



**Written submission from  
BWXT Nuclear Energy Canada Inc.**

**Mémoire de  
BWXT Nuclear Energy Canada Inc.**

In the Matter of the

À l'égard de

**BWXT Nuclear Energy Canada Inc.,  
Toronto and Peterborough Facilities**

---

**BWXT Nuclear Energy Canada Inc.,  
installations de Toronto et Peterborough**

---

Application for the renewal of the licence for  
Toronto and Peterborough facilities

Demande de renouvellement du permis pour les  
installations de Toronto et Peterborough

**Commission Public Hearing**

**Audience publique de la Commission**

**March 2 to 6, 2020**

**Du 2 au 6 mars 2020**

*This page was intentionally  
left blank*

*Cette page a été intentionnellement  
laissée en blanc*

# **RENEWAL OF OPERATING LICENCE FFOL-3620.1/2020**



**REVISION RECORD**

<b>Rev. No.</b>	<b>Description of Revision</b>	<b>Prepared By and Date</b>	<b>Approved By and Date</b>
00	Initial issue.	David Snopek 2019-12-19	John MacQuarrie 2019-12-19

**TABLE OF CONTENTS**

<b>1</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>2</b>	<b>INTRODUCTION.....</b>	<b>5</b>
2.1	Background.....	5
2.2	Processes and Materials .....	7
2.3	Licence Renewal Application.....	8
<b>3</b>	<b>BUSINESS PLAN .....</b>	<b>10</b>
<b>4</b>	<b>SAFETY AND CONTROL AREAS (SCAs) .....</b>	<b>10</b>
4.1	Management System.....	10
4.2	Human Performance Management .....	13
4.3	Operating Performance .....	14
4.4	Safety Analysis .....	17
4.5	Physical Design .....	18
4.6	Fitness for Service .....	19
4.7	Radiation Protection .....	21
4.8	Conventional Health and Safety .....	29
4.9	Environmental Protection.....	32
4.10	Emergency Management and Fire Protection.....	40
4.11	Waste Management.....	42
4.12	Security .....	44
4.13	Safeguards .....	45
4.14	Packaging and Transport.....	45
<b>5</b>	<b>OTHER MATTERS OF REGULATORY INTEREST .....</b>	<b>46</b>
5.1	Cost Recovery .....	46
5.2	Financial Guarantees.....	46
5.3	Other Regulatory Approvals .....	47
5.4	Public Information Program .....	47
<b>6</b>	<b>CONCLUSIONS .....</b>	<b>56</b>
<b>7</b>	<b>REFERENCES.....</b>	<b>56</b>
7.1	Internal References .....	56
7.2	External References .....	57
<b>8</b>	<b>ACRONYMS AND ABBREVIATIONS .....</b>	<b>58</b>

## 1 EXECUTIVE SUMMARY

BWXT Nuclear Energy Canada Inc. (BWXT NEC) (formerly known as GE-Hitachi Nuclear Energy Canada Inc.) 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, businesses and the Canadian economy. BWXT NEC operates in three plant locations: Arnprior, Toronto and Peterborough, Ontario. The Toronto and Peterborough facilities are Class IB nuclear facility operations.

BWXT NEC's current Nuclear Fuel Facility Operating Licence (FFOL-3620.01/2020) 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<sub>2</sub>) pellets in Toronto at 1025 Lansdowne Avenue; and to produce and test fuel bundles in Peterborough at 1160 Monaghan Road. The Peterborough facility is also authorized to receive, repair, modify and return contaminated equipment from off-site nuclear facilities.

BWXT NEC's current licence was granted on January 1, 2011 and expires on December 31, 2020. In November 2018, BWXT NEC submitted an application seeking a 10-year renewal of the licence. Following the licence application submission BWXT NEC provided updated Preliminary Decommissioning Plans, Safety Analysis Reports, and information related to Licence Release Limits.

In the application, BWXT NEC requested authorization during the next licence period to have the flexibility to conduct pellet production in both Toronto and Peterborough. BWXT NEC also submitted a bounding Environmental Risk Assessment (ERA) for the Peterborough facility to demonstrate that the anticipated environmental emissions and monitoring practices would be similar to those currently in place at the Toronto facility.

Throughout the current licence period, there were no environmental action level exceedances, emissions were well below regulatory limits, and BWXT NEC demonstrated strong performance in all Safety and Control Areas (SCAs). In addition, there have been no lost-time injuries at BWXT NEC over the past five years. BWXT NEC continuously improved engagement with the communities in Toronto and Peterborough through timely, transparent and meaningful discussion in an effort to develop an atmosphere of openness and transparency with members of the public, elected officials and Indigenous groups. This requires a demonstrated commitment to operating in accordance with the highest environment, health and safety standards, while at the same time, sharing information concerning anticipated effects on the environment, and the health and safety of persons that may result from the activity.

BWXT NEC has operated safely under the current licence and is committed to continuously improve systems to protect employees, the environment and our communities against environment, health and safety hazards. We work to implement programs and objectives 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 has implemented a business management system for the licensed activity, which ensures applicable buildings and facilities, process equipment, and processes used in support of licensed activities are conducted in accordance with the Nuclear Safety Control Act and Regulations, applicable CNSC requirements, and best practices.

The renewal application, supplemental information provided subsequent to the application, and this written submission demonstrate that BWXT NEC is qualified to undertake the licensed activities and that adequate provisions have been made, and will continue to be made, for the protection of the environment, employees and the public.

## 2 INTRODUCTION

### 2.1 Background

BWXT NEC (formerly known as GE-Hitachi Nuclear Energy Canada Inc.) 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, businesses and the Canadian economy. BWXT NEC operates in three plant locations: Arnprior, Toronto and Peterborough, Ontario.

The current Nuclear Fuel Facility Operating Licence (FFOL-3620.01/2020) issued by the CNSC authorizes BWXT NEC to operate and modify its nuclear fuel facility to produce natural and depleted Uranium Dioxide (UO<sub>2</sub>) pellets in Toronto at 1025 Lansdowne Avenue; and to produce and test fuel bundles in Peterborough at 1160 Monaghan Road. The Peterborough facility is also authorized to receive, repair, modify and return contaminated equipment from off-site nuclear facilities.

The Toronto facility is located in a mixed industrial, commercial, and residential area in west-central Toronto (refer to Figure 1). The facility consists of two separate buildings, which are identified as Building 7 and Building 9.

Building 7 houses uranium dioxide pellet manufacturing on the first, second and third floors and office space on the fourth floor.

Building 9 is a warehouse used for the storage of uranium dioxide as miscellaneous scrap awaiting reprocessing or shipment for disposal, compaction of waste, and decontamination activities.

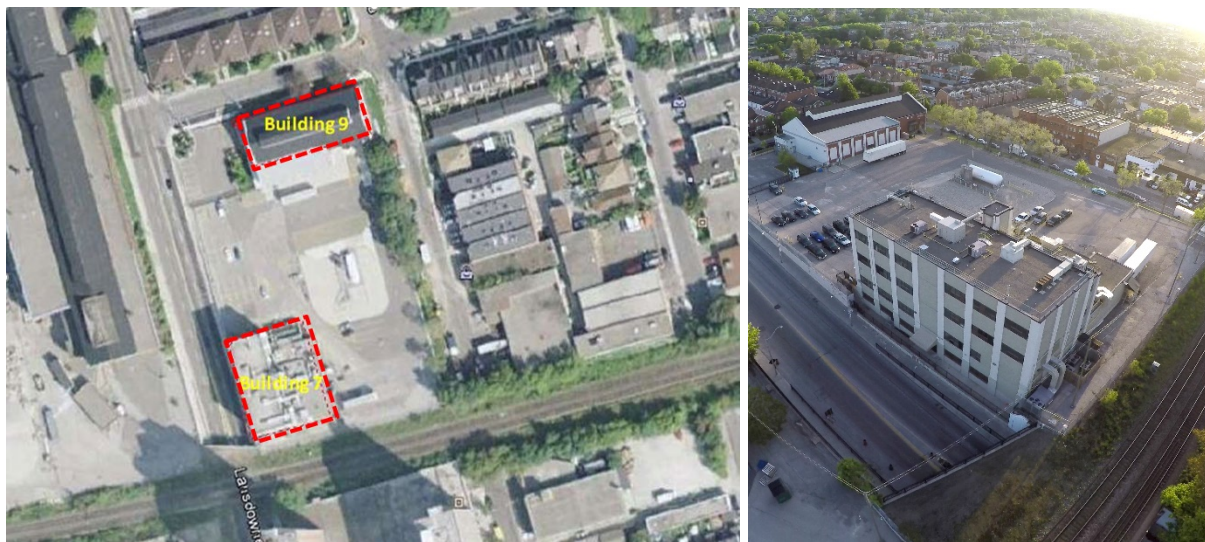


Figure 1 – Toronto Facility

The Peterborough facility is located in a mixed industrial, commercial, and residential area in west-central Peterborough (Figure 2). The buildings are located on the existing GE plant complex. The licensed facility consists of four separate buildings; Building 21, 24, 26 and 28.

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 radioactive material including completed uranium fuel bundles, sealed drums of Uranium Dioxide powder, and contaminated equipment as required.

Building 26 is principally a conventional fabrication and assembly operation. It also houses manufacturing equipment and facilities for the repair of contaminated equipment.

Building 28 houses the main shipping and receiving docks. It is directly accessible through Building 26.

The current licence allows the processing of up to 150 Mg of uranium at each facility in any calendar month.



**Figure 2 – Peterborough Facility**

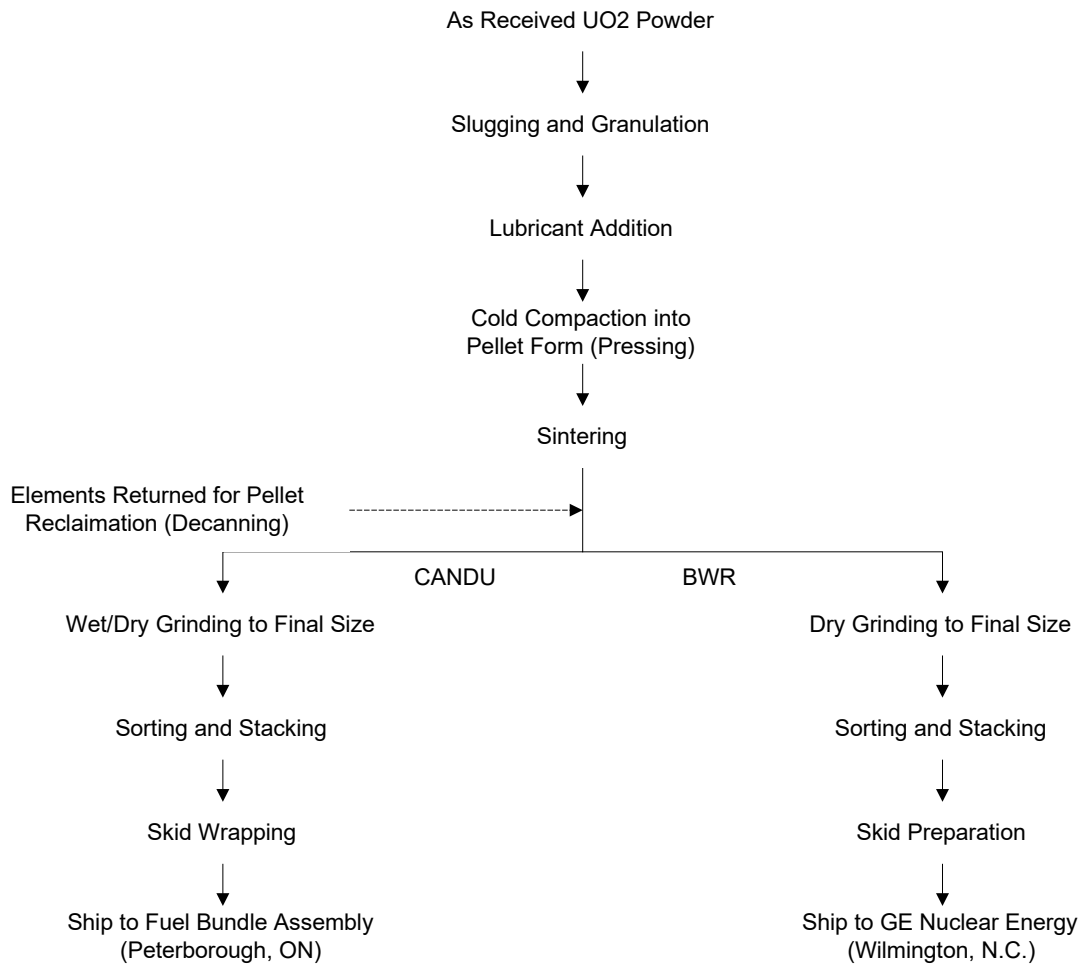


**2.2 Processes and Materials**

The Toronto Facility processes natural and depleted UO<sub>2</sub> powder into fuel pellets. Specifically, UO<sub>2</sub> powder is received in standard steel drums and the powder is compressed into "slugs" and granulated to a free-flowing powder. This powder is pressed into a pellet shape and the sintered pellets are ground to the required diameter, inspected and wrapped for shipment to the Peterborough Facility. BWXT NEC also can periodically ship pellets to the United States of America for use in Boiling Water (BWR) commercial power reactors. See Figure 3 for the process.



**Uranium Dioxide  
Fuel Pellet Fabrication Flow**

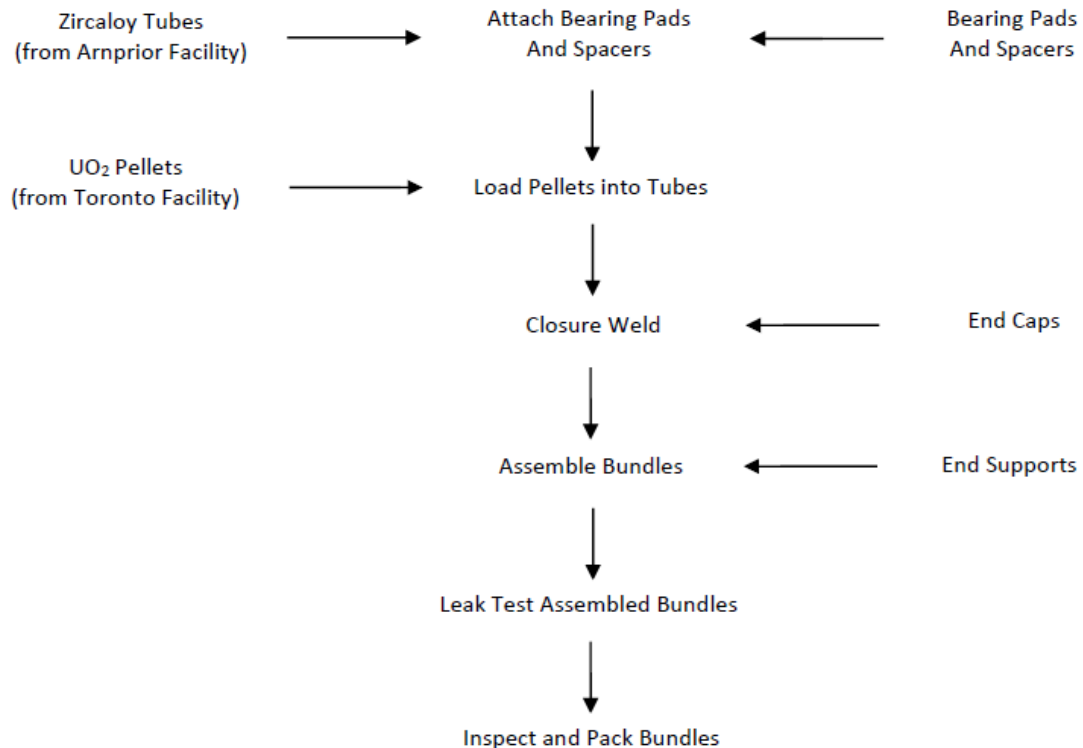


**Figure 3 – Uranium Fuel Pellet Manufacturing Process**



At the Peterborough Facility, 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 4.

In addition, contaminated equipment from off-site nuclear facilities is periodically received at the Peterborough facility for repair and/or modification.



**Figure 4 – Fuel Bundle Fabrication Process**

### 2.3 Licence Renewal Application

BWXT NEC's current licence was granted on January 1, 2011, amended on December 16, 2016 to reflect the transfer to BWXT NEC., and expires on December 31, 2020. In November 2018, BWXT NEC submitted an application seeking a 10-year renewal of its Fuel Facility Operating Licence based on the current possession and processing limits of Uranium as follows:

- Possess up to a maximum of 700 Mg of Uranium at the Toronto facility in any form at any given time;
- Possess up to a maximum of 1500 Mg of Uranium at the Peterborough facility in any form at any given time; and
- Shall not process more than 150 Mg of Uranium at each facility in any form in any calendar month.

The application requests authorization during the next licence period to conduct pellet production at both facilities (see 2.3.1).

Additional information was provided following the application submission. In particular, BWXT NEC provided updated Preliminary Decommissioning Plans and associated financial guarantee amounts, Safety Analysis Reports, and information related to Licence Release Limits.

### 2.3.1 Authorization for Pellet Production in Peterborough

BWXT NEC is seeking the additional flexibility during the proposed next licence period to produce pellets at both facilities, with no change to the current overall throughput level. While there has been no formal business decision to produce pellets at the Peterborough facility, BWXT NEC has requested Licence Conditions and associated Licence Conditions Handbook (LCH) compliance verification criteria to permit such activities during the proposed next licence period.

