part of the effluent monitoring programs. BWXT NEC's effluent and environmental monitoring program is comprised of the following components:

1. Air effluent
2. Water effluent
3. Soil sampling

BWXT NEC has established CNSC accepted Action Levels for various environmental parameters. An Action Level is defined in the *Radiation Protection Regulations* as "specific dose of radiation or other parameter that, if reached, may indicate a loss of control of part of a licensee's radiation protection program, and triggers a requirement for specific action to be taken." Action Levels are also applied to environmental protection. Action Levels are set below regulatory limits; however, they are CNSC reportable events. Accordingly, BWXT NEC has established Internal Control Levels for various environmental parameters that are set even lower than Action Levels to act as an early warning system. Internal Control Level exceedances trigger an internal investigation and corrective actions; however, they are not CNSC reportable events. During the reporting period, basic process objectives were established for liquid effluent. No Action Levels or regulatory limits were exceeded during the reporting period.

3.9.3.1 Independent Environmental Monitoring Program

To complement existing and ongoing compliance activities and site monitoring programs, the CNSC implemented its Independent Environmental Monitoring Program to verify that the public and environment around CNSC-regulated facilities are not adversely affected by releases to the environment. This verification is achieved through independent sampling and analysis by the CNSC. This program applies to the BWXT NEC operations. The most recent results are available for sampling conducted in 2021. The results are compared to relevant provincial and federal guidelines and are available on the CNSC website.

3.9.4 Environmental Protection Program Performance

Environmental protection goals and results are summarized in Table 23.

Table 23: Environmental Protection Program Goals

Environmental Protection Program Goals	Actual	Result
Reduce monthly water consumption by 5% by year end.	Complete	Achieved 20% reduction over 2021
Complete one asbestos abatement project by year end	Complete	Achieved B21 North Stairway

2023 Environmental Protection goals are established as follows:

1. Update the reporting systems for gathering information relevant to sustainability reporting.
2. Complete one asbestos abatement project by year end.

3.9.5 Air Effluent Monitoring

BWXT NEC has a valid *Environmental Compliance Approval* issued by the Ministry of Environment, Conservation and Parks (MECP) for air emissions. In accordance with permit conditions, the site maintains emission summary and dispersion modelling reports and acoustic assessment reports that demonstrate compliance to relevant legislation. An annual summary report is submitted to the MECP. Monitoring of airborne emissions is not required by the MECP as the emissions are deemed to be insignificant in accordance with MECP methodology. Due to the additional regulation by the

CNSC, uranium and beryllium stack emissions are both monitored and compared to CNSC Action Levels.

A single process uranium air emission point exists. The R2 Area exhaust system exhausts through a High Efficiency Particulate Air filter. The facility performs continuous in-stack monitoring drawing a sample of air across a filter capable of trapping uranium dust. The filter papers are analyzed in-house and verified externally by an independent laboratory by delayed neutron activation analysis. The minimum detection limit is 0.01 µg uranium. Results are compared to the previous results and to the Internal Control Level and Action Level of 1.0 µg/m^3. Measured uranium air emissions are included in the estimated dose to members of the public through direct correlation with facility DRLs. Details are provided in section 3.7.12.

The facility also uses beryllium as part of the fuel bundle manufacturing process. The Environmental Protection Act of Ontario (R.S.O. 1990, c. E. 19) and Ontario Regulation 419/05 Air Pollution – Local Air Quality determine the permitted concentration of contaminant release. The limit at the POI for Beryllium is 0.01 µg per cubic meter of air (µg/m^3). The POI is the plant/public boundary. Three beryllium air emission points exist. The facility performs continuous in-stack monitoring drawing a sample of air across a filter capable of trapping beryllium. The filter is analyzed for beryllium using the Atomic Absorption method or the Inductively Coupled Plasma - Atomic Emission Spectrometer method at an accredited external independent laboratory. The result is related to the air volume passed through the filter. The minimum detection limit is 0.002 µg beryllium. A calculation of the concentration is then made based on the volume of air drawn across the filter. These values are compared to the previous results, and to the Internal Control Level of 0.01 µg/m^3 and Action Level of 0.03 µg/m^3 at the stack exit, which are both very conservative.

A summary of air effluent sampling results is in Table 24. Uranium air releases continue to remain low and well below the Action Level of 1 µg/m^3 as presented inRefer to previous annual compliance reports for past uranium stack air emissions that were previously compared to a mass based release limit, as opposed to the concentration based limit established in the current licence. The five-year trend graph of annual beryllium air concentrations presented in Figure 8 shows a stable performance consisting of very low measurements.

Table 24: Air Effluent Sampling Summary

Stack Description	Emission Contaminant	Total Number of Samples	Action Level (µg/m^3) (# Samples Exceeding Level)	Licence Release Limit (µg/m^3) (# Samples Exceeding Limit)	Highest Value Recorded (µg/m^3)	Average Value Recorded (µg/m^3)
R2 Area	Uranium	50	1.0 (0)	410 (0)	0.005	0.001
North	Beryllium	51	0.03 (0)	2.6 (0)	0.001	0.000
Acid	Beryllium	51	0.03 (0)	2.6 (0)	0.001	0.000
South	Beryllium	51	0.03 (0)	2.6 (0)	0.001	0.000