Any pellet production at the Peterborough facility would be conducted within the existing licensed facility via a re-configuration of existing space. Air and water emissions are routinely measured at both the Toronto and Peterborough facilities and historically are shown to be only a fraction of the regulatory limits. A bounding ERA for the Peterborough facility has been submitted in conjunction with the licence application demonstrating that the anticipated environmental emissions and monitoring practices at the Peterborough facility would be similar to those currently in place at the Toronto facility.

Should the decision be made to produce pellets at the Peterborough facility under the proposed amended licence, it is requested that the changes would be made under the approved change management program and prior notification requirements within the LCH. Program documents and assessment reports affected by the project would be revised at that time and those subject to prior notification would be submitted to CNSC Staff as required.

### 2.3.2 Preliminary Decommissioning Plans

Updated Preliminary Decommissioning Plans (PDPs) were submitted for both facilities on March 27, 2019. The PDPs were accepted by CNSC Staff on July 30, 2019. Subsequently, a minor revision of the Toronto PDP was submitted on October 16, 2019. BWXT NEC is seeking approval of the updated financial guarantee amounts as follows;

Peterborough: \$10,775,122

Toronto: \$37,362,745

Additionally, BWXT NEC has requested that the financial guarantee instrument be a combination of Surety Bond and Letter of Credit, with the first \$700,000 for Peterborough and first \$1,300,000 for Toronto being satisfied by Letters of Credit. The remaining obligation in each case would then be satisfied by Surety Bonds. Draft forms of both instrument types were provided to CNSC Staff on October 16, 2019.

Additional information on decommissioning and financial guarantees can be found in sections 4.11 and 5.2.

### 2.3.3 Safety Analysis Reports

Updated Safety Analysis Reports were submitted to CNSC Staff on April 9, 2019. More information on safety analysis can be found in section 4.4.

### 2.3.4 Licensed Release Limits

BWXT NEC provided input to CNSC staff on August 1, 2019 as input to the development of updated Licensed Release Limits for both facilities, which was confirmed to be acceptable on August 19, 2019. It is anticipated that updated Licensed Release Limits will be established that; (1) include uranium and beryllium, (2) are concentration based, and (3) consider radiotoxicity, chemical toxicity, and protection of aquatic life.

BWXT NEC is committed to continuously improve systems to protect employees, the environment and our communities against environment, health and safety hazards. We work to implement programs and objectives 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 of the quality assurance program for the licensed activity, which ensures applicable buildings and facilities, process equipment, and processes used in support of licensed activities are conducted in accordance with the Nuclear Safety Control Act and Regulations, applicable CNSC requirements, and best practices.

BWXT NEC has demonstrated strong performance in all SCAs throughout the current licence period as noted in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada [20][21][22][23] and as demonstrated in BWXT's Annual Compliance Reports [1][2][3][4][5][6][7][8]. Throughout the current licensing period, CNSC staff introduced additional regulatory documents and CSA standards and BWXT NEC has integrated these new requirements on an ongoing basis as part of its continuous improvement program.

The renewal application and supplemental information provided subsequent to the application demonstrate that BWXT NEC is qualified to undertake the licensed activities and that adequate provisions have been made, and will continue to be made, for the protection of the environment, employees and the public.

### **3 BUSINESS PLAN**

BWXT NEC in Peterborough and Toronto manufactures natural and depleted  $UO_2$  fuel bundles for use primarily in CANDU reactors in Canada. In Peterborough, BWXT NEC also performs engineering design and manufacturing for the CANDU nuclear industry. In total, these two locations employ nearly 400 people, including engineers, technicians, millwrights and other highly specialized professions and trades.

Manufacturing engineering upgrades will continue within the scope of the current licensed activity of each facility. As discussed in the licence application and this document, although BWXT NEC has applied for the flexibility to produce pellets at either of its two licensed locations, there are no business plans to manufacture pellets in Peterborough at this time.

### **4 SAFETY AND CONTROL AREAS (SCAS)**

#### **4.1 Management System**

The "Management System" SCA covers the framework that establishes the processes and programs required to ensure an organization achieves its Environment, Health and Safety (EHS) objectives, continuously monitors its performance against these objectives and fosters a healthy safety culture. The Management System is fully compliant with CSA N286-12 [24].

##### **4.1.1 Relevance and Management**

Design and implementation of BWXT NEC's Business Management System (BMS) began in 2009 over the course of two to three years. The top-level document consists of the BMS Manual which contains the organizational vision and strategy as well as the scope of responsibility for each function across the BWXT NEC business. The BMS includes assurance mechanisms, such as audits, self-assessments and management reviews, to ensure continuous improvement and effectiveness.

In 2010, a Licenced Activity Quality Assurance (LAQA) program [9] was added to the BMS. The LAQA program references procedures and work instructions which contain procedural requirements and work steps assigned to individuals across several functions within the BMS. New tools were added since 2010, such as Use of Experience and Nuclear Safety Culture (Human Performance Improvement) programs to

assist in maintaining improvements in key process indicators. Three notable areas of additional assurance in the BMS which have been included since 2010 are as follows:

- An improved program of work planning, control and independent verification was implemented, supported by a new Preventive Maintenance Software System;
- An improved configuration control program was implemented to ensure the original design intent of Critical to Safety (CTS) systems and equipment is maintained; and
- BWXT NEC's training program was redesigned to comply with Systematic Approach to Training (SAT) guidelines.

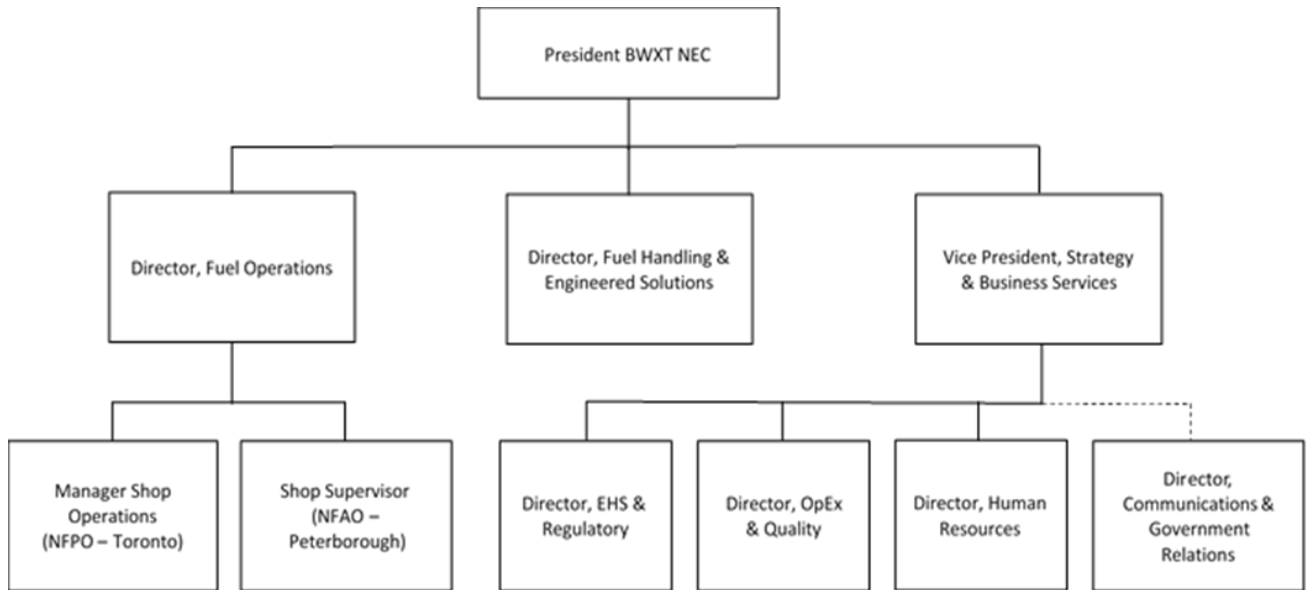
The LAQA program complies with CSA N286-12, "Management System Requirements for Nuclear Facilities" and consists of the following key elements:

- Organization and Responsibilities
- Personnel Capability
- Use of Experience
- Work Planning Control
- Work Processes Control Practice
- Verification
- Non-conformances
- Corrective Action
- Change Control
- Document Control and Records
- Audits
- Management Self-Assessment
- Management Program Review

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 Director, OPEX and Quality 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.

Figure 5 outlines the leadership organization, in which the President of BWXT NEC is responsible for total operations of BWXT NEC (reporting to the President of BWXT Canada Ltd.); and the Director, EHS and Regulatory has been delegated the authority to act on behalf of the President of BWXT NEC on matters dealing with the CNSC.



**Figure 5 – Leadership Organization**

BWXT corporate policy describes BWXT’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 and 4) Self-Checking.

BWXT NEC’s commitment to a strong safety culture is measured by BMS tools such as audits and self-assessments, use of experience and corrective action program metrics which measure the effects of safety culture improvements. External agencies such as the CNSC audit BWXT NEC operations against Canadian Standards Association (CSA) standards which include Safety Culture requirements (e.g., CSA N286-12 [24])

#### 4.1.2 Past Performance

The BWXT NEC Management System described above uses internal audits and self assessments to evaluate various aspects of operations related to the licensed activities. The audit program requires an audit of compliance for each Management System program element at least once every three years. Similarly, the self assessment program requires assessments be completed on each Management System element once every 3 years. Results of audits and self assessments are reported in BWXT NEC’s Gensuite® Action Tracking System (ATS) to ensure findings, identified opportunities for improvement, and areas of concern are reviewed by site management and processed accordingly. There were no significant issues identified in the more than 50 internal Management System Audits completed during the current licence period. Also, there were more than 75 Management System Self Assessments completed, yielding improvement opportunities identified and implemented to strengthen the Management System.

BWXT NEC conducts Annual Management Reviews of the Management System and uses all associated programs and performance to evaluate the effectiveness of the system and to identify opportunities for improvement. In the current licence period, eight Annual Management Reviews have been completed by BWXT NEC to evaluate the effectiveness of the Management System and to identify opportunities for improvement.



CNSC Staff have assessed the Management System SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e., Satisfactory rating).

#### **4.1.3 Future Plans**

Updates to the Management System will be implemented in line with any future version releases of CSA-N286 through revised business plans. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.1.4 Challenges**

No challenges are foreseen at this time.

#### **4.1.5 Requests**

BWXT NEC has no requests on this SCA at this time.

### **4.2 Human Performance Management**

The “Human Performance Management” SCA covers activities that enable effective human performance through the development and implementation of processes that ensure personnel have the necessary knowledge, skills, procedures, and tools in place to safely carry out their duties.

#### **4.2.1 Relevance and Management**

##### **4.2.1.1 General Training**

The BWXT NEC training program is described in the LAQA program implemented through business-wide training procedures. Qualifications and training requirements are identified and personnel are given the appropriate training to ensure they are competent in the work they do. Such training includes on-the-job training, radiation protection, and safety risk assessment training. Workers only perform functions for which they are qualified.

##### **4.2.1.2 Systematic Approach to Training**

In 2015, BWXT NEC began implementation of a SAT program. The program applies to new training and the revision of existing training, including continuing training and applies to training managed internally by BWXT NEC or externally through vendors or contractors.

The SAT-based training system is a cyclical process, allowing for training to be systematically analyzed, designed, developed, implemented, evaluated, documented and managed in order to meet operational and organizational requirements and to react quickly to make changes to those requirements. The application of SAT at BWXT NEC is done in a manner commensurate with the risks and characteristics of the business activity. Programs that have been developed in compliance with SAT include:

- Training on knowledge areas such as Respiratory Protection Awareness, Transportation of Dangerous Goods, Security Awareness, Radiation Protection & Emergency Response for Class 7 Carriers, Uranium Emergency Response Assistance, Canada Labour Code Part II, and Radiation Safety;
- Training on tasks such as External & Internal Radiation Hazard Monitoring, First Aid/Automated External Defibrillator/Cardiopulmonary Resuscitation, B3 Area Donning & Doffing; and
- Training for roles such as Material Handling – Shipping/Receiving, Material Handling – Janitorial, and Facilities Coordinator.

#### 4.2.1.3 Supervisor and Management Training

As required by the Canada Labour Code-II, managers and Supervisors are trained to ensure that workers use prescribed protective equipment; workers are advised of potential and actual hazards; and that every reasonable precaution is taken for the protection of workers.

In addition, to protect workers and to ensure nuclear security, supervisors and managers are trained to anticipate and respond to changes in employee behavior in accordance with both the Violence Prevention requirements under the Canada Labour Code-II and the Nuclear Security Regulations.

#### 4.2.1.4 Radiation Protection Training

A well-established radiation protection training program is in place at both the Toronto and Peterborough facilities. Each new employee is provided with radiation protection training prior to commencing work at the facility and employees are re-trained on a schedule.

#### 4.2.1.5 Human Performance Expectations and Improvement

BWXT NEC clearly states expected “Standards of Performance” and summarizes these expectations with the following statement; “We shall be proactively self-critical, striving to determine how we can do better than the minimum requirements. The minimum regulation, rule, or guide should not be viewed as an acceptable standard or goal. We should look to other organizations for best practices and lessons learned, and model those where appropriate.” The priorities set before all employees are (in order of importance) – Safety, Quality, followed by Schedule and Costs. To assist employees in achieving this Standard, error prevention techniques are included in Operations reviews, usually with a teaching example from within the BWXT NEC operation where the use of the error prevention technique could have improved the experienced outcome, or where the employee did employ such techniques and avoided a potentially adverse outcome. Human Performance indicators, such as Near Misses or First Aids are tracked as a measure of performance improvement.

#### 4.2.2 Past Performance

CNSC Staff have assessed the Human Performance Management SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### 4.2.3 Future Plans

A large portion of the existing training roles and programs have had SAT implementation completed by year end 2019. Expected completion in early 2020. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### 4.2.4 Challenges

BWXT NEC will continue to improve Human Performance Management across its operations and does not see any additional challenges in the implementation of this SCA.

#### 4.2.5 Requests

BWXT NEC has no requests concerning this SCA at this time.

#### 4.3 Operating Performance

The “Operating Performance” SCA covers the overall conduct of the licensed activities and the activities that enable effective performance.



### 4.3.1 Relevance and Management

#### 4.3.1.1 Operational Reviews

Management conducts routine meetings to review operations at each facility including a discussion of EHS concerns. Reporting of EHS-related concerns are encouraged and tracked to completion in the Gensuite® software system, which is also used as a measure of employee engagement.

Operating performance is monitored with key performance indicators and program goals. In accordance with EHS program requirements internal audits are conducted annually to assess conformance to internal and external requirements. The annual management review encompasses the following items:

- Status of actions from previous management reviews;
- Follow-up actions from previous management reviews;
- Results of external agency audits where applicable;
- Open regulatory compliance obligations;
- Results of Quality Assurance (QA) for licensed activity internal and external audits (where applicable);
- Results of QA for licensed activity management self-assessments;
- Trends in non-conformances for closure metrics;
- EHS related Quality Assurance Actions;
- Trends in Incident and Measurement (Gensuite) items for root cause;
- Status of EHS training activities;
- Procurement process;
- Extent to which EHS and As Low As Reasonably Achievable (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; and
- Evaluation of the effectiveness and continuing suitability of the EHS policy and the EHS program.

#### 4.3.1.2 Pressure Boundary

BWXT NEC pressure boundary systems at the Toronto and Peterborough facilities are operated and controlled in compliance with CSA B51-14. BWXT NEC also maintains an Authorized Inspection Agency agreement with the Technical Standards and Safety Authority (TSSA). As documented in the service agreement between BWXT NEC and TSSA, the TSSA provides design registration services, quality system accreditation and authorized inspection services in accordance with the requirements of the Technical Standards and Safety Act, 2000.

#### 4.3.1.3 Reporting and Trending

The management system and other program level documents have parameters that are routinely monitored, measured and tracked to ensure the facility is operated as intended. Additionally, annual compliance and performance reports are submitted to the CNSC as required by the current operating Licence and LCH, in order to demonstrate BWXT NEC's compliance with the NSCA, applicable Regulations and licence conditions specified by the CNSC.