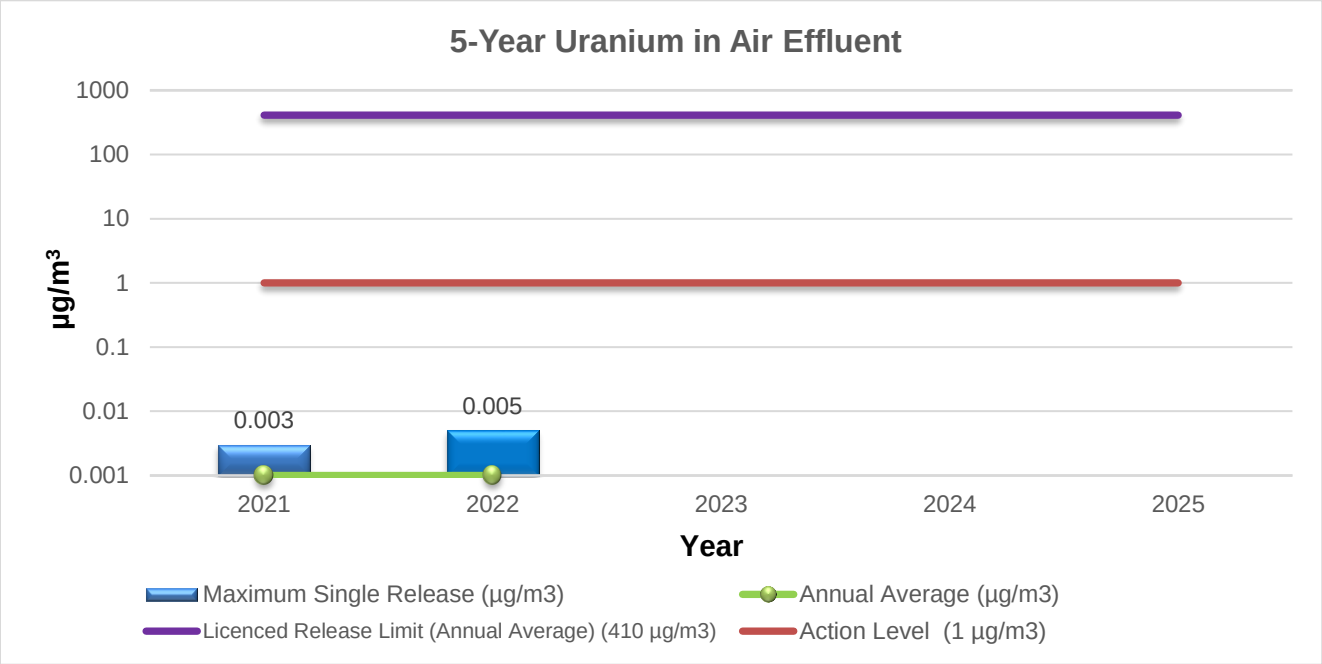

Figure 7: 5-Year Uranium in Air Effluent

Note: The above graph has a logarithmic scale.

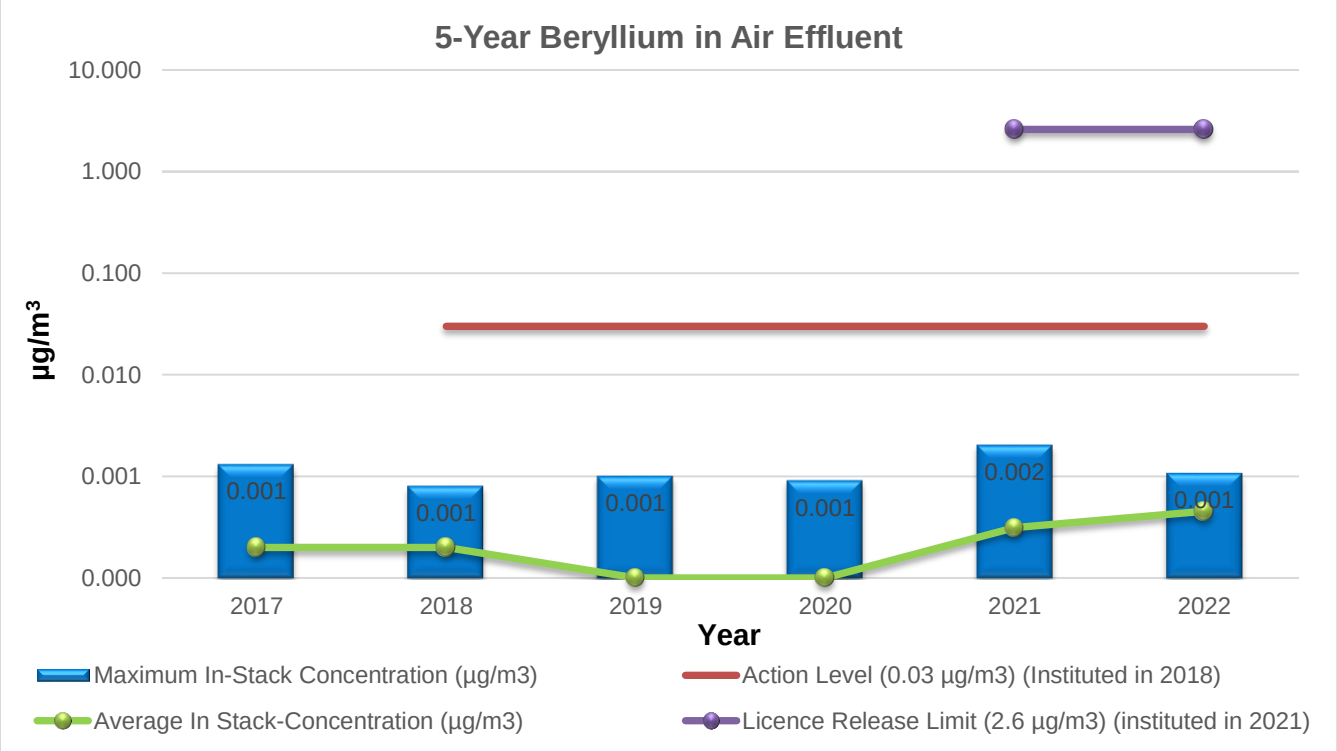

Figure 8: 5-Year Beryllium in Air Effluent

Note: The above graph has a logarithmic scale.

3.9.6 Water Effluent Monitoring

All potentially uranium-contaminated wastewater is held for determination of the quantity and concentration of uranium prior to discharge. Liquid waste generated from routine activities, such as washing floors, walls and equipment in the uranium pellet loading and end closure weld area is held in a 205 Litre (45-gallon) drum stored in the maintenance area. Most of the potentially contaminated waste water originates from floor washing. The water is filtered and agitated prior to sampling, and then sent for independent analysis at an accredited external laboratory. The minimum detectable concentration is 0.000002 mg U/L (parts per million (ppm)). After the waste water sample result is verified to be below the Internal Control Level of 3 ppm (per batch) and the Action Level of 3 ppm (annual average), the wash water is discharged to the sanitary sewer.

A summary of uranium in water effluent sampling results is presented in Table 25. Uranium water releases continue to remain low and below the Action Level of 0.003 g/L (3 ppm (annual average)), and the licenced release limit of 0.14 g/L (weekly composite), as presented in Figure 9. Refer to previous annual compliance reports for past uranium in water emissions that were previously compared to a mass based release limit, as opposed to the concentration based limit established in the current licence.

Table 25: Uranium in Water Effluent Sampling Summary

Uranium	2018	2019	2020	2021	2022
Total Amount of Liquid Discharged (L) from Uranium Processing Areas	820	615	1025	410	820
Average Concentration (at the point of release) (ppm)	0.02	0.04	0.20	0.22	0.30
Maximum Concentration (at the point of release) (ppm)	0.03	0.07	0.37	0.41	0.78
Number of Samples Exceeding Internal Control Level (3 ppm)	0	0	0	0	0
Number of Samples Exceeding Action Level (3 ppm annual average)	0	0	0	0	0

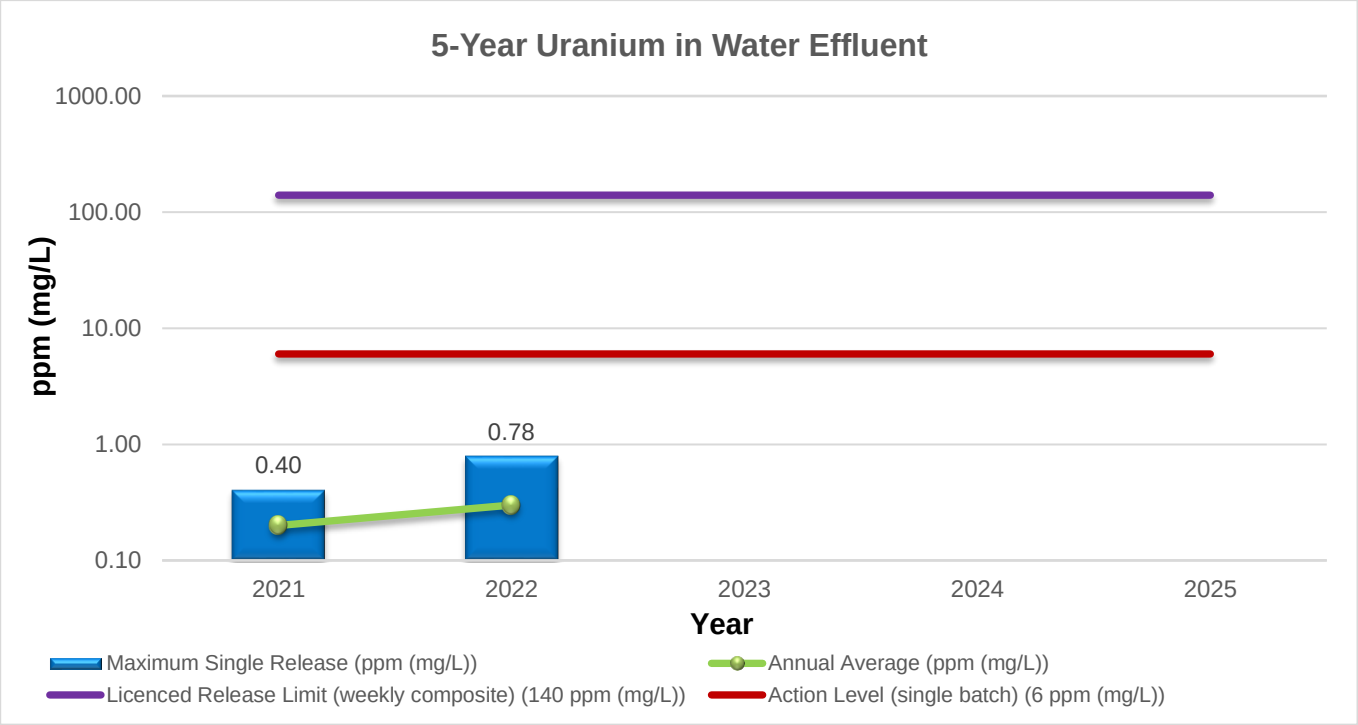

Figure 9: 5-Year Uranium in Water Effluent

Note: The above graph has a logarithmic scale.

A second liquid effluent is beryllium in water that is generated from equipment use and cleaning activities in the beryllium classified areas. BWXT NEC has established an Internal Control Level of 4 µg/L and the Action Level is 40 µg/L. The Internal Control Level is conservatively consistent with international drinking water guidelines for beryllium, noting that the discharge point is to the sanitary sewer (i.e. not to drinking water). All potentially beryllium contaminated water passes through a weir settling system prior to release to the sanitary sewer. Regular sampling of the beryllium wastewater is conducted. The water sample consists of a 24-hour composite sample taken from the outflow lines. It is sent for analysis at an external accredited independent laboratory. The minimum detectable concentration is 0.007 µg Be/L (0.000007 mg Be/L or parts per million (ppm)). Sampling results are presented in Table 26.

Beryllium average and maximum concentrations are trending steady, as presented in Figure 10. Where Internal Control Levels are exceeded, internal investigation is conducted to determine the cause and corrective/preventive actions are tracked to closure.