#### 4.3.2 Past Performance

BWXT NEC has successfully implemented and maintained over the course of the licence period, a program for the operation of its Toronto and Peterborough facilities, which provides direction for safe operation and reflects the Facility Safety Analysis (FSA). BWXT NEC has established essential documentation (as specified by the BMS) 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

Unplanned events occurred over the current licence period, as follows (all previously reported to the CNSC):

- 1) In 2015, a sprinkler pipe burst in the unheated warehouse on the licensed site in Toronto. During an unusually cold month that winter, condensation build up in the normally dry piping system froze and expanded enough to break open the piping, releasing the hold back pressure allowing the system to accidentally activate. The off-site monitoring company immediately detected the situation, which was immediately addressed.
- 2) In 2017, a sprinkler head accidentally activated after it was re-installed too close to the Furnace 2 exit door flame after overhead renovation work completion at BWXT NEC's Toronto licensed facility. Corrective and preventive actions were implemented to address the situation.
- 3) In 2017 at the Toronto licensed facility, a small hydrogen gas leak on Furnace 5 occurred at a union coupling causing a 15 cm flame that lasted three-to-four minutes at the location of the leak and did not propagate to other materials. The flame was extinguished by shutting off the gas supply using the emergency stop button. Corrective and preventive actions were implemented across all furnaces.
- 4) In 2017 at the Peterborough Fuel Assembly Operation, incorrect Powdered Air Purifying Respirator (PAPR) respirator filters were discovered in use and in stores. As a result, an investigation was initiated and corrective actions implemented.
- 5) In August of 2018, the region of Toronto surrounding the BWXT NEC Toronto facility lost electrical power for a period of approximately 16 hours. The power outage coincided with a period of heavy rainfall at the plant location. Due to the protracted power outage BWXT NEC opted to manage the event under its Emergency Plan and activated its Emergency Organization, notified the CNSC and BWXT NEC personnel managed surface water entering the basement of the building. Water was contained to the interior of Building 7 and was collected and processed in accordance with normal water treatment practices through the Building's Water Effluent Treatment System. All treated and released water met the normal release criteria.
- 6) In 2019, personal air sample for an operator in the Beryllium area was above the Occupational Exposure Limit. Subsequent investigation showed that the ventilation system needed adjustment and was upgraded to increase the capture efficiency which was effective.

CNSC staff have assessed the Operating Performance SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### **4.3.3 Future Plans**

There are no future plans at this time concerning the operational methods in place at BWXT NEC's licenced facilities in Peterborough and Toronto. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.3.4 Challenges**

There are no challenges in operational methods or performance identified at this time.

#### **4.3.5 Requests**

BWXT NEC has no requests concerning this SCA at this time.

### **4.4 Safety Analysis**

The "Safety Analysis" SCA covers the maintenance of the safety analysis that supports the overall safety case for the facility. Safety Analysis is a systematic evaluation of the potential hazards associated with the conduct of an activity or facility and considers the effectiveness of preventative measures and strategies in reducing the effects of such hazards.

#### **4.4.1 Relevance and Management**

BWXT NEC has successfully implemented and maintained documentation which describes the safety analysis for the Toronto and Peterborough facilities which have been updated over the course of the licence period.

The Safety Analysis completed for the Toronto and Peterborough facilities utilizes a combination of What-if Analysis, Hazards and Operability and Quantitative Risk Analysis and documents a systematic evaluation of hazards associated with the licensed facilities.

Modifications to the facilities 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. Impacts on the safety analysis are identified and the safety analysis is validated and updated where necessary.

#### **4.4.2 Past Performance**

Facility safety analyses were updated through the licence period including in 2019 for both facilities. The 2019 update produced Safety Assessment Reports (SARs) for both facilities which document the results of the safety assessment.

The SARs for Toronto and Peterborough conclude that the facility safety analysis demonstrated that 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.

Other analyses that support facility safety include Fire Hazard Analysis (FHA's) that were updated in 2018 and 2019 respectively [10][11][12][13][14] and Environmental Risk Assessments (ERAs) which were updated in 2018 [15][16].

CNSC Staff have assessed the Safety Analysis SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### **4.4.3 Future Plans**

BWXT NEC will continue to maintain and adapt the safety analyses for the facilities. Safety analyses are updated as required and on a five-year cycle. Therefore, at least two updates to the SARs are expected over the licence period.

#### **4.4.4 Challenges**

It is expected that performance under the Safety Analysis SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.4.5 Requests**

BWXT NEC has no requests at this time on this SCA.

### **4.5 Physical Design**

The “Physical Design” SCA relates to activities that impact the ability of structures, systems and components to meet and maintain their design basis given new information arising over time and taking changes in the external environment into account.

#### **4.5.1 Relevance and Management**

##### **4.5.1.1 Physical Design Change Control**

Changes made to the physical facilities, equipment, processes, procedures or practices that could adversely affect product quality, employee and public health and safety or the environment due to the operation of BWXT NEC’s facilities are assessed through the change control program. Any changes to the design basis are identified and assessed 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.

The change control fundamentals as described include:

- Recognition of the need for change control and detailed description of the change;
- Thorough assessment of the change impact on the original system design intent and development of any mitigation requirements (i.e., to manage any effects of unsuccessful changes and unforeseen events);
- Authorization to proceed with the change plan;
- Controlled installation, commissioning, qualification and communication of the change; and
- Update of associated documentation and training for the change(s).

The Change Management process includes a conditional release step allowing the commissioning to proceed subject to the outstanding requirements noted on the Change Notice Form, which subsequently must be satisfactorily addressed before final approval is granted for the project following any commissioning.

#### 4.5.1.2 Fire Protection System Design Changes

Prior to the implementation of any proposed modification to the Toronto or Peterborough facility with the potential to impact protection from fire, the following is completed:

- The proposed modification is submitted for third-party review;
- The review is carried out by one or more independent external reviewer(s) having specific expertise with such reviews; and
- Results of the review are submitted to the Commission or a person authorized by the Commission.

Plant modifications at the Toronto and Peterborough facility are also made in accordance with the National Building Code, the National Fire Code and CSA N393, “Fire Protection for Facilities that Process, Handle, or Store Nuclear Substances” [25].

#### 4.5.2 Past Performance

Significant facility improvements which occurred over the course of the licence period include:

- 2011 – Radiation Refurbishment Facility constructed (within Building 26 Peterborough)
- 2011 – New modular office building (adjacent to Building 21 Peterborough)
- 2013 – Fire safety and powder storage upgrades (Building 24 Peterborough)
- 2013/2014 – Security and monitoring system upgrades (Toronto)
- 2015 – Natural gas supply upgrade, including header replacement and piping (Building 7 Toronto)
- 2014/2015 – Test rig refurbishment (Building 21 Peterborough)
- 2016 - Fire separation enhancements (Building 24/22 Peterborough)
- 2017 - Installation of an Emergency Operations Centre trailer outside Building 9 (Toronto)

CNSC staff have assessed the Physical Design SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e., Satisfactory rating).

#### 4.5.3 Future Plans

There are no future plans at this time concerning the Physical Design in place at BWXT NEC’s licenced facilities in Peterborough and Toronto. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### 4.5.4 Challenges

There are no challenges in Physical Design identified at this time.

#### 4.5.5 Requests

BWXT NEC has no requests at this time on this SCA.

#### 4.6 Fitness for Service

The “Fitness for Service” SCA covers activities that impact the physical condition of structures, systems and components to ensure that they remain effective over time. This area includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

#### **4.6.1 Relevance and Management**

##### **4.6.1.1 Fuel Critical to Safety Program**

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 FSA 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 Fuel Operations 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.

#### **4.6.2 Past Performance**

Notable upgrades within the Fitness for Service SCA which occurred over the course of the licence period include:

- The upgrade of the routine preventive maintenance program to the Maintenance Connections platform (2014); and
- Implementation of the CTS program (2016).

CNSC Staff have assessed the Fitness for Service SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

Both the Toronto and Peterborough facilities utilize an asset management and preventive maintenance software system "Maintenance Connection," which 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 assets and parts. Preventive maintenance tasks on CTS equipment are designated in this system.

The procedure is utilized across BWXT NEC and provides an overview of the preventative maintenance program implementation at BWXT NEC. The main purpose of the program is consolidation of asset listing, tracking of asset condition, identification of asset preventive maintenance requirements/schedules, and issuing work orders. The program at BWXT NEC is implemented via the Maintenance Connection web-based software suite.

Internal Process Audits at BWXT NEC monitor closure status of assigned preventive maintenance work orders.

#### **4.6.3 Future Plans**

There are no future plans at this time concerning Fitness for Service in place at BWXT NEC's licenced facilities in Peterborough and Toronto. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.6.4 Challenges**

There are no challenges in Fitness for Service identified at this time.

#### **4.6.5 Requests**

BWXT NEC has no requests at this time on this SCA.

### **4.7 Radiation Protection**

The "Radiation Protection" SCA covers the implementation of a radiation protection program in accordance with the Radiation Protection Regulations [26]. The radiation protection program is required to ensure that contamination levels and radiation doses received by individuals are monitored, controlled within regulatory limits, and maintained ALARA.

BWXT NEC has a well-established and effectively implemented radiation protection program, which includes a commitment to ALARA and continuous improvement. Over the course of the licence period, there were no worker doses in exceedance of regulatory dose limits.

#### **4.7.1 Relevance and Management**

In accordance with the Radiation Protection Regulations and CNSC Guidance document G-129, "Keeping Radiation Exposures and Doses As Low As Reasonably Achievable" [27], BWXT NEC has implemented a Radiation Protection program. This document establishes the Radiation Protection program in place at the Peterborough and Toronto facilities and identifies corresponding procedures to ensure that radiation exposures and doses are kept ALARA. Key components of the BWXT NEC radiation protection program include:

- Management control over work practices;
- Personnel qualification and training;
- Control of occupational and public exposure to radiation; and
- Planning for unusual situations.

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

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

Continuous improvement of BWXT NEC's radiation protection program is also facilitated through an ALARA Committee consisting of both unionized and management employees. The ALARA Committee meets at least quarterly and sets annual ALARA goals focused on reducing worker dose and surface



contamination at both facilities. Continuous improvement of BWXT NEC's radiation protection program is also achieved through additional review processes including self-assessments and audits, reported safety concerns, near miss and incident investigations, and CNSC inspections.

#### 4.7.1.1 Potential Radiological Hazards

BWXT NEC's radiation protection program addresses the hazards associated with UO<sub>2</sub>, as the primary potential worker hazard is inhalation of airborne UO<sub>2</sub> particles. Measurements are performed for airborne and surface traces of Uranium as an indicator of process containment efficiency. A respiratory protection program is in place and additionally urine samples are regularly provided by employees to indicate if inhalation may have occurred. Sampling frequency ranges from weekly to once per three months, based on established criteria such as job function and worker location within the facilities.

A lesser potential hazard exists in the form of low-level external gamma and beta 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.

The BWXT NEC radiation protection program ensures that surface/airborne contamination and radiation doses to employees and the public are monitored and controlled.

#### 4.7.1.2 Radiation Protection Control Measures

The Director, EHS and Regulatory, has oversight of BWXT NEC's Radiation Protection program. Dose records are regularly reviewed by the EHS department on receipt from the licensed dosimetry provider. In addition, the ALARA Committee reviews trending data from radiation monitoring (contamination and dose rate) 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 Toronto and Peterborough facilities using portable handheld radiation detectors. Measured dose rates are compared to established dose 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 improvements, such as reconfiguration.

Internal radiation hazards exist at both the Toronto and Peterborough facilities in the form of loose Uranium which may enter the body by inhalation, ingestion or absorption. As a result, continuous and/or periodic air monitoring is conducted at various work stations within the Peterborough and Toronto facilities as appropriate. Workstation air monitoring is a key performance indicator that speaks to effective administrative and engineered controls. Additionally, surface contamination measurements (swipes) are conducted in manufacturing areas of each facility to monitor and reduce the amount of loose radioactive material available for 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 committees.

The measurement of Uranium in urine is also a key method of assessing whether inhalation of airborne UO<sub>2</sub> has occurred. Employees who in the course of their work, may be exposed to radioactive dust undergo a bioassay. Criteria which determine the frequency of urine sampling for an employee are documented in BWXT NEC's radiation protection program.

#### 4.7.1.3 Zone Control

Areas within the Toronto and Peterborough facilities are classified according to the potential radiation hazard. Once classified, the specific area requires radioactive material handling procedures appropriate



for the hazard, personnel monitoring and contamination monitoring programs, etc. These classifications are defined in the radiation protection program 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; and
- R3 Areas - these areas are designed for operations involving exposed solid dispersible nuclear substances, where external radiation may be of concern and where the hazard of contaminant inhalation or ingestion is identified. Loose contamination may be above R2 Internal Control Levels and below R3 Internal Control Levels.

#### 4.7.1.4 Radiation Protection Dose Limits and Action Levels

The annual dose assignment for employees at BWXT NEC consists of external (Toronto and Peterborough) and internal (Toronto) dosimetry inputs, for which dose summaries are tracked for quarterly, year-to-date, five-year and lifetime. All NEW employees who are monitored for radiation exposure receive an annual dose letter identifying their annual dose.

All fuel manufacturing NEWs at BWXT NEC are assigned TLDs, which measure the whole body and skin doses received in each monitoring period. At the end of each wear period (one-to-three-months), TLDs are collected and sent to a CNSC licensed dosimetry service provider. The dosimetry service provider processes the TLDs and provides the results to BWXT NEC and the National Dose Registry.

BWXT NEC has established facility-specific CNSC approved Action Levels for various radiological and environmental parameters. An Action level is defined in the Radiation Protection Regulations [26] 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” [38], which are approved by the CNSC and specified in the LCH (refer to Table 1 and Table 2 below). 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.

BWXT NEC has also established internal control levels for various radiological and environmental parameters which are set below Action Levels to give an indication of conditions prior to a potential loss of control. An internal control level exceedance results in an internal investigation and corrective actions as appropriate.

Details on the results of routine surface contamination measurements, workstation air sampling, routine dose rate measurements, Urinalysis, Radiation Dose Distributions, Whole Body Effective Dose and Equivalent Skin Dose, are captured in the Annual Compliance Reports issued to CNSC staff.

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		
U in Airborne Contamination	Unclassified Area	R1 Area	R2 Area
	12 dpm/m <sup>3</sup>	12 dpm/m <sup>3</sup>	36 dpm/m <sup>3</sup>

**Table 1 – Summary of Action Levels for the Radiation Protection Program at Peterborough Facility**

Nuclear Energy Worker	Period	Action Level (mSv)
Effective dose	Quarter of a year	6.0
Effective dose	1 year	15.0
Effective dose	5 years	60.0
Skin dose	1 year	350
Extremity dose	1 year	350
Pregnant NEW	Balance of the pregnancy	3.5
Parameter		Action Level
Urinalysis		10 µg/L for any period

Nuclear Substance and Form	Action Level		
U in Airborne Contamination	Unclassified Area	R2 Area	R3 Area (non-mask)
	36 dpm/m <sup>3</sup>	180 dpm/m <sup>3</sup>	270 dpm/m <sup>3</sup>

**Table 2 – Summary of Action Levels for the Radiation Protection Program at Toronto Facility**

4.7.1.5 Public Dose Assessment and Limits

The public dose limit (i.e., 1 mSv) is specified in the Radiation Protection Regulations [26] and this requirement has been embedded as part of the BWXT NEC radiation protection program. To ensure compliance with the public dose requirements, BWXT NEC has established Derived Release Limits (DRLs) for Uranium emissions to the environment for both the Toronto and Peterborough facilities. The facility DRLs account for realistic exposure pathways in order to restrict the dose to a member of the

public to less than 1 mSv per year. Through direct correlation with the facility DRLs, the estimated effective dose as a result of air releases is calculated annually.

Additionally, environmental TLDs at the Toronto and Peterborough plant boundary are in place and are used to estimate the direct gamma dose to a member of the public. Estimated effective doses to the public are comprised of the summation of annual dose estimates resulting from air releases and direct gamma radiation. Estimated effective doses to the public from BWXT NEC operations are well below the public dose limit as captured in the Annual Compliance Reports issued to CNSC Staff.

#### 4.7.2 Past Performance

During the current licence period, BWXT NEC has not exceeded any CNSC limits with respect to radiation protection. In keeping with BWXT NEC's commitment to continual improvement, radiation protection program updates are ongoing. For example:

- Multiple shielding installations to reduce the ambient dose rate.
- Improved and recurring radiation protection awareness training.
- Work instruction revisions to provide more detailed requirements, including instrumentation use, deviation acceptance criteria and internal reporting expectations.

Four radiation protection-related action level exceedances occurred over the licence period. In 2012, one action level was exceeded for an annual extremity dose greater than 350 mSv in Toronto. As a result of the investigation, two corrective actions were implemented. In 2013 and 2015, action level exceedances were reported when urine samples exceeded 10 µg (microgram) U/L in Toronto. The investigations resulted in five and six corrective actions implemented respectively. In 2014, one action level exceedance occurred for a Whole Body dose in Peterborough greater than 4 mSv in one quarter year. The investigation into the incident concluded that the majority of the exposure was non-occupational as a result of improper dosimeter storage. Reporting and investigations were completed as required with appropriate corrective actions implemented for all exceedances.

The following figures demonstrate that the radiation protection program at BWXT NEC is effective at keeping radiation doses to workers and the public ALARA, with ongoing continual improvement initiatives.