Table 26: Beryllium in Water Effluent Sampling Summary

Beryllium	2018	2019	2020	2021	2022
Total Number of Samples Analyzed for Beryllium Concentration in Water	19	19	20	17	18
Average Concentration (at the point of release) (µg/L)	0.6	0.6	1.4	0.9	0.8
Maximum Concentration (at the point of release) (µg/L)	2.5	1.8	9.1	3.1	3.3
Number of Samples Exceeding Internal Control Level (4 µg/L)	0	0	1	0	0
Number of Samples Exceeding Action Level (40 µg/L)	0	0	0	0	0

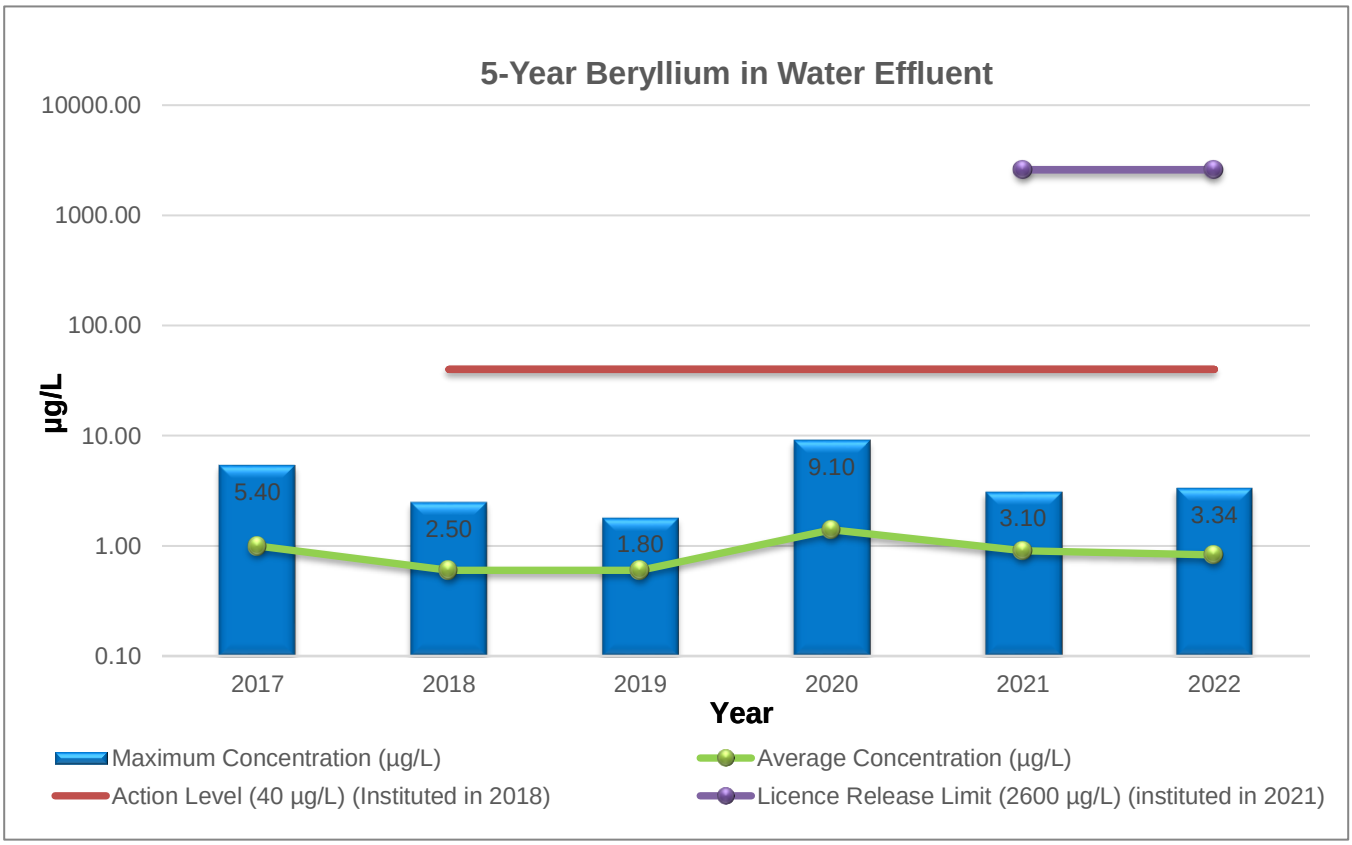

Figure 10: 5-Year Beryllium in Water Effluent

Note: The above graph has a logarithmic scale.

3.9.7 Soil Sampling Measurements/Monitoring

Facility air emissions are the primary pathway for potential release into the natural environment by impingement on the ground surface in the immediate vicinity of the facility depending on the wind direction. Uranium and beryllium may be washed into the soil by rainfall, snow, etc. Depositions of uranium or beryllium are detected by taking small samples of surface soil and analyzing. Soil sampling for beryllium and uranium started in 2021 and are conducted annually by a third-party consultant. If soil analysis indicates concentrations higher than the background levels and MECP

standards or rising levels, emissions may have increased and investigation can be made into the cause.

Samples of surface soil are retrieved from 13 locations in accordance with a documented plan. The sampling methodology used is based on the MECP *Guidelines on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*, December 1996, ISBN-0-7778-4056-1. Three quality control soil samples at a background location more than 19 km west of the facility are also taken, along with two replicate samples for field quality control purposes. The soil samples are stored in a cooler with ice and transported the next day for analysis at an independent accredited laboratory by Inductively Coupled Plasma Mass Spectrometry for uranium and beryllium content. The minimum detectable concentration of uranium is 1.0 part per million (1.0 µg U/g). The minimum detectable concentration of beryllium is 0.5 part per million (0.5 µg Be/g). Results are compared to previous years and the MECP guidelines.

The results of the soil siltation sampling program were compared to the stringent standards in MECP Table 1 (Full Depth Background Site Condition Standards). For residential, parkland, institutional, industrial, commercial, and community property uses, the standard is 2.5 µg/g for both uranium and beryllium.

A summary of results taken in the reporting period is listed in Table 27.

Table 27: Soil Sampling Result Summary

	Uranium	Beryllium
MECP Guideline (µg/g)	2.5 µg U/g	2.5 µg Be/g
Minimum Detectable Limit (µg/g)	1.0	0.5
Number of Samples Taken	13	13
Average concentration (µg/g)	<1.0	<0.50
Maximum concentration (µg/g)	<1.0	0.53

The analytical results for uranium and beryllium concentrations for all soil samples analyzed are without exception well below the acceptable standard published by the MECP Table 1 Background Site Condition Standards. Based on the results of the sampling program there is no evidence that uranium or beryllium used at the BWXT NEC facility has had any impact on Peterborough soils. No risk has been identified to the soils or to the public of Peterborough.

3.10 Emergency Management and Fire Protection

The emergency preparedness and fire protection programs are well-established and effective. The facility has an established emergency plan that describe the actions to be taken to minimize the health and environmental hazards, which may result from fires, explosions, or the release of hazardous materials. The plan includes effects to the local area and members of the public. The plans are intended to reduce the risk of fires within the facility and assist emergency staff and plant personnel in understanding key emergency response issues, and assist the facility in protecting employees, the local community and the environment through sound emergency management practices. The emergency plan is developed in accordance with applicable standards and meets the CNSC operating licence requirements.

Continuous improvement is achieved through several review processes, including site inspections, reported safety concerns, near miss and incident investigations, drills and self-assessments. Non-conformances are tracked to closure.

There were no events that activated the emergency organization during the reporting period, however there was a false fire alarm resulting in a building evacuation which was reportable to the CNSC.

3.10.1 Emergency Preparedness Program Activities

The facility continues to update and improve its Emergency Response Program. Program improvements including revisions to emergency response work instructions as well as the emergency plan were made during the reporting period.

Emergency preparedness training is achieved through response drills where responses are critiqued to continually improve the effectiveness of the process. These are conducted at least annually. All employees are trained on established fire prevention measures, emergency situation responses, emergency evacuation routes and their responsibilities. Awareness training is conducted during new employee orientation and refreshed through response drills. On-site emergency responders are provided with the level of training necessary to allow them to effectively perform their designated functions as defined the training matrix. Training course completion is summarized in Table 4. Tests of the emergency response plans were performed in the following areas:

1. Fire safety/evacuation (four)
2. Medical (two)

Peterborough Fire Services participated in one of these drills and BWXT NEC's Emergency Management Organization was activated.

3.10.2 Fire Protection Program Activities

The Fire Protection program describes the systems and resources available to prevent and detect fire and to minimize impact from a fire event and consist of the following key elements:

- Fire and Life Safety Features;
- Inspection and Maintenance;
- Fire Protection Assessment;
- Fire Protection;
- Housekeeping;
- Minimization of Combustibles;
- Ignition Source Control;
- Impairment;
- Design for the Prevention and Mitigation of Fires;
- Training;
- Outside Coordination; and
- Program Assessment.

The documented fire hazards analysis (FHA) identifies the facility fire hazards and their potential impact on worker and public safety, and asset protection. FHA's are available for building 21, building 24, and buildings 26/28.

The facility maintains a documented fire safety plan that is developed in accordance with the National Fire Code of Canada, the National Building Code of Canada and CSA N393-13, *Fire protection for facilities that process, handle, or store nuclear substances*. The fire safety plan is based on the documented FHA and ensures that measures are appropriate to the facility. The fire safety plan provides information on resources in the buildings, emergency procedures and actions to be taken in the event of a fire. It includes training, duties of designated personnel, details of maintenance procedures and fire protection measures. The information assists the occupants in utilizing life safety features in the buildings, ensure an orderly evacuation at the time of an emergency and provide a maximum degree of flexibility to achieve the necessary fire safety for the buildings. The fire safety plan was approved by Peterborough Fire Services on December 16, 2021.

Fire protection systems are inspected and tested in accordance with the National Fire Code of Canada following an established schedule. A third-party review and internal self-assessment is conducted annually. Identified continuous improvements are tracked to completion using the ATS.

During the reporting period, BWXT NEC's work with Peterborough Fire Services, to establish a clear basis for contingency response planning between the organizations to deal with fire and rescue emergency situations at BWXT NEC continued. The program facilitates effective communication and exchange of relevant information, and assures timely, reliable, and effective decision making and response actions. Site hazard reviews and site familiarization tours are scheduled annually with Peterborough Fire Services. Unfortunately, the site familiarization tours were not able to take place due to pandemic restrictions. These tours are planned for 2023.

In 2022 all sprinkler heads in Building 21-1 fuel shop and Building 24 were replaced. Internal inspection of all accessible sprinkler risers in Buildings 21, 24 and 26, was also completed.

3.11 Waste Management

The "Waste Management" 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 Safety and Control Area also covers the ongoing decontamination and planning for decommissioning activities.

Radioactive wastes are any materials that contain a nuclear substance, and which have been declared to be waste. BWXT NEC has an effective and well-established radioactive waste disposal program that ensures all radioactive waste disposals are compliant with the *Nuclear Safety and Control Act* and associated regulations and the facility operating licence conditions. Radioactive solid waste generated from fuel manufacturing, which consist of, or are contaminated by uranium are accumulated in controlled and classified areas. A low volume of radioactive wastes from Peterborough are transported to and consolidated with the Toronto facility wastes. These are combined, compacted for volume reduction where possible, and shipped routinely to a licensed radioactive waste disposal facility.

Waste management and generation details are further described in Appendix B, submitted to the CNSC separately.

BWXT NEC maintains a preliminary decommissioning plan (PDP) and financial guarantees in accordance with CNSC Regulatory Guide G-219 *Decommissioning Planning for Licensed Activities*, CNSC Regulatory Guide G-206 *Financial Guarantees for the Decommissioning of Licensed Activities,* and CSA N294-09 *Decommissioning of Facilities Containing Nuclear Substances*. The

PDP strategy and end-state objective of decommissioning is to release the site from regulatory control for industrial use or demolition of the structures. These are reviewed at least once every five years. No changes were made to the PDP during the reporting period.

The facility conducts an annual Waste Audit and Waste Reduction Work Plan due to the large office space, in accordance with Ontario Regulation 102/94 under the Environmental Protection Act. The audit serves to assess and advance the non-nuclear waste diversion initiatives and consists of the physical collection and sorting of generated waste and includes a waste composition study. It provides a prepared Waste Reduction Work Plan where areas of success are highlighted and opportunities for improvement are identified through waste reduction, reuse and recycling. The results of the audit are communicated to employees and waste reduction and diversion initiatives are undertaken.

3.12 Security

The "Security" Safety and Control Area covers the programs required to implement and support the security requirements stipulated in the regulations and in the licence.