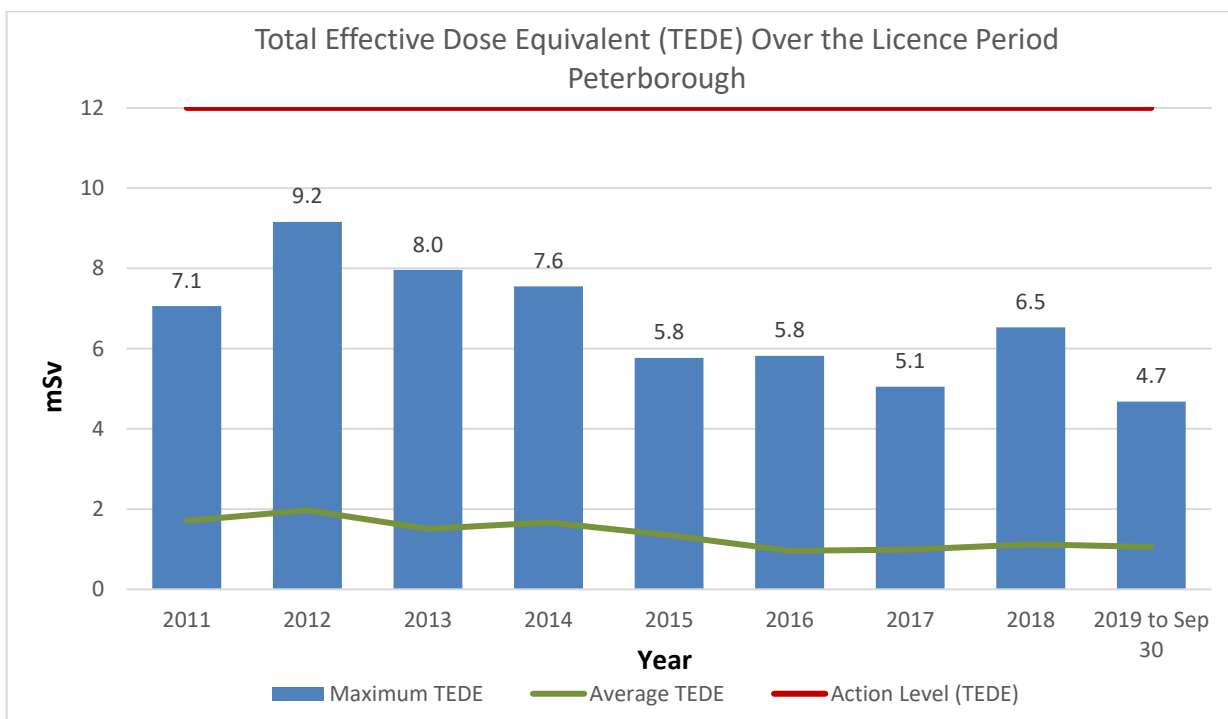


Figure 6 - Total Effective Dose Equivalent for Peterborough

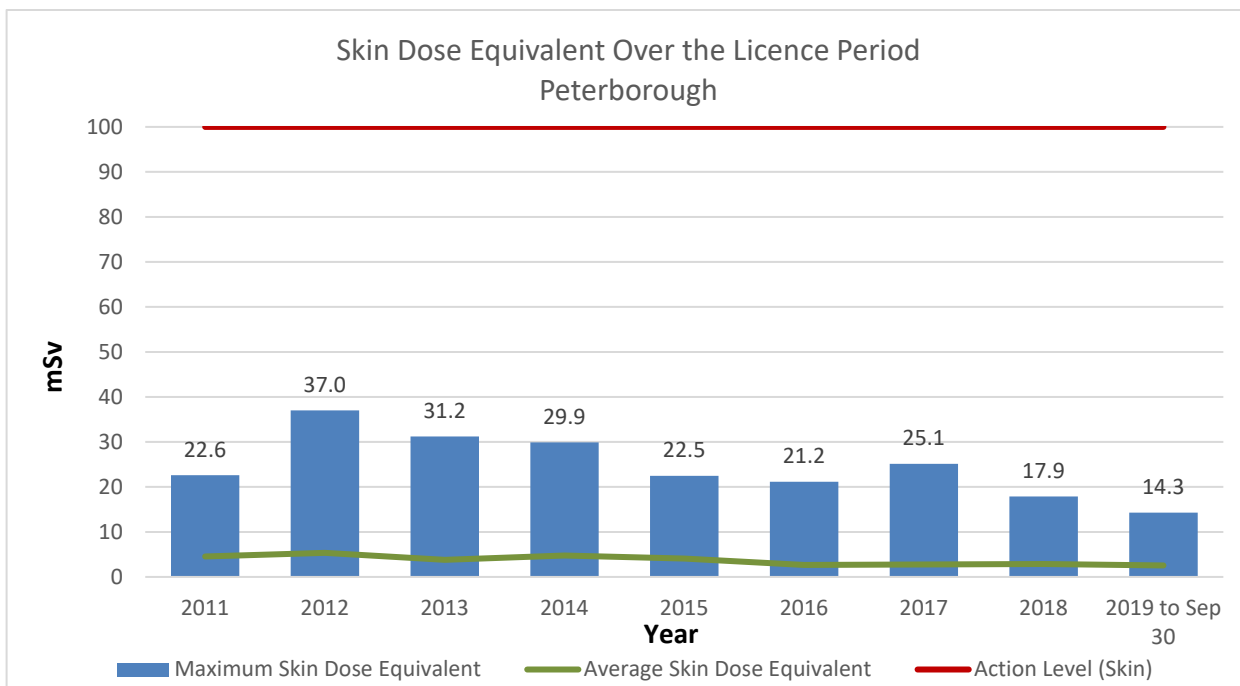


Figure 7 - Skin Dose Equivalent for Peterborough

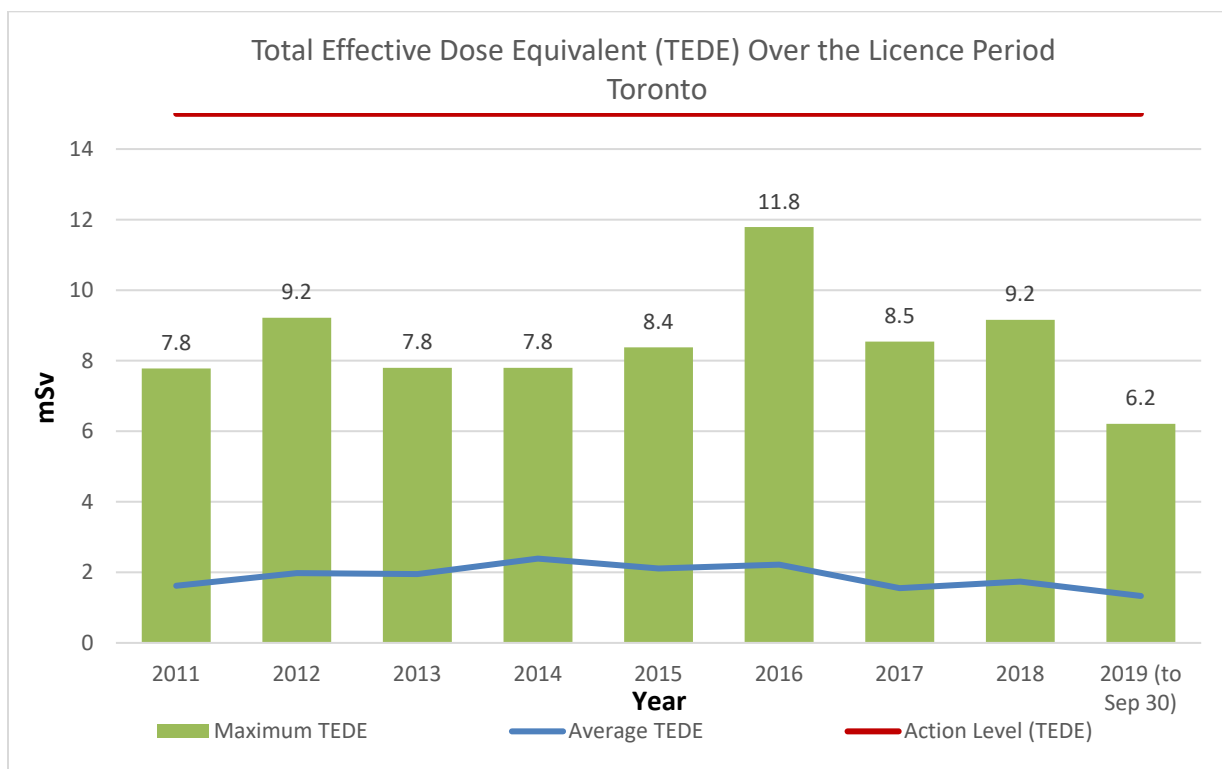


Figure 8 - Total Effective Dose Equivalent for Toronto

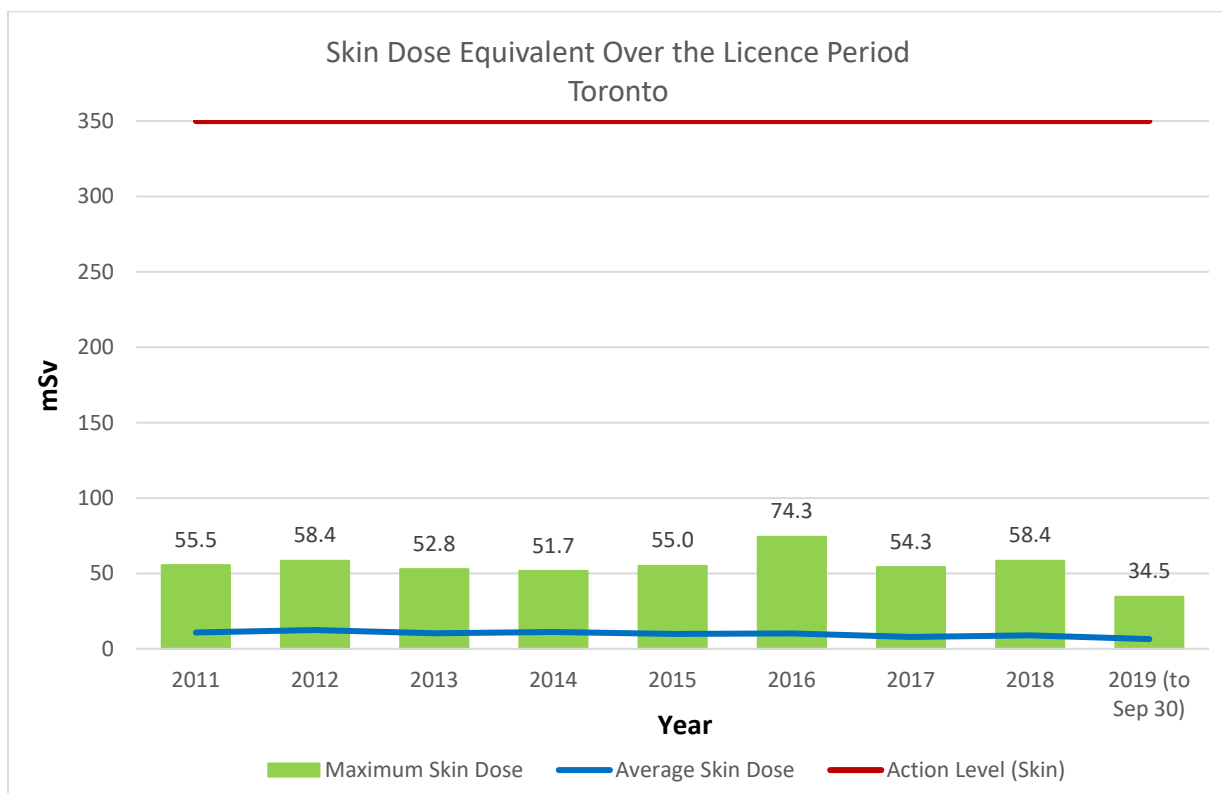
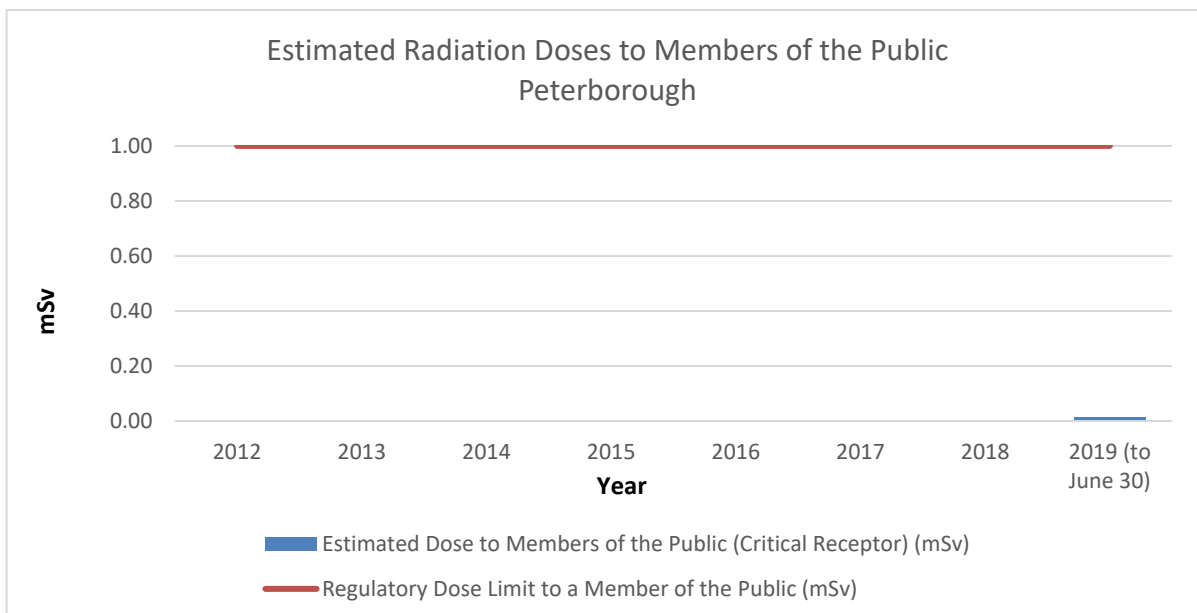


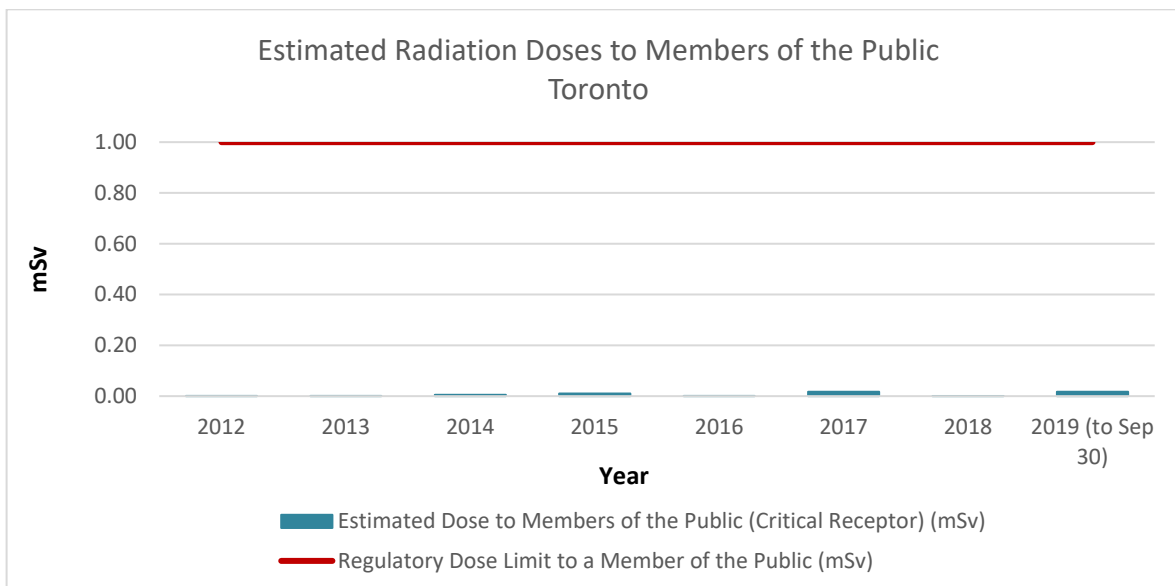
Figure 9 - Skin Dose Equivalent for Toronto

Total effective radiation dose equivalent to members of the public are specified in the *Radiation Protection Regulations* as 1 mSv per calendar year. 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” for uranium emissions to the environment. The facility DRLs account for the realistic exposure pathways as described in the facilities 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 boundary continuously (24 hours per day, 365 days per year). Additionally, 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. Direct gamma emissions were included in the estimates starting in 2016 and 2014 for Peterborough and Toronto respectively.

Over the licence period, radiation doses to members of the public surrounding BWXT NEC facilities was a small fraction of the applicable regulatory dose limit and shown in Figure 10 and Figure 11.



**Figure 10 - Peterborough Estimated Radiation Doses to Members of the Public**



**Figure 11 - Toronto Estimated Radiation Doses to Members of the Public**

CNSC Staff have assessed the Radiation Protection SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### 4.7.3 Future Plans

BWXT NEC has a well-established and effectively implemented radiation protection program, which includes a commitment to ALARA and continuous improvement. BWXT NEC will continue to improve the program through routine reviews, such as self-assessments, internal and external audits and worker safety suggestions. In addition to program oversight by management, ALARA committees will continue to meet regularly at both work sites and develop annual goals in keeping with the company's commitment to ALARA. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### 4.7.4 Challenges

As radiation doses continue well below the regulatory dose limits, dose reductions become increasingly challenging. Workstation and shielding projects will continue into the next licence period as opportunities are identified.

#### 4.7.5 Requests

BWXT NEC has no requests at this time.

### 4.8 Conventional Health and Safety

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

#### 4.8.1 Relevance and Management

BWXT NEC has a well-established integrated management system for EHS program excellence. This is ensured through the effective implementation of program elements. BWXT NEC has an established EHS policy that is reviewed and signed annually by the President of BWXT NEC. BWXT NEC's objective is to eliminate or minimize ALARA both known and potential EHS 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

BWXT NEC 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. See also the Radiation Protection SCA in section 4.7.
- Beryllium Safety Committee – comprised of unionized workers and management to continuously improve the beryllium safety program and reduce potential beryllium hazards to workers at the Peterborough site.
- 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.