The facility maintains a security program in accordance with the *General Nuclear Safety and Control Regulations*, *Class I Nuclear Facilities Regulations*, and the *Nuclear Security Regulations*. The security program outlines the systems, processes and responsibilities for performing security operations with the objective of maintaining a safe and secure facility. The program manual identifies the individual responsibilities for implementation and maintenance of the program. The manuals include instructions for administering the security program, provides the basis for security protocols and identifies the controls in place to meet regulatory requirements. Program details are prescribed information and confidential. Examples of security measures in place include:

- Access control (access cards and locked restricted-access areas);
- Facility Access Security Clearance program;
- Security guards;
- Security barriers;
- Intrusion detection systems; and,
- Preventing the unauthorized removal of nuclear material.

3.13 Safeguards and Non-Proliferation

The "Safeguards and Non-proliferation" 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. BWXT NEC has implemented and maintains a safeguards program and undertakes all required measures to ensure safeguards implementation in accordance with IAEA commitments and CNSC regulatory document 2.13.1 *Safeguards and Nuclear Material Accountancy.* Movement of safeguarded nuclear material (inventory changes) are documented and reported to the CNSC as required.

BWXT NEC has implemented and maintains a well-established Safeguards program and undertakes all required measures to ensure IAEA commitments and CNSC regulatory requirements are met. BWXT NEC reports all Inventory Change Documents through the Nuclear Materials Accountancy Reporting system.

The Physical Inventory Taking (PIT), was conducted between July 18th and July 19th and was followed by a Physical Inventory Verification (PIV) and Design Information Verification (DIV) on July

20th and 21st which involving both the CNSC and the IAEA. The scope of the PIV concerned book examination, physical verification of nuclear material and evaluation of the quality and performance of BWXT NEC's measurement system. The scope of the DIV concerned verification of the facility, general building design, essential equipment, accounting procedures, operator's measurement system, nuclear material characteristics, nuclear material location & flow and operational status of the facility. No non-conformances were noted.

Two short notice random inspections took place during the reporting period on June 10th and on August 26th. The inspection involved physical examination of bundle boxes, sampling and scanning of pellet skids and verification of records. No non-conformances were noted.

3.14 Packaging and Transport of Nuclear Substances

The "Packaging and Transport of Nuclear Substances" Safety and Control Area covers the packaging and transport of nuclear substances and other nuclear materials to and from the licensed facility. In the reporting period, all packaging and shipments to and from the facility were conducted safely according to applicable regulations. Shipments of dangerous goods are not routinely made from BWXT NEC by air, rail or water. Routine road shipments of both dangerous goods and non-dangerous goods are made between suppliers, the Toronto plant, the Peterborough plant, and customer nuclear generating stations. Shipments of prescribed substances are only made to:

- Persons in Canada, holding a valid CNSC Licence to possess such prescribed substances; or,
- Persons in Canada, not requiring a valid CNSC Licence by virtue of the Nuclear Safety and Control Act and regulations; or,
- Persons outside Canada, as approved by an Export Permit, CNSC Export Licence, or combination of CNSC Export Licence and reference to General Export Permit as applicable.

The transportation of dangerous goods in Canada is regulated by Transport Canada through the *Transportation of Dangerous Goods Regulations*. Additional requirements for the transport of Class 7 radioactive materials is regulated by the CNSC through the *Packaging and Transportation of Nuclear Substances Regulations*. In addition, the IAEA has established uniform regulations for all modes of transportation throughout the world. The IAEA has published the *Regulations for the Safe Transport of Radioactive Material* and the CNSC has endorsed these through the *Packaging and Transport of Nuclear Substances Regulations*.

BWXT NEC has an established *Emergency Response Assistance Plan* compliant to Part 7 of the *Transportation of Dangerous Goods Regulations*. During the reporting period, the plan was revised and approved by Transport Canada. It is in place to ensure that timely and effective response protocols are in place with the intent to protect public safety, property and the environment in the event of an accident involving the transportation of natural or depleted UO_2. A tabletop emergency drill was completed to test elements of the transportation emergency plan with continuous improvements identified and tracked to completion. Transportation of uranium materials to and from BWXT NEC are included in the plan.

4 OTHER MATTERS OF REGULATORY INTEREST

4.1 Public Information Program

4.1.1 Employee/Internal Communications

BWXT NEC uses a variety of means to engage its ~400 employees in Peterborough. The company uses the employee portal (intranet), electronic bulletin boards, email alerts and printed communications to issue company news, executive blogs and general business updates. The president of BWXT NEC normally holds all-employee meetings at all sites in the fourth quarter of the year. Due to the COVID-19 pandemic, this meeting was recorded and shared with employees virtually. Open communication is important to the president of BWXT NEC and he encourages employees contact him throughout the year with questions.

4.1.2 Government Stakeholders

BWXT NEC places great importance on its relationships with all levels of government in the communities in which it operates and works to ensure there is open communication and awareness of BWXT NEC's operating activities. In 2022, BWXT NEC emailed over ten electronic updates to the MP for Peterborough-Kawartha, MPP for Peterborough and Mayor and Councillors for Peterborough. These communications provided elected officials in Peterborough with information about the CNSC's independent air quality study, invitations for tours, meetings and virtual community events, relevant information and links, and copies of newsletters and other documentation.

4.1.3 Indigenous Relations

BWXT Canada (which includes BWXT NEC) has been a member of the Canadian Council for Aboriginal Business (CCAB) since September of 2017 and is currently Progressive Aboriginal Relations (PAR) Certified at the committed level. This signifies BWXT Canada's commitment to continuous improvement in Indigenous relations and intention to undergo external verification of performance in the future.

BWXT Canada's Indigenous Relations Committee meets regularly to review objectives outlined in the PAR criteria as the company works to find ways to strengthen its ties with Indigenous communities. In 2022, BWXT NEC contacted local Indigenous communities in Peterborough via email and a letter offering to meet. These communications provided information about the CNSC's independent air quality study, invitations for tours, meetings and virtual community events, relevant information and links, and copies of newsletters and other documentation.

Throughout 2022, Curve Lake First Nation would provide an update on behalf of the community and BWXT NEC would provide an update on behalf of the company. Topics of interest discussed at these meetings include environmental monitoring, community support, future events, operations in Peterborough and Toronto, CCAB PAR progress, and more.

In November, BWXT NEC met virtually with folks from IBA Braiding that were representing Scugog Island First Nation. This meeting was to provide an overview of BWXT NEC and find ways to connect and support the Scugog Island First Nation community. Representatives from BWXT NEC met virtually with council members from the Métis Nation of Ontario Peterborough & District Wapiti Métis Council in December to provide an overview of operations, update on current events and news and answer questions. The President of the Métis Nation of Ontario Peterborough & District Wapiti Métis Council also provided an update to BWXT NEC on recent news from the community.

The company is also an active member within the Indigenous Relations Suppliers Network established by Bruce Power and Indigenous Opportunities in Nuclear program established by

Ontario Power Generation. Overall, the CCAB PAR program supports BWXT NEC's commitment to engaging with Indigenous communities and working together to build and sustain meaningful long-term relationships. More information on BWXT NEC's commitment to Indigenous relations, including our policy, can be found at nec.bwxt.com under the Community tab.

4.1.4 Community Relations

BWXT NEC is committed to providing timely information to the communities in which it operates and works to ensure there is open two-way communication and awareness of BWXT NEC's operating activities. Throughout 2022, BWXT NEC utilized a variety of communication channels to provide information to its neighbours, including electronic email updates to its contact list (which includes interested members of the public), banners along the fence line, newsletters, mailers, social media and Facebook targeted advertising. Community members can sign up to join BWXT NEC's email updates anytime by contacting the company at questions@bwxt.com or by submitting their info by clicking to our online form link: https://www.bwxt.com/bwxt-nec/contact-us-1.

4.1.5 Community Volunteerism

Post-COVID-19, BWXT NEC's employees remained committed to supporting their community through volunteerism and charitable giving. In 2022, Peterborough employees contributed to a spring fundraiser and conducted a fall food drive and collection for Kawartha Food Share. In the winter, employees contributed to a holiday gift collection for Kinark Children's Services and donated blood at Canadian Blood Services during the December Days of Giving Campaign. Additionally, employees participated as judges at the virtual Peterborough Regional Science Fair and Fleming College Innovation and Technology Showcase. Lastly, employees provide funding to the Peterborough Regional Health Centre (PRHC) through a BWXT NEC charitable parking program.

4.1.6 Community Investment

In Peterborough, BWXT NEC made a number of charitable contributions to local organizations in 2022: provided three bursary awards for students in the School of Trades And Technology program at Fleming College; sponsored the virtual PRHC Dragon Boat Festival; sponsored the virtual Peterborough Regional Science Fair and provided funding for awards; supported Adam Scott Collegiate and Vocational Institute; Kenner Collegiate Vocational Institute; and Crestwood Secondary School through student awards in STEM; provided funding to Kawartha Food Share as part of a fundraiser in the fall; sponsored the Métis Nation of Ontario's Annual General Assembly; provided funding to the Métis Nation of Ontario Peterborough & District Wapiti Métis Council for COVID-19 relief; sponsored the Five Counties virtual Winterfest event; provided funding to the Community Counselling Resource Centre; provided funding to Kinark Children's Centre for holiday gifts for children; and provided funding to Big Brothers Big Sisters Peterborough for holiday hampers of essential items for community members in need.

4.1.7 Tours

BWXT NEC provides facility tours to help engage members of the industry, local elected officials, Indigenous communities and interested members of the public in an effort to help better understand our business. In 2022, no large facility tours occurred. BWXT NEC created a virtual tour of its Peterborough facility, which is posted on its website and looks forward to offering in-person tours in 2023.

4.1.8 Community Events

Due to the COVID-19 pandemic, BWXT NEC chose to again cancel its annual in-person community barbeques. A Community Webinar was held on Nov 3, 2022 in the evening. The webinar provided a means to engage neighbours, community members and other stakeholders, and to educate them about our business. There were 13 participants on the live webinar and BWXT NEC representatives answered questions for over 30 minutes. The webinar recording is available on BWXT NEC's public website (nec.bwxt.com). BWXT NEC leadership presented an informative slideshow containing information about the company, safety and compliance, public information program, licence renewal, and facts about natural uranium. Throughout the webinar, viewers could submit their questions in the comment section and BWXT NEC would address these questions live in the video feed. BWXT NEC issued invitations to the Community Webinar in mailers sent to neighbours, on the dedicated website, on social media and used targeted Facebook advertising to share the invitation details.

4.1.9 Community Newsletters

BWXT NEC distributes by mail, and posts to its website, community newsletters as a tool to share information with the local Peterborough community about the company's operational performance, health and safety, CNSC licence, activities in the community and general information. Three newsletters were issued to the Peterborough surrounding community in May, July and November of 2022. The newsletters were also posted to our public information website, emailed to our contact list and shared on social media.

4.1.10 Community Liaison Committee - Peterborough

The Peterborough CLC was established in 2020 and meets three to four times per year. In 2022, most meetings were held virtually due to the pandemic. (Meetings would have been held in-person at the Peterborough BWXT NEC facility in the evenings). The CLC is a forum for the exchange of information between the community and BWXT NEC and allows members to bring forward questions, discuss concerns and identify opportunities to improve community relations.

BWXT NEC held a new member orientation session on February 8th. BWXT NEC subsequently met with the CLC on April 6th, June 14th October 13th and held a Year End meeting on November 23rd. Meeting records are posted to the company's website. In 2022, CLC members met with BWXT NEC staff to discuss the facility's operations and received updates on topics such as the independent air quality study, Annual Compliance Report, soil sampling, public disclosure protocol, public surveying, community updates, environmental monitoring information, safety scenarios, nuclear medicine, public information program updates, events, community outreach and support, media coverage, community opposition groups, CLC recruitment, and more. The October 13, 2022 meeting was held in-person and included a facilities tour through Building 21 (Fuel Bundle Manufacturing) and Buildings 26 and 28 (Engineering and Manufacturing).

Representatives from the CNSC attended the Year End CLC meeting as guests to provide information on their independent air quality studies for both Toronto and Peterborough communities.