**4.8.2 Past Performance**

As can be seen in Table 3, BWXT NEC has had five years without a Lost Time Injury (LTI). Additionally, BWXT NEC has had zero LTI's in seven out of the nine years of the current licensing period.

**Table 3 - Lost Time Injuries**

	2011	2012	2013	2014	2015	2016	2017	2018	2019 (YTD)
Peterborough	0	0	0	0	0	0	0	0	0
Toronto	0	1	0	1	0	0	0	0	0

BWXT NEC also measures recordable injuries which are lower level injuries requiring medical treatment or restricted work. The Peterborough site was injury-free with no recordable or lost time injuries in 2018 and achieved a BWXT President and Chief Executive Officer Safety Award as recognition for their excellent safety performance. The Toronto site won the same award for being injury-free in 2017.

In 2011, BWXT NEC undertook a comprehensive initiative to improve machine safeguarding. A risk assessment at both the Toronto and Peterborough facilities was completed by a third party. The study reviewed the hazards for every machine at the two facilities and assessed the risk to personnel. The output of the study was used to inform a multi-year project to upgrade the guarding of the machines. Over the course of the licence period, over 125 machines were upgraded or replaced to reduce the risks posed to the operator.

Employment and Social Development Canada conducted a routine inspection at the Toronto facility in 2018 to assess compliance with federal health and safety legislation. The governing legislation includes the Canada Labour Code Part II and the Canada Occupational Health and Safety Regulations. As a result of the inspection, minor non-compliances were identified and have all been closed.

CNSC Staff have assessed the Conventional Health and Safety SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e., Satisfactory rating).

**4.8.3 Future Plans**

BWXT NEC will continue to maintain and adapt the conventional health and safety program over the next licence period. It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### 4.8.4 Challenges

Through trending of injuries and worker concerns the ergonomics at the sort and stack operation in Toronto has been identified as an area of challenge. This operation involves lifting pellet trays weighing 11 kg. Two recordable injuries were associated with this workstation in 2018. In 2019, a program of cross training workers across multiple work areas, and instituting job rotation between workstations was initiated. This is expected to reduce the ergonomic risk to the individuals. Engineered controls are also being evaluated to automate some of the manual movements to further reduce the overall ergonomic risks of the workstation.

#### 4.8.5 Requests

BWXT NEC has no requests at this time.

### 4.9 Environmental Protection

The “Environmental Protection” SCA covers programs that identify, control and monitor all releases of radioactive and hazardous substances and effects on the environment from facilities or as the 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. During the licence period, no environmental action levels or regulatory limits were exceeded and public doses from the operations at the Peterborough and Toronto facilities were only a fraction of the regulatory public dose limit.

CNSC Staff have assessed the Environmental Protection SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as either exceeding requirements and regulatory expectations in specific areas (Fully Satisfactory) or meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### 4.9.1 Relevance and Management

BWXT NEC facilities operate an Environmental Management System (EMS), which ensures an effective environmental protection program is in place to achieve environmental goals and objectives. BWXT NEC’s environmental protection program is in compliance with relevant CSA standards.

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.

BWXT NEC’s radiation protection program provides details of the environmental monitoring aspects for Uranium for both Peterborough and Toronto. This includes emission source air sampling, air quality sampling, liquid effluent sampling, soil sampling as well as boundary monitoring.

As the Peterborough facility uses Beryllium as part of the fuel bundle manufacturing process, a Beryllium safety program is additionally in place. Beryllium use in a federally regulated facility is governed by the Canada Labour Code Part II and the Canada Occupational Health and Safety Regulations. The Environmental Protection Act of Ontario and Ontario Regulation 419/05 Air Pollution – Local Air Quality Regulation, determine the permitted concentration of contaminant release.

As part of BWXT NEC's monitoring of the effectiveness of the Environmental Protection program, internal inspections are completed on a routine basis and focus on all areas of the plant. The purpose of these inspections is to identify environmental as well as health and safety issues. WSC members carry out routine plant inspections and the findings are documented, corrective actions identified, and all actions are tracked to completion.

#### 4.9.1.1 Environmental Risk Assessment

ERAs specific to the Toronto and Peterborough facilities has been completed in accordance with CSA N288.6-12 [28]. The ERAs concluded that emissions of radioactive material from the facility were very low and pose no adverse effect to human health.

The emissions of non-radioactive contaminants from the facility were below the Ministry of the Environment, Conservation and Parks point of impingement standards; and exposure to water releases is also estimated to be minimal. Hence, it was concluded that the emissions of non-radiological substances resulting from the BWXT NEC facilities pose no adverse effect to human health.

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

#### 4.9.1.2 Airborne Emission Program

The Toronto facility performs continuous in-stack sampling and boundary air monitoring for Uranium. The facility performs continuous in-stack monitoring by drawing a sample of air across a filter capable of trapping Uranium dust. The in-stack samples are analyzed and verified externally by an independent laboratory. Boundary samples are high volume air samples drawn at five positions strategically located around the facility perimeter, which are analyzed externally by an independent laboratory. Results are compared to previous results, and to relevant Internal Control Levels and Action Levels, and corrective actions are generated as appropriate.

A single process Uranium air emission point exists in the Peterborough facility, which exhausts through a High Efficiency Particulate Air filter. The facility performs continuous in-stack monitoring by 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. Results are compared to previous results, and to relevant Internal Control Levels and Action Levels and corrective actions are generated as appropriate.

Three Beryllium air emission points also exist at the Peterborough facility. 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 at an external independent laboratory. The sample results are compared to previous results, and to an Internal Control Level and Action Level (established in 2018) at the stack exit, which are both very conservative.

#### 4.9.1.3 Water Effluent Monitoring

In Toronto, bulk quantities of  $UO_2$  powder are handled, which requires frequent cleaning and washing protective clothing, walls, floors and equipment. The water is treated to remove  $UO_2$ , and the concentration of  $UO_2$  in waste water leaving the treatment system is measured in-house. The concentration of  $UO_2$  in the total waste water leaving the plant premises is calculated and compared to the Internal Control Level and the Action Level. Each batch is only released when in-house sample results confirm the concentration is less than the Internal Control Level. A weekly composite sample is also prepared and sent for independent analysis at an external laboratory.

In Peterborough, all potentially Uranium-contaminated wastewater is held for determination of the quantity and concentration of Uranium prior to disposal. Liquid waste primarily generated from routine activities, such as washing floors 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 prior to sampling, and then sent for analysis at

an external laboratory. After the water sample result is verified to be below the Internal Control Level and the Action Level, the wash water is filtered again and then discharged to the sanitary sewer.

A second liquid effluent from the Peterborough facility is Beryllium in water, which is generated from equipment use and washing. 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 which is sent for analysis at an external independent laboratory. The sample results are compared to an Internal Control Level and Action Level (established in 2018), which are both very conservative.

4.9.1.4 Terrestrial Monitoring

Naturally occurring Uranium may be detected at low levels in various rocks, ores, soil, water, air and plants (in Ontario, background levels of Uranium in soil are generally below 2.5 µg/g). The Canadian Council of Ministers of the Environment (CCME) has established soil quality guidelines to protect human health and the natural environment. The guidelines represent levels of Uranium in soil below which no risk to human health is expected. These guidelines have been adopted by the Ontario Ministry of the Environment, Conservation and Parks.

The Toronto and Peterborough facility UO<sub>2</sub> 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. UO<sub>2</sub> is insoluble in water but may be washed into the soil by rainfall, snow, etc. Depositions of Uranium are measured by taking small samples of surface soil and analyzing for natural Uranium. Soil sampling is conducted annually at the Toronto facility, in which samples of surface soil are retrieved from 49 locations in accordance with a documented plan by a third-party consultant. The samples are analyzed by an independent laboratory and if soil analysis indicates rising natural Uranium levels, further investigation into the cause(s) is carried out (note, the amount of Uranium released through air emissions from both facilities in any year, based on actual measurements, is extremely low).

Soil sampling is not conducted at the Peterborough facility due to the negligible air release amounts. However, if a decision is made to incorporate pelleting at the Peterborough facility, additional monitoring practices at the Peterborough facility would be incorporated similar to those at the Toronto facility.

4.9.1.5 Environmental Protection Action Levels

Action Levels as listed in Table 4 and Table 5 have also been set for the purpose of ensuring that releases remain ALARA and that pollution prevention principles are applied. 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. Over the course of the Licence period, there were no environmental Action Level exceedances.

Release	Action Level
Uranium in water (single batch)	6 ppm Uranium in solution
Uranium in water (annual average)	3 ppm Uranium in solution
Uranium in Stack Measurement	1 microgram (µg) Uranium / m <sup>3</sup>
Beryllium in Stack Measurement	0.03 microgram (µg) Beryllium / m <sup>3</sup>
Beryllium in water (single measurement)	40 microgram (µg) Beryllium / m <sup>3</sup>

**Table 4 - Action Levels for Peterborough Facility**

Release	Action Level
Uranium in water to sewer (single batch)	6 ppm Uranium in solution
pH of water to sewer	Less than 6.65 and above 9.0
Uranium in water (annual average)	3 ppm Uranium in solution
Uranium in Stack Measurement	1 microgram (µg) Uranium / m <sup>3</sup>
Facility Perimeter Air Quality Monitor	0.08 microgram (µg) Uranium / m <sup>3</sup>

**Table 5 - Action Levels for Toronto Facility**

**4.9.2 Past Performance**

During the current licence period, BWXT NEC has not exceeded any regulatory limits with respect to environmental protection. In keeping with BWXT NEC's commitment to continual improvement, the following improvements to the environmental protection program have occurred:

- Noise reduction initiatives.
- Additional wash water filtration.
- Ventilation system improvements.
- Hydrogen safety system upgrades.
- Continuous in-stack air sampling system improvements.
- Automation of the water treatment system in Toronto.
- Program updates to achieve compliance with relevant CSA environmental monitoring standards.

The following figures demonstrate that the environmental protection program is effective at keeping emissions ALARA, with ongoing continual improvement initiatives.