In 2022, the CLC had a membership of eight external members (including a representative from a local school, representative from a local health organization, representative from a local Indigenous community and a representative from a local economic development agency). Two members left the CLC mid-year and one didn't attend the orientation or regular meetings. BWXT NEC launched a recruitment campaign in the fall of 2021 to attract new members for which four applications were received. All four applicants were accepted upon review and joined the committee in 2022.

4.1.11 Website

BWXT NEC has a dedicated public information website, located at nec.bwxt.com. The website provides information about the company's operations and activities that can be accessed by members of the public and other key stakeholders 24/7.

In 2022, there were 14,444 sessions from 12,666 users. Top pages visited were: Home page (30%), About Peterborough (10.5%), NA, Contact Us (6.5%), About Toronto (8.5%) About Arnprior (3.5%) and What We D0 (3.5%.

Over the course of 2022, new information was regularly updated on the website. The following represents some of the updates that were posted:

- Licence renewal updates (Record of Decision)
- Public disclosures
- Document summaries and environmental information
- Frequently asked questions
- Peterborough and Toronto CLC (meeting minutes, recruitment)
- Copies of the Toronto (three) and Peterborough (three) newsletters
- Community Webinar information
- Virtual Tour (Peterborough)
- Annual Compliance Report information
- Notice of CNSC's annual public meeting and webinar

4.1.12 Information Brochures

BWXT NEC maintains public information brochures. These brochures are updated on a yearly basis when new information is available from the Annual Compliance Report. These brochures are available in Peterborough during tours and meetings and are also posted on our public website. Brochures are used as information tools at community events like job fairs and community barbeques.

4.1.13 Public Inquiries

Members of the public can contact BWXT NEC by dialing our toll-free number, 1.855.696.9588 and/or emailing us at questions@bwxt.com. These contact details appear on BWXT NEC's website and in community newsletters and public information brochures.

In 2022, 1473 emails were received by questions@bwxt.com, the majority of which were spam, questions for finance or purchasing, job seekers or agencies seeking employment verifications. In 2022, there were 113 calls from June to December to the 1.855.696.9588 toll free number, most of which were related to employment verification, procurement, community giving or public/media relations. We encourage community members to use this outlet to contact us with questions, comments and concerns. All emails and calls to the information line were appropriately handled and addressed.

4.1.14 Earned Media

In 2022, BWXT NEC was mentioned in eight Peterborough news articles, two opinion pieces and featured on local television media twice. The tone of the majority of news articles was negative and focused on concerns from community members related to fuel pellet manufacturing, soil sampling and legal action by CARN on the CNSC's decision on BWXT NEC's licence renewal. BWXT NEC received positive media coverage about CNSC IEMP results.

4.1.15 Social Media

In October of 2020, BWXT NEC launched its own dedicated Facebook and Twitter social media platforms to better engage with its community members. Social media channels help BWXT NEC share information about activities with the public in a timely way. In 2022, BWXT NEC issued two to four social media posts each week on Twitter and Facebook. Post topics include information about BWXT NEC's operations, invitations to events, job postings, community giving and involvement, CLC recruitment, educational information, industry highlights, and more.

4.1.16 Public Disclosure Protocol

BWXT NEC has a Public Disclosure Protocol in place that sets guidelines for providing timely information to interested members of the public and other stakeholders. This Protocol and any Public Disclosures issued by BWXT NEC can be found at nec.bwxt.com under the Community tab. The Public Disclosure Protocol document is also available in full on the website as a PDF. There were 0 public disclosures made in 2022.

4.2 Cost Recovery

BWXT NEC is current on its cost recovery payments to the CNSC.

4.3 Financial Guarantees

The PDP and associated decommissioning cost estimates are in place in accordance with CNSC Regulatory Guide G-206 *Financial Guarantees for the Decommissioning of Licensed Activities*, CNSC Regulatory Guide G-219 *Decommissioning Planning for Licensed Activities*, and CSA N294-09 *Decommissioning of Facilities Containing Nuclear Substances*. The PDP strategy and end-state objective of decommissioning is to release the site from regulatory control for industrial use or demolition of the structures.

On December 22nd, 2020 the CNSC in its relicensing decision accepted the proposed financial guarantee amount and financial instruments. The financial instruments remain valid in the format approved by the CNSC. The issuers of the financial guarantee instruments remain in good standing. The financial rating of the financial guarantee issuers were provided to the CNSC in March of 2023.

4.4 Improvement Plans and Future Outlook

BWXT NEC remains committed to continuously improve its EHS programs to improve efficiency and minimize risk to employees, the public and the environment. Fuel production levels are projected to increase to be similar to the amount processed in 2021 which will be an increase over 2022 levels. Future opportunities for automation of the bundle assembly process are planned for 2023 and beyond which will deliver ergonomic and cost saving improvements.

5 CONCLUDING REMARKS

BWXT NEC is committed to the establishment and continuous improvement of a healthy safety culture. Safety culture refers to the core values and behaviours resulting from a collective commitment by our company's leaders and individuals to emphasize safety, quality, ethics, and security over competing goals to ensure protection of employees, the public and the environment. It is a top business priority to continuously improve our EHS systems to protect fellow employees, the environment, and our communities against environmental, health and safety hazards. BWXT NEC management recognizes, reviews, prioritizes and controls workplace hazards and ensures compliance with applicable regulatory requirements, applicable codes and company policies.

Governed by an integrated management system, conventional health and safety, radiation protection and environmental protection programs are well implemented. All radiation dose measurement results were below Internal Control Levels, Action Levels and regulatory limits. Environmental protection programs are well implemented. There were no significant environmental issues or incidents encountered during the reporting period. Facility emission results were very low and below Internal Control Levels, Action Levels and regulatory limits. Annual releases to the air and water were both a very small fraction of regulatory limits. Public dose was estimated to be 11.5 µSv.

All production and possession limits were respected. Transportation of dangerous goods was conducted safely between suppliers, customers and waste vendors without risk to workers, the public or the environment.

This annual compliance monitoring and operational performance report demonstrates that BWXT NEC has successfully met the requirements of the *Nuclear Safety and Control Act*, regulations and CNSC Class IB Nuclear Fuel Facility Licence requirements.