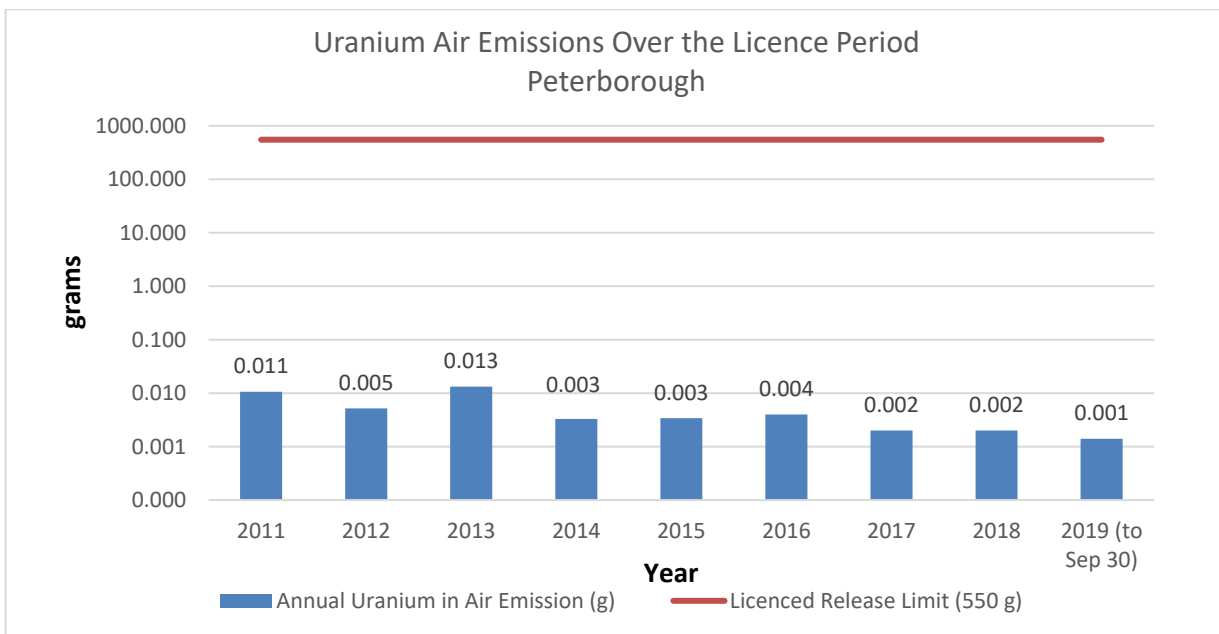


Figure 12 - Peterborough Uranium in Air Emissions

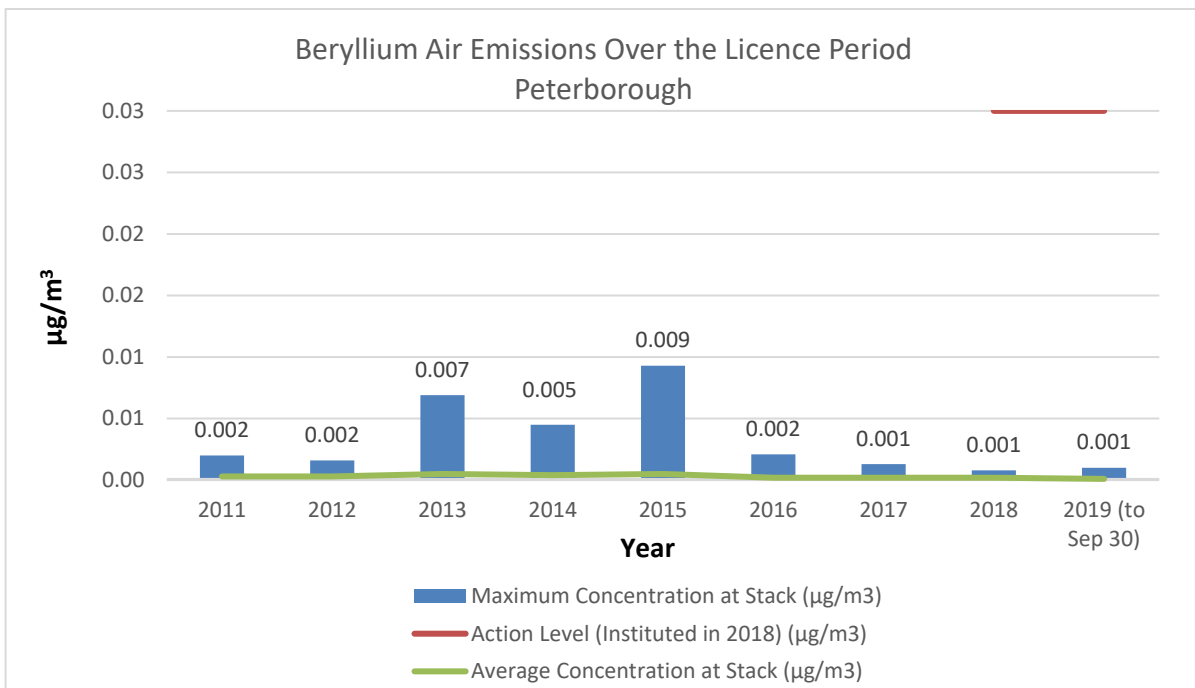


Figure 13 - Peterborough Beryllium in Air Emissions

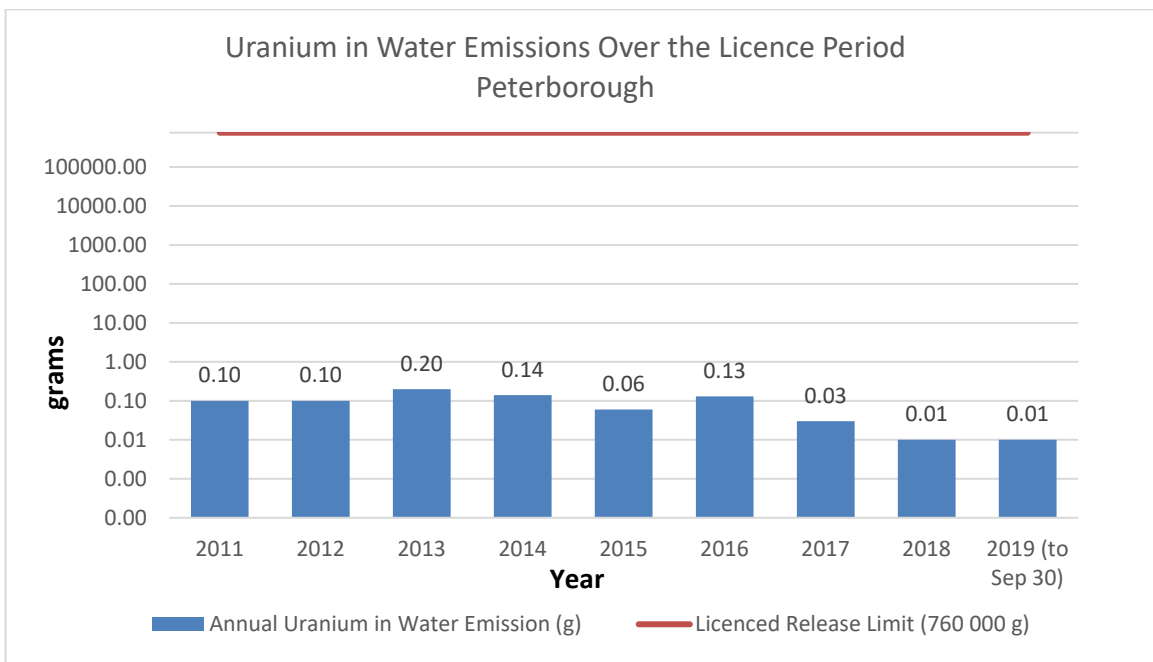


Figure 14 - Peterborough Uranium in Water Emissions

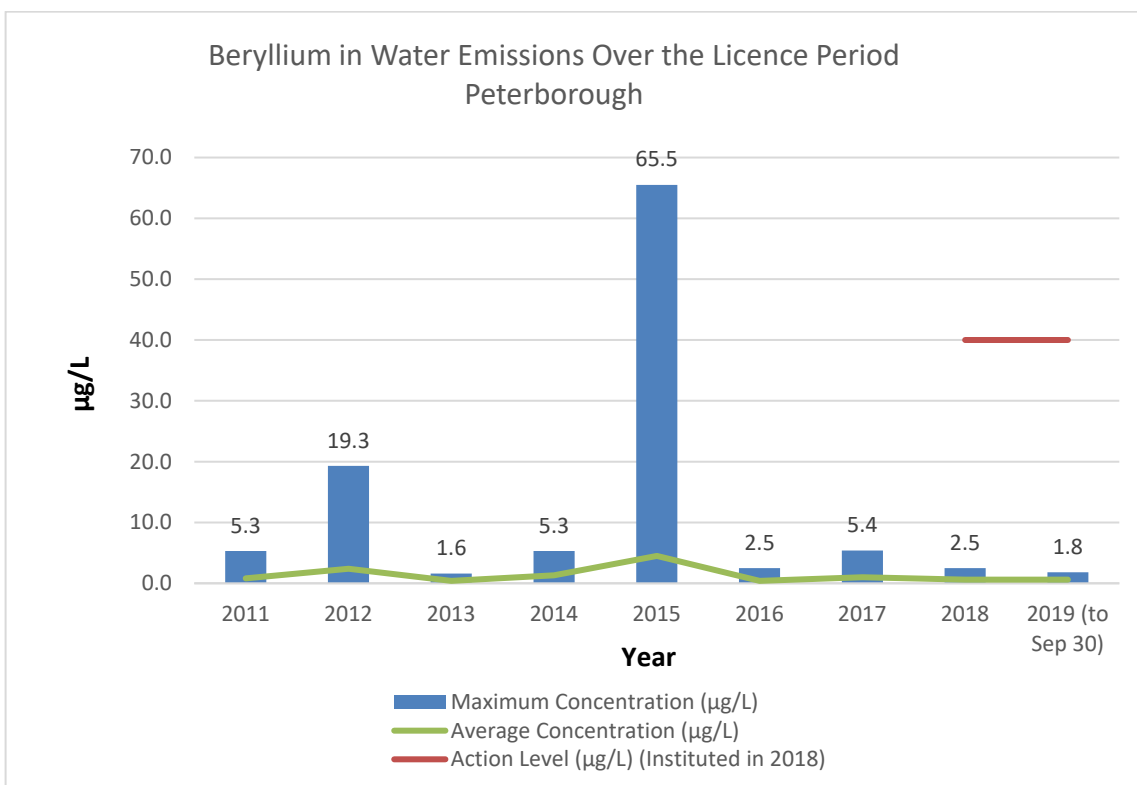


Figure 15 - Peterborough Beryllium in Water Emissions

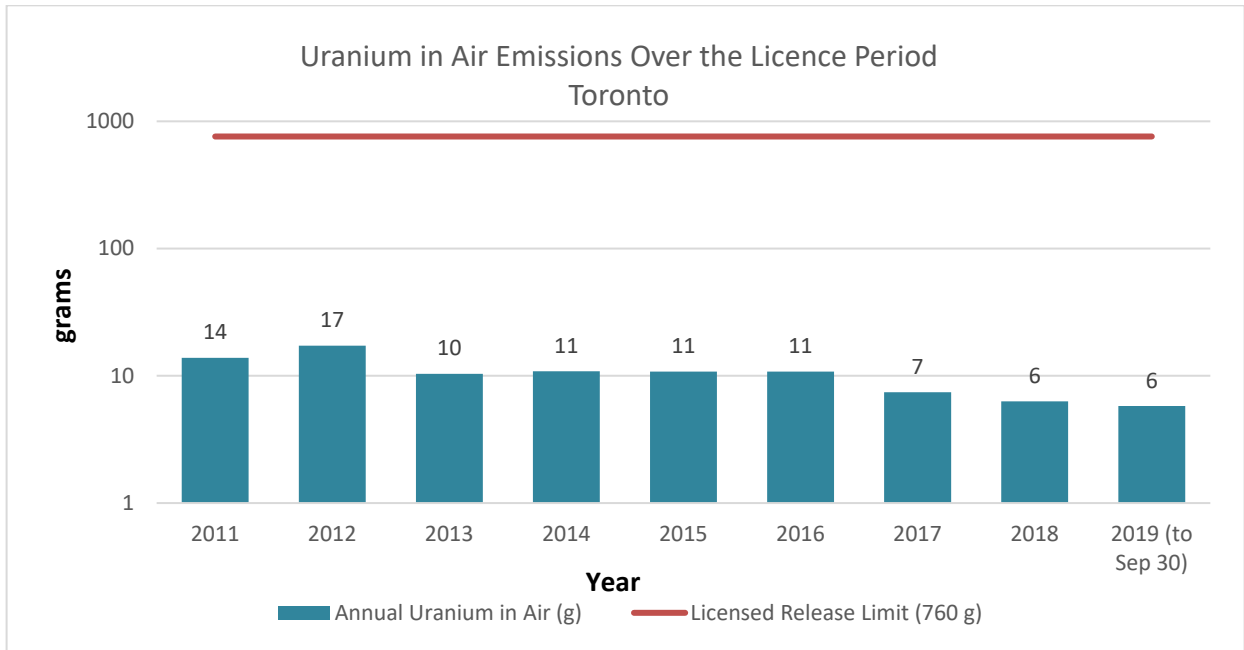


Figure 16 - Toronto Uranium in Air Emissions

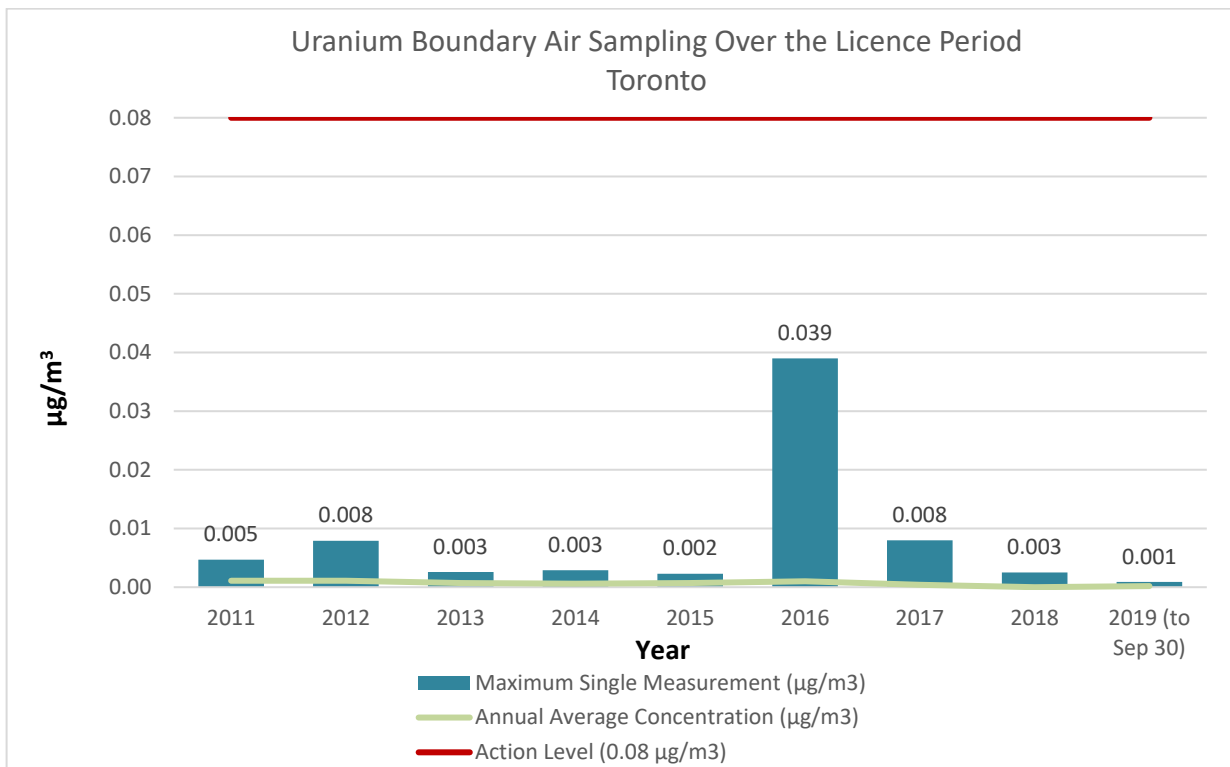


Figure 17 - Toronto Uranium Boundary Air Sampling



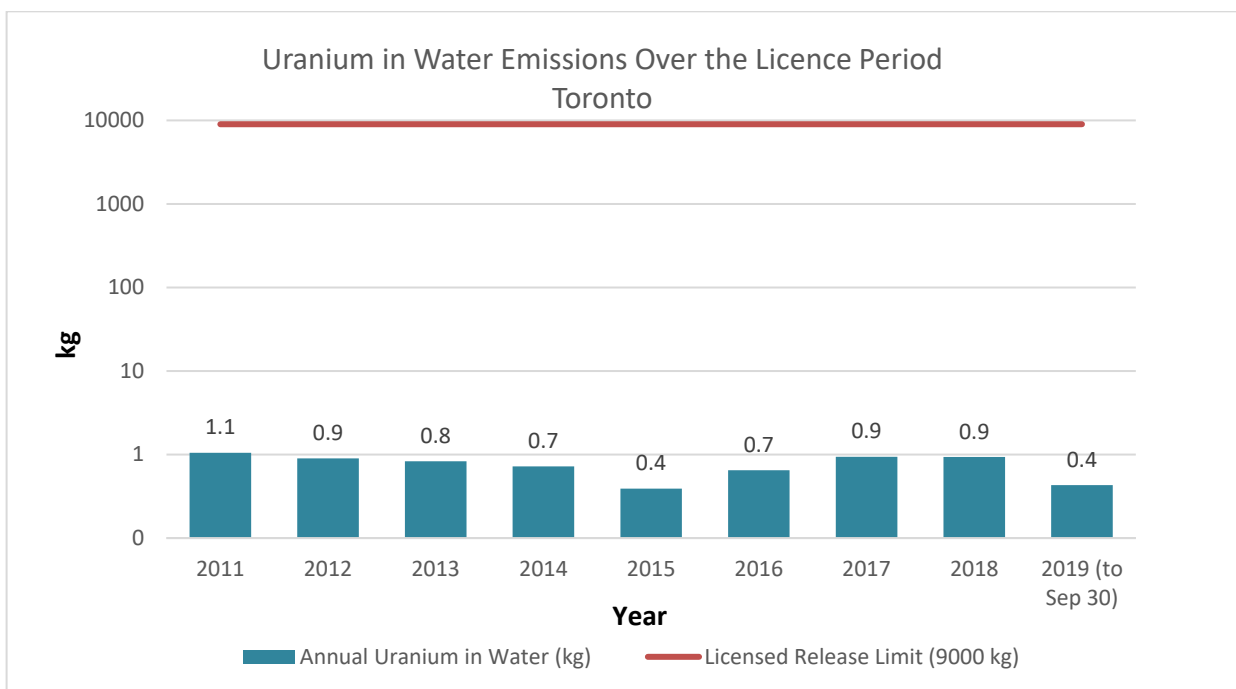


Figure 18 - Toronto Uranium in Water Emissions

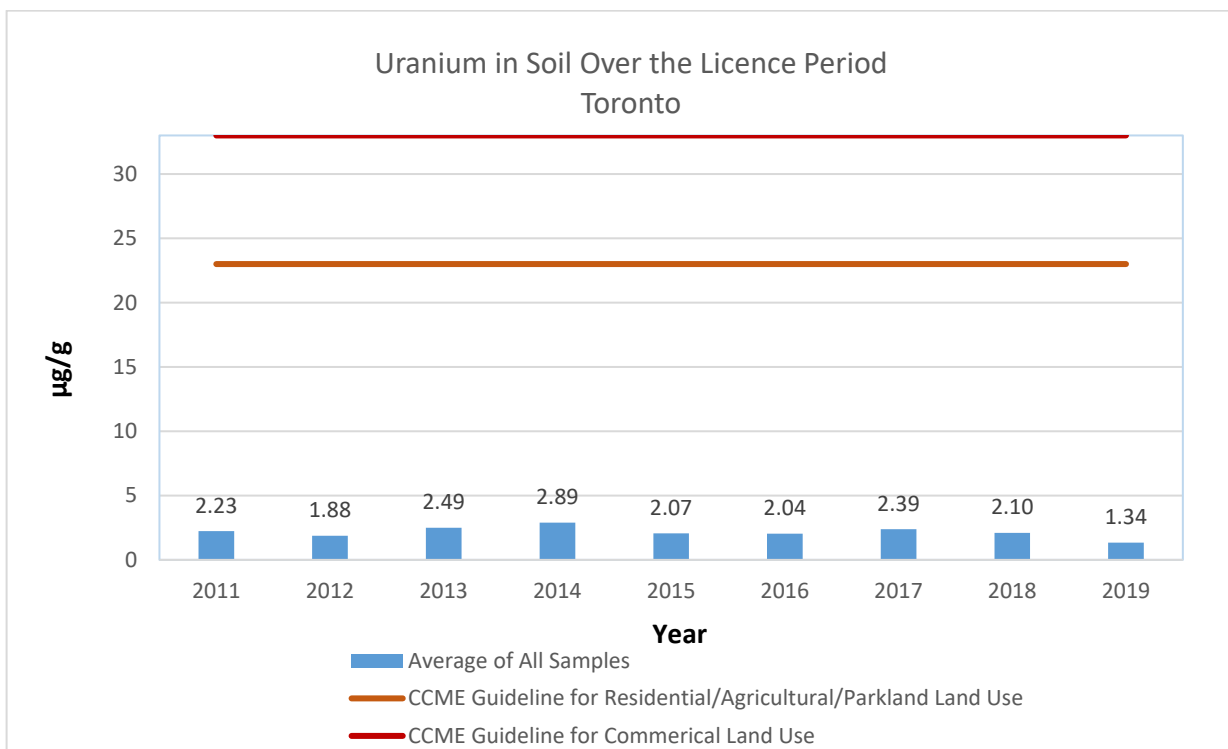


Figure 19 - Toronto Uranium in Soil

### 4.9.3 Future Plans

BWXT NEC is seeking the additional flexibility during the proposed next licence period to conduct pelleting operations at the Peterborough facility. Hence, a revised ERA has been completed for the Peterborough facility which identifies potential health and ecological risks associated with the consolidation of the BWXT NEC fuel pelleting operation in Toronto with the existing BWXT NEC fuel assembly operations in Peterborough. The revised ERA is considered bounding in nature based on the Toronto facility's pelleting operating experience and performance.

The consolidated ERA concluded that emissions of radioactive material BWXT NEC consolidated operations would be very low and the maximum estimated annual effective dose as a result of direct gamma radiation and air releases from operations would be well below of the CNSC public annual dose limit.

The emissions of non-radioactive contaminants from the consolidated facility would be below the Ministry of Environment, Conservation and Parks point of impingement standards; and exposure to water releases was also estimated to be minimal. Hence, it was concluded that the emissions of non-radiological substances resulting from BWXT NEC consolidated operations pose no adverse effect to human health.

The consolidated ERA also concluded that emissions of radioactive and non-radioactive materials from BWXT NEC consolidated operations posed no adverse effects to non-human biota.

If a decision is made to incorporate pelleting at the Peterborough facility, additional monitoring practices will be incorporated at the Peterborough facility, which are expected to be similar to those at the Toronto facility. Additional monitoring practices would include boundary air monitoring and routine soil sampling for Uranium. This additional monitoring would be implemented in advance of production changes so that baseline data is available.

It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

### 4.9.4 Challenges

It is expected that performance under the Environmental Protection SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

### 4.9.5 Requests

BWXT NEC has no requests at this time.

## 4.10 Emergency Management and Fire Protection

The "Emergency Management and Fire Protection" SCA covers emergency plans and emergency preparedness programs that exist for emergencies and for non-routine conditions and to minimize the likelihood and severity of fire at the facility.

### 4.10.1 Relevance and Management

#### 4.10.1.1 Fire Protection Program

The primary goals of the Fire Protection program are to minimize the risk of radiological and hazardous material releases resulting from fire; protect facility occupants from death or injury due to fire; minimize economic loss resulting from fire damage to structures, equipment and inventories; and minimize the impact of radioactive or hazardous material on the environment as a result of fire. The program outlines key fire protection requirements intended to reduce the risk of fire and explosion at the facility.

The Fire Protection program has been developed based on the requirements of CSA N393, "Fire Protection for Facilities that Process, Handle, or Store Radioactive Substances" [25]. These standards

specify the minimum fire protection requirements for the design, construction, commissioning, operation, and decommissioning of facilities that process, handle, or store nuclear substances, including structures, systems and components, and other hazardous substances that directly relate to the nuclear substances being regulated. The Toronto and Peterborough facility FHA's were updated in 2018 and 2019 respectively [10][11][12][13][14]. 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.

Fire protection systems are inspected and tested in accordance with the National Fire Code of Canada following an established schedule. An annual third-party review and internal self-assessments are conducted at each site and identified continuous improvements are tracked to completion.

#### 4.10.1.2 Emergency Plan

Each facility has established emergency response plans that describe the actions to be taken to minimize the health and environmental hazards, which may result from fires, explosions, release of hazardous materials, or other emergencies.

Each facility Emergency Plan describes the organization and methods to prepare for, respond to and recover from emergencies and has been developed based on the requirements of CNSC REGDOC-2.10.1 [29]. The Emergency Plan describes the responsibilities assigned to various personnel and functions to ensure that proper planning, training, and equipment are maintained to manage and respond to emergencies. It documents methods used to respond to emergencies and to ensure the timely notification of, and coordination with, off-site agencies and organizations that may be affected by such events or requested to provide assistance to supplement the emergency organization.

Emergency response training is achieved through response drills where actual responses are regularly critiqued to continually improve the effectiveness of the program. 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. Emergency responders are provided with the level of training necessary to allow them to effectively perform their designated functions.

Work instructions describe the development of drill and exercise scenarios, drill objectives, assigning competent drill observers, and a critique of drill performance. Drills that involve activation of the Emergency Organization are conducted at least annually. An evacuation drill is also conducted annually

and is evaluated for adequacy of alarms and evacuation routes and time taken for evacuation. Triennially, a full-scale exercise is conducted at each site. The offsite emergency response organizations necessary to mitigate the consequences of the exercise scenarios are invited to participate in these exercises.

Site familiarization tours are conducted annually with Peterborough and Toronto Fire Services as they are the primary responders for the facilities.

#### **4.10.2 Past Performance**

BWXT NEC recently completed a project to address areas for improvement identified by the CNSC following an Emergency Response Exercise inspection in October 2016. A major revision of the Toronto Emergency Response program was completed to address CNSC comments and further implement the requirements of CNSC REGDOC-2.10.1 including redistribution of roles and responsibilities; and the formation of a designated Emergency Operations Centre (EOC) location in Toronto equipped with the tools and technology required to respond to an emergency event. The updated emergency response program and associated training was completed for the Toronto facility in 2018, which included four full-scale exercises involving coordination with outside response agencies.

CNSC Staff have assessed the Emergency Management and Fire Protection SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### **4.10.3 Future Plans**

As discussed above, BWXT NEC recently revised its Emergency Plan at the Toronto facility leading up to a successful full-scale CNSC-witnessed exercise in September 2018 involving Toronto Fire Services and Toronto Paramedic Services. Currently the Emergency Plan for Peterborough is being revised adopting a similar approach. This will involve separating the Emergency Plan from the Fire Protection Program as was done for Toronto. A full-scale exercise is being planned for Peterborough in 2020 under the updated Emergency Plan.

In the upcoming licence period the 2015 revisions to the National Fire Code and National Building Code will apply to inspections, testing and modifications of the facility.

BWXT NEC will continue to develop and advance its Emergency Management and Fire Protection Program over the course of the next licence period.

#### **4.10.4 Challenges**

It is expected that performance under the Emergency Management and Fire Protection SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.10.5 Requests**

BWXT NEC has no requests at this time.

#### **4.11 Waste Management**

The "Waste Management" SCA covers internal waste-related programs that form part of the facility's operations up to the point where the waste is removed from the facility to a separate waste management facility. This area also covers the planning for decommissioning.

BWXT NEC's Toronto and Peterborough facilities have an effective and well-established waste disposal program that ensures all radioactive waste disposals are conducted in accordance with the NSCA, associated Regulations and the facility operating licence conditions.

#### 4.11.1 Relevance and Management

BWXT NEC's waste management program apply to hazardous wastes (solid, liquid, and gaseous) generated on-site, including the management and disposal methods for that waste. These programs establish a cradle-to-grave approach with respect to waste management which includes waste collection, transportation, disposal, reduction and recycling; and ensures compliance with the Nuclear Safety and Control Act, the Environmental Protection Act and the Transportation of Dangerous Goods Regulations.

The radioactive waste program is additionally described in the radiation protection program. Radioactive wastes are managed in such a way as to ensure that they do not give rise to any unnecessary exposures to radiation or unacceptable effects on the environment. Any risks which arise in the management of radioactive wastes are kept ALARA. Radioactive solid wastes 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. In Toronto, only about 0.01% of the Uranium that is processed ends up in waste streams. Nearly all nuclear material is used in the product or recycled back to the supplier.

BWXT NEC maintains PDPs and financial guarantees for both the Peterborough and Toronto facilities in accordance with CNSC Regulatory Guide G-206 Financial Guarantees for the Decommissioning of Licensed Activities [30], CNSC Regulatory Guide G-219 Decommissioning Planning for Licensed Activities [31] and CSA N294-09 Decommissioning of Facilities Containing Nuclear Substances [35]. Additional information on PDPs and Financial Guarantees can be found in section 5.2.

#### 4.11.2 Past Performance

There are two main sources of UO<sub>2</sub> Contaminated Waste;

- Normal production generates radiological contaminated waste.
- Removal of building structural, obsolete machinery or services such as; exhaust duct, electrical conduit, etc.

All articles removed from certain radiation classified areas are included in radioactive waste, unless they meet the limits for surface contamination clearance to an unclassified area/public domain in accordance with the radiation protection program. Generation of radiological waste is minimized by employee awareness with respect to limiting articles entering the classified areas, re-use of shop coats, shoe covers and gloves which are laundered at the Toronto site. The Peterborough facility ships Uranium contaminated waste to the Toronto site as needed. This waste is consolidated with Toronto's waste, and then sent to a licensed nuclear waste site.

Non-radiological hazardous waste is managed in accordance with the Ontario Environmental Protection Act, R.R.O. 1990, and Regulation 347. This includes a requirement for subject waste disposal to a licenced waste disposal site within 90 days of generation.

CNSC Staff have assessed the Waste Management SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

#### 4.11.3 Future Plans

Updates to the PDPs will be conducted twice during the upcoming licensing period; in 2024 and 2029.

It is expected that this SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.11.4 Challenges**

It is expected that performance under the Waste Management SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### **4.11.5 Requests**

BWXT NEC has no requests at this time.

#### **4.12 Security**

The Security SCA covers the programs required to implement and support the security requirements stipulated in the Regulations, the licence, orders, or expectations for the facility or activity.

##### **4.12.1 Relevance and Management**

The Toronto and Peterborough facilities each maintain a security program in accordance with the General Nuclear Safety and Control Regulations [32], Class I Nuclear Facilities Regulations [33], and the Nuclear Security Regulations [34]. The security programs outline the systems, processes and responsibilities for performing security operations with the objective of maintaining safe and secure facilities.

Examples of security measures in place at both facilities include:

- Access control (access cards and locked restricted-access areas);
- Facility Access Security Clearance program;
- Security guards;
- Security barriers; and
- Intrusion detection systems.

##### **4.12.2 Past Performance**

CNSC staff have assessed the Security SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating).

A notable upgrade within the Security SCA which occurred over the course of the licence period was the addition of a 24-hour, seven days a week guard presence at the Toronto facility and physical guard house at the vehicle entrance.

##### **4.12.3 Future Plans**

BWXT NEC will continue to maintain and adapt the security program over the next licence period and will continue to work closely with local law enforcement. It is expected that performance under the Security SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

##### **4.12.4 Challenges**

No challenges are foreseen at this time.

##### **4.12.5 Requests**

BWXT NEC has no requests at this time.

#### **4.13 Safeguards**

##### **4.13.1 Relevance and Management**

The “Safeguards” SCA covers the programs and activities required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the Treaty on the Non-Proliferation of Nuclear Weapons. The BWXT NEC Safeguards program is in compliance with CNSC REGDOC-2.13.1 [37].

##### **4.13.2 Past Performance**

BWXT NEC has implemented and maintained a well-established Safeguards program throughout the licence period and undertakes all required measures to ensure IAEA commitments and CNSC regulatory requirements are met. At the start of 2019 BWXT NEC transitioned to reporting all Inventory Change Documents for both facilities through the Nuclear Materials Accountancy Reporting system.

CNSC staff have assessed the Safeguards SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e. Satisfactory rating). The IAEA and CNSC also conduct periodic Safeguards audits which include an annual physical inventory verification and short-notice random inspections at both facilities throughout the year.

##### **4.13.3 Future Plans**

BWXT NEC will continue to develop and advance its Safeguards program over the course of the next licence period.

It is expected that performance under the Safeguards SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

##### **4.13.4 Challenges**

No challenges are foreseen at this time.

##### **4.13.5 Requests**

On November 13, 2019, BWXT NEC requested that FM-P-008 Uranium Accountancy Program [17] replace both SG-01 (Toronto) and SG-01 (Peterborough) as the governing safeguards program document applicable to both facilities.

#### **4.14 Packaging and Transport**

The “Packaging and Transport” SCA covers the safe packaging and transport of nuclear substances to and from the licensed facility.

##### **4.14.1 Relevance and Management**

Routine shipments of both dangerous goods and non-dangerous goods are made between suppliers, the Toronto and Peterborough facilities and customer nuclear generating stations. Over the course of the licence period, packaging and shipments to and from both facilities have been conducted safely in accordance with relevant Regulations.

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.

BWXT NEC has an established Emergency Response Assistance Plan compliant with the Transportation of Dangerous Goods Regulations. 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 Uranium Dioxide. Transportation of Uranium materials to and from BWXT NEC is included in the plan.

#### 4.14.2 Past Performance

There have been four reportable events related to transportation over the current licence period. Two were related to classification, one related to damaged packaging and the fourth was a minor motor vehicle accident. In all cases there were no effects on the environment, the health and safety of persons, or national or international security.

CNSC Staff have assessed the Packaging and Transport SCA in the annual Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada as meeting all regulatory requirements and expectations (i.e., Satisfactory rating).

#### 4.14.3 Future Plans

BWXT NEC will continue to develop and advance its Packaging and Transport program over the course of the next licence period.

It is expected that performance under the Packaging and Transport SCA will continue to meet or exceed regulatory requirements and expectations over the next licence period.

#### 4.14.4 Challenges

No challenges are foreseen at this time.

#### 4.14.5 Requests

BWXT NEC has no requests at this time.

### 5 OTHER MATTERS OF REGULATORY INTEREST

#### 5.1 Cost Recovery

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

#### 5.2 Financial Guarantees

Preliminary Decommissioning Plans and associated decommissioning costs estimates for both facilities were updated in 2019 in accordance with CNSC Regulatory Guide G-206 Financial Guarantees for the Decommissioning of Licensed Activities [30], CNSC Regulatory Guide G-219 Decommissioning Planning for Licensed Activities [31], and CSA N294-09 Decommissioning of Facilities Containing Nuclear Substances [35]. The PDPs are required to be updated every five years.

The PDP strategy and end-state objective of decommissioning is to release the site from regulatory control for reuse or demolition of the structures.

Updated PDPs were submitted to the CNSC for both facilities on March 27, 2019 and were accepted by CNSC Staff on July 30, 2019. Subsequently, a minor revision of the Toronto PDP was submitted on

October 16, 2019. BWXT NEC is seeking approval of the updated financial guarantee amounts as follows;

Peterborough: \$10,775,122

Toronto: \$37,362,745

BWXT NEC has requested that the financial guarantee instrument be a combination of Surety Bond and Letter of Credit, with the first \$700,000 for Peterborough and first \$1,300,000 for Toronto being satisfied by Letters of Credit. The remaining obligation in each case would then be satisfied by Surety Bonds. Draft forms of both instrument types and details of the underwriting financial institution have been provided to CNSC Staff on October 16, 2019.

Until such time as the updated PDP amounts and financial instruments are approved, BWXT NEC maintains the existing financial guarantee amounts in the form of an irrevocable Letter of Credit.

### 5.3 Other Regulatory Approvals

BWXT NEC maintains Environmental Compliance Approvals (ECAs) from the Ministry of the Environment, Conservation and Parks (MOECP) for air and noise emissions for both facilities.

BWXT NEC also maintains a services agreement with the TSSA as an authorized inspection agency as required by the Licence.

### 5.4 Public Information Program

BWXT NEC is committed to connecting with the communities in which it operates in a timely, transparent and meaningful way and recognizes that the most effective way to build and sustain public trust is to maintain environmental excellence while fostering an atmosphere of openness and transparency with stakeholders and other interested parties. This requires a demonstrated commitment to operating in accordance with the highest environment, health and safety standards, while at the same time, sharing information concerning anticipated effects on the environment, health, and safety of persons that may result from the activity.

BWXT NEC's Public Information and Disclosure Program (PIDP) document [18] has been developed in accordance with CNSC REGDOC-3.2.1, "Public Information and Disclosure" [36]. The public information program (PIP) provides the strategy and methodologies to be employed for public communications, information distribution and feedback, and how these activities will be managed.

Throughout the licence period, BWXT NEC continuously improved and updated the PIP in response to increased levels of interest from the community. Updates to the PIP over the course of the licence period included additions of a community newsletter, increased public advertisement, establishment of a Community Liaison Committee (CLC), requests to meet with local elected officials, Indigenous communities and local organizations, addition of a dedicated communications team, participation in community events, and increased opportunities for communication.

BWXT NEC's 2019 PIP activities included:

- Maintaining a BWXT NEC public information website;
- Maintaining information pamphlets with current information about the facilities of interest to a member of the public;
- Providing a toll-free communication line and general email address for members of the public to submit comments/questions. The number and address are provided on the BWXT NEC website and materials distributed to the public;
- Communicating public CNSC licensing hearings;

- Issuing public disclosure of events;
- Holding or participating in public/community meetings and open houses;
- Mailings to stakeholders to communicate public information and solicit comments and questions;
- Providing facility tours to selected groups, media and elected officials;
- Meeting with designated elected officials, public agencies and other stakeholders;
- Holding four meetings a year with our Toronto Community Liaison Committee to engage interested immediate neighbours and representatives of recognized residents' groups and local community organizations;
- Supporting local community-based initiatives through volunteerism, sponsorship or other activities;
- Requesting annual meetings with local municipal councillors, and provincial and federal elected officials to provide an update on BWXT NEC's communications activities, facility activities and receive feedback on local community interests regarding the facility; and
- Other outreach activities as determined by BWXT NEC.

The following subsections provide examples of BWXT NEC's public engagement initiatives.

#### **5.4.1 Government Stakeholders**

BWXT NEC recognizes the importance of building and maintaining relationships with all levels of government in the communities in which it operates and proactively seeks to engage local elected officials to ensure representatives are aware of BWXT NEC's operating activities in Toronto and Peterborough.

BWXT NEC hosted several community leaders at the Toronto and/or Peterborough facilities throughout the licence period. BWXT NEC utilized various communication tools to provide elected officials in Toronto and Peterborough with the following: information about the licence renewal, invitations for tours, meetings and community events, relevant information and links, copies of newsletters and other documentation.

For example, facility tours, meetings and/or discussions were conducted during the licence period with:

- Member of Parliament (MP) for Peterborough-Kawartha;
- Member of Provincial Parliament (MPP) for Peterborough;
- Mayor of Peterborough;
- Councillors in Peterborough;
- Peterborough County Warden;
- MP for Davenport;
- MPP for Davenport;
- Councillor for Davenport;
- Toronto Public Health;
- Peterborough Public Health;
- Ministry of the Environment;
- Ontario Minister of Agriculture, Food and Rural Affairs; and

- Ontario Minister of Energy.

BWXT NEC will continue to keep elected officials informed of any updates leading up to and following the relicensing period.

#### 5.4.2 Indigenous Relations

BWXT Canada and BWXT NEC together joined the Canadian Council of Aboriginal Business (CCAB) in September 2017 and are actively working towards becoming Progressive Aboriginal Relations (PAR) certified. PAR is an online management and reporting program that supports progressive improvement in Aboriginal relations, and a certification program that confirms corporate performance at the bronze, silver or gold level. If a company is a leader in Aboriginal relations, PAR certification recognizes the commitment and success. Currently the company is PAR Committed – which signifies commitment to continual improvement in Indigenous relations and intention to undergo external verification of performance in the future. This program supports BWXT NEC's commitment to engaging Indigenous communities and building and sustaining meaningful long-term relationships. Additionally, the company joined the Indigenous Relations Suppliers Network established by Bruce Power in 2017 and sits on a committee founded by Ontario Power Generation called Indigenous Opportunities in Nuclear.

A PAR Committee was established and is comprised of employees across a range of disciplines, such as, Human Resources, Communications, Finance, Procurement, and Union representation. The PAR Committee has undergone Indigenous Cultural Awareness training including Indigenous Protocol Consultations and How to Ally with Indigenous People. BWXT's Leadership team has also taken this training. The PAR Committee meets every six weeks to discuss and share progress. As members of the committee are located across Canada, this meeting is key to continuing our progress in Indigenous relations. The committee discusses ways in which BWXT Canada can improve Indigenous relations through development of the four PAR drivers:

- Leadership Actions
- Employment
- Business Development
- Community Relationships

A Canada-wide company policy for Indigenous Relations was developed in 2017 which is publicly available on BWXT NEC's website and is listed as follows: BWXT Canada is committed to having a positive relationship with Indigenous groups and communities. BWXT understands that our primary bases of operation lie within the traditional territories of particular Indigenous groups and communities. Therefore, we will:

- Work to build and maintain a positive, long-term relationship with local Indigenous groups or communities that is based on mutual understanding, respect, open and honest communication and trust;
- Develop strategies in several key areas including employment, economic development, education, training and community sponsorship that appropriately reflect the interests of Indigenous groups and BWXT;
- Enter into appropriate relationships and communities wishing to be informed and involved with these key areas identified;
- Enhance employee understanding of Indigenous history and culture and the role Indigenous groups and communities play in Canada and in our business;

- Identify opportunities to increase our knowledge of the local environment and ways we can work together with Indigenous groups or communities to preserve or enhance that environment for all to enjoy.

BWXT in Canada also developed a Commitment Statement which is posted online. The Commitment is as follows: BWXT in Canada and its affiliates are committed to working with Indigenous communities and peoples in the areas in which we operate. Our commitment is driven by respect for Indigenous people and the traditional territories. We acknowledge that Indigenous peoples and communities have made significant contributions to Canada and have a right to their diverse cultural identities and traditions, and to build and sustain economic prosperity. We believe that strong communities are healthy communities, and we take great pride in our work to forge meaningful, responsible and mutually-beneficial relationships with Indigenous communities. We have implemented a company-wide Indigenous Policy that will guide us as we strive to nurture and build these valuable relationships with First Nations and Métis peoples.

The Communities of Interest (COI) for BWXT NEC in Peterborough and Toronto are as follows:

- Mississaugas of Scugog Island First Nation
- Chippewas of Rama First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Chippewas of Georgina Island First Nation
- Chippewas of Beausoleil First Nation
- Métis Nation of Ontario
- Mississaugas of the New Credit First Nation

BWXT NEC uses the following methods as much as possible to educate and communicate updates with its COI's:

- Letters/Electronic Email Updates – communicate key business updates.
- Meetings & Tours – invitations to meet and tour our facilities.
- Invitations – invitations to our community events (i.e. community barbeque and information nights).

In 2018, BWXT NEC identified the Indigenous Communities in Toronto and Peterborough and contacted each community with an introductory letter in April and a letter in December to inform the communities about our application for relicensing. In October, BWXT NEC attended the CCAB's Indigenous Relations Supplier event.

Throughout 2019, BWXT NEC sent multiple letters and electronic updates to the COIs in Peterborough and Toronto. These communications provided information about the licence renewal, invitations for tours, meetings and community events, relevant information and links, and copies of newsletters and other documentation. In 2019, a facility tour and meeting was conducted with the Métis Nation of Ontario Peterborough & District Wapiti Métis Council in Peterborough. Additionally, BWXT NEC representatives attended the Métis Nation of Ontario Peterborough & District Wapiti Métis Council Harvest Lunch at the Canadian Canoe Museum. BWXT NEC will continue to keep the Toronto and Peterborough Indigenous communities informed of any updates throughout and after the relicensing period.

### 5.4.3 Community Engagement

BWXT NEC recognizes the importance of building and maintaining relationships with members of the public and community groups and organizations in Peterborough and Toronto. At community events, visitors can sign-up to be added to the BWXT NEC stakeholder contact list to receive updates throughout the year.

Throughout the licence period, BWXT NEC engaged with many community members, groups and organizations, with the primary purpose of sharing information and addressing concerns. BWXT NEC uses a variety of communication tools to engage with the community, such as: mailed and emailed invitations, announcements on the company website and social media channels, advertisements in local media and at community venues, banners posted outside the Toronto and Peterborough facilities, notices in the community newsletters, and outdoor/indoor media screens.

For example, facility tours, virtual and in-person meetings and/or discussions were conducted during the licence period with:

- Prince of Wales Public School parents and teachers;
- Residents in the vicinity of the Toronto and Peterborough facilities;
- Rotary Club of Peterborough;
- Canadian Radiation Protection Association;
- Trent University Physics Group;
- Peterborough Regional Health Centre Foundation;
- Professional Engineers of Ontario;
- University of Ontario Institute of Technology;
- North American Young Generation in Nuclear;
- Ontario Power Generation;
- Ontario Flying Farmers;
- Canadian Canoe Museum;
- Crestwood Secondary School students and faculty;
- Kawartha Pine Ridge District School Board;
- Ontario Power Generation;
- Toronto local print, online and television media;
- Peterborough & the Kawarthas Economic Development;
- Citizens Against Radioactive Neighbourhoods;
- CLC members; and
- Sussex Strategy Group.

In October and November of 2018, a 10-minute survey, conducted either online or by telephone was performed among residents of Toronto and Peterborough who live in proximity to BWXT NEC facilities. BWXT NEC mailed postcards with an invitation to complete the survey online to neighbourhoods in proximity to the Toronto and Peterborough facilities. The survey explored participants' familiarity with and impressions of BWXT NEC. The survey also explored participants' support for and understanding of



various sources of energy, including nuclear power. The objective of the survey was to understand residents' awareness and opinions regarding BWXT NEC's operations in their local communities. The results of the survey provided BWXT NEC with a perspective for making improvements in its public outreach initiatives, which will be measured against the baseline data generated. A community barbeque in both Peterborough and Toronto was held in June to engage neighbours around BWXT NEC facilities and address their questions.

Over the course of the licence period, BWXT NEC's community stakeholder contact list grew significantly and BWXT NEC will continue to keep community members informed of any updates leading up to and following the relicensing period.

#### **5.4.4 Community Volunteerism & Investment**

The 2016 acquisition of GE Hitachi Nuclear Energy Canada by BWXT Canada resulted in the need to rebuild the volunteer program to ensure the program aligned with BWXT corporate objectives and complied with company policies. The rebuilding process also required the development of main infrastructure components such as a portal and program charter. Throughout 2017, BWXT NEC rebuilt all components of its volunteer program and officially launched a new program, called BWXT Volunteer Strong in November of 2017. This program has the full support of leadership and has been received positively by employees.

Through BWXT Volunteer Strong, all employees have the opportunity to help build stronger communities for those that live and work in them and can volunteer time and expertise to local causes that are important to the communities in areas such as:

- Education
- Health & Wellbeing
- Arts & Culture
- Environment
- Indigenous Relations

Since the new program was launched in 2017, BWXT NEC employees in Peterborough and Toronto have volunteered time at over 35 community events.

In addition to providing volunteer hours, BWXT NEC supports a range of community-based groups/initiatives that help improve community life in three key areas through charitable giving: community and cultural, charitable and health care support, education and vocational support. Examples include bursaries and scholarships to local high school, college and university graduates and support for community events.

#### **5.4.5 Community Events**

BWXT NEC has hosted community barbecues in Toronto since 2015 and Peterborough since 2016. These events create a platform for the exchange of information between BWXT NEC and community members and help to build positive relationships within the communities.

Senior leaders and department experts staff the barbecues and provide information about BWXT NEC's operations. Visuals and information about BWXT NEC's history, highly-skilled workforce, engineering and manufacturing capabilities, track record of safety and regulatory compliance, public information program and facts about natural uranium are provided during the barbeque.

Community attendance at the barbeque in both Toronto and Peterborough has increased over the licence period. For example, in 2016, both Peterborough and Toronto had approximately 130 community members attend. By 2019, this number doubled with over 300 community members in attendance.



In 2019, BWXT NEC held Community Information Night events in Peterborough and Toronto. This event provided the public with another opportunity to meet with BWXT NEC subject-matter experts and senior leaders. Large posters and print materials provided information about BWXT NEC's operations and capabilities, safety record and regulatory compliance, public information program, Indigenous relations, careers, licence renewal and more. The CNSC was present at both of the 2019 Information Nights to answer questions from members of the communities. Guests were encouraged to take home a copy of the Licence Renewal Briefing Guide, a document prepared by BWXT NEC to provide an overview of BWXT NEC's CNSC licenced facilities in Toronto and Peterborough. An electronic copy of this document is available on the website, [www.nec.bwxt.com](http://www.nec.bwxt.com).

#### **5.4.6 Community Newsletters**

Community newsletters are used by BWXT NEC as a tool to share information with the local communities in Toronto and Peterborough about the company's operational performance, health and safety, activities in the community and general information about the business. Copies of the community newsletters can be found on the BWXT NEC website and are available for download.

Throughout the licence period, the total number of editions and overall dissemination of the newsletters was increased to reach a larger distribution of community members. For example, in 2015, one newsletter was sent to 600 residents in the Toronto community and in 2019, three newsletters were sent to approximately 4000 residents in Toronto. In 2016, two newsletters were sent to approximately 1,500 Peterborough residents and in 2019, three newsletters were sent to approximately 3,700 residents.

Additionally, the Toronto newsletter is translated to Portuguese and copies of the translated version can be found on the BWXT NEC website.

In addition to mailing paper copies of the newsletters, BWXT NEC utilized outdoor and indoor screen signage to advertise the Fall newsletter in Peterborough in 2019. Four outdoor signs and nine indoor signs in key locations across Peterborough advertised the Fall newsletter for one week. This change was part of an effort to explore new communication methods to advertise the newsletters and company news to a broader range of community members.

#### **5.4.7 Community Liaison Committee – Toronto**

The Toronto CLC was established in 2013. Before a CLC was established, meetings were held with residents who lived on Brandon Avenue and a plant tour was held for residents in April of 2013.

The CLC is a forum for the exchange of information between the community and BWXT NEC. The CLC is not a decision-making body but provides a forum for members to bring forward questions, discuss concerns and identify opportunities to improve community relations. BWXT NEC seeks to learn more about community priorities, interests and activities, and improve how it shares information about work at the Lansdowne Avenue facility, health & safety initiatives and community activities.

Members meet with BWXT NEC staff to discuss the facility's operations and receive updates on topics such as emergency planning and training, community initiatives and environmental monitoring. CLC members provide input on BWXT NEC activities such as newsletter content, annual barbeque planning, community initiatives, etc. Their input is valuable in guiding communications efforts with area residents.

BWXT NEC proactively recruits for new CLC members on an annual basis in the fall. BWXT NEC promotes the recruitment through its community newsletter, website, social media, postcard mailers and fence line banners.

Guest speakers are occasionally invited to the CLC meetings to provide additional information on the nuclear industry. The CLC provides input on guest speakers and topics for discussion.

Over the course of the licence period, the following guest speakers attended CLC meetings:

- CNSC;
- Nuclear Waste Management Organization;
- Sussex Strategy Group;
- Ontario Power Generation; and
- Bruce Power.

In 2016, a Terms of Reference [19] for the CLC was established, with input from CLC members. The Terms of Reference provides guidance on the structure and purpose of the CLC, along with conduct and length of membership and renewal.

CLC meeting records are posted on the BWXT NEC website at [www.nec.bwxt.com](http://www.nec.bwxt.com).

BWXT NEC is currently working on establishing a CLC for the Peterborough community and plans to promote and form a CLC during 2020.

#### 5.4.8 Website, Email and Toll-Free Telephone Number

BWXT NEC utilizes multiple avenues for communication with members of the public. BWXT NEC has a dedicated website ([www.nec.bwxt.com](http://www.nec.bwxt.com)), email ([questions@bwxt.com](mailto:questions@bwxt.com)) and toll-free telephone number (1.855.696.9588).

On December 19, 2016, the website was rebranded and launched following BWXT Canada's acquisition of GE Hitachi Nuclear Energy Canada, renamed as BWXT Nuclear Energy Canada, to point the old website to [www.nec.bwxt.com](http://www.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. Additionally, the 1.855.696.9588 phone line and [questions@bwxt.com](mailto:questions@bwxt.com) email is available 24/7 and monitored daily.

For example, the BWXT NEC website was continuously updated throughout the licence period to include new information, such as:

- Annual Compliance Reports;
- EHS policy;
- Public Disclosures;
- PIP Pamphlets;
- Licence Renewal updates;
- Contact information;
- Newsletters;
- CLC Meeting Records;
- Certifications;
- Independent Environmental Monitoring Program (IEMP) results; and
- News.

Throughout 2018 and 2019, BWXT NEC continuously updated the relicensing section of the [www.nec.bwxt.com](http://www.nec.bwxt.com) website to keep members of the public informed about the licence renewal process. The relicensing section of the website includes copies of the licence renewal application and letter,

consolidated ERA, licence renewal briefing guide and public notices from the CNSC. Additionally, in 2019, BWXT NEC updated the FAQ section of the website to include questions and concerns from the community. The webpage will be continuously updated with new information leading up to and following the relicensing period.

#### **5.4.9 Social Media**

BWXT NEC leverages BWXT's social media channels which include Twitter, Linked-In and Facebook to share information about BWXT NEC activities. 2017 was the first year that BWXT NEC engaged via Facebook, enhancing its overall social media presence. Social media channels have been used to create awareness of the community barbeques and volunteer activities in the Peterborough and Toronto communities.

A variety of information is shared via social media such as:

- Job Opportunities;
- Employee Profiles;
- News;
- Community Activities (i.e. barbeques, Information Nights, BWXT Volunteer Strong, CLC, etc.); and
- Information about BWXT NEC's capabilities, products and services.

#### **5.4.10 Earned Media**

BWXT NEC utilizes media channels where appropriate to share information. The media is a valuable component of BWXT NEC's communications program and is recognized as a key conduit for BWXT NEC to deliver accurate information about its operations and activities to its broader communities. BWXT NEC engages with media during interviews, responds to media inquiries in a timely manner and develops editorials to help inform its communities regarding its operations.

Throughout the licence period, BWXT NEC was mentioned several times in local media coverage, particularly in Peterborough and largely around the acquisition in late 2016 and relicensing activities in 2019. Overall, media coverage was balanced, however, several editorials submitted by community members in 2019 expressed concerns regarding the nature of BWXT NEC's operations. Concerns with members of the public are being addressed through discussions, community events and website updates.

#### **5.4.11 Public Disclosure Protocol**

BWXT NEC has a Public Disclosure Protocol in place that sets out guidelines to providing timely information to interested members of the public and other stakeholders. Disclosures are posted to the BWXT NEC website and emailed to a distribution list of interested individuals and groups. Based on this protocol, BWXT NEC commits to:

- Maintaining two-way communication channels with the target audience to understand and address comments, questions and concerns;
- Providing reporting on its website within 48 hours of unusual operational events with the potential for offsite consequences, or that would be of interest to the target audience;
- Providing timely reporting on its website of environmental events that trigger notification of the CNSC under Section 29 of the General Nuclear Safety and Control Regulations;
- Providing information to the target audience through BWXT NEC's website and/or other Public Information Program activities, about significant operational changes or expansions that require an environmental assessment or amendments to our facility licence;

- Posting environmental monitoring results (relevant sections of Annual Compliance Reports) on its website;
- Consulting with stakeholders to determine the type of information, and method for information sharing regarding this Public Disclosure Protocol;
- Posting this Public Disclosure Protocol on the BWXT NEC website.

## 6 CONCLUSIONS

BWXT NEC is committed to continuous improvement of programs and systems to protect employees, the environment and our communities against environmental, health and safety hazards. As a result, radiation exposures have been maintained well below dose limits. Similarly, environmental emissions and public doses have been maintained at small fractions of regulatory limits.

BWXT NEC has been operating safely in Peterborough and Toronto for over 50 years. BWXT NEC's performance over the licence period demonstrates that it is qualified to carry out the activities permitted under the renewed licence. The commitments made in the application and subsequent submissions establish adequate provisions for the protection of the environment, the health and safety of persons, the maintenance of national security, and measures required to implement Canada's international obligations.

## 7 REFERENCES

### 7.1 Internal References

**Table 6 - Internal Reference Documents**

Title	Reference
[1] BWXT NEC 2018 Annual Compliance Report	
[2] BWXT NEC 2017 Annual Compliance Report	
[3] BWXT NEC 2016 Annual Compliance Report	
[4] BWXT NEC 2015 Annual Compliance Report	
[5] BWXT NEC 2014 Annual Compliance Report	
[6] BWXT NEC 2013 Annual Compliance Report	
[7] BWXT NEC 2012 Annual Compliance Report	
[8] BWXT NEC 2011 Annual Compliance Report	
[9] Licence Activity Quality Assurance Program, BMS-BP-004 Rev 4	
[10] Fire Hazards Analysis BWXT Nuclear Energy Canada Inc. Building 7 (Toronto), June 29, 2018	
[11] Fire Hazards Analysis BWXT Nuclear Energy Canada Inc. Building 9 (Toronto), June 29, 2018	
[12] Fire Hazards Analysis BWXT Nuclear Energy Canada Inc. Building 21 (Peterborough), February 20, 2019	
[13] Fire Hazards Analysis BWXT Nuclear Energy Canada Inc. Building 24 (Peterborough), February 20, 2019	
[14] Fire Hazards Analysis BWXT Nuclear Energy Canada Inc. Building 26 and 28 (Peterborough), February 20, 2019	

Title	Reference
[15] Environmental Risk Assessment Report – Nuclear Fuel Pellet Operation, December 2018	
[16] Environmental Risk Assessment Report – Peterborough Facility, December 2018	
[17] FM-P-008, Rev 2, Uranium Accountancy Program, March 12, 2019	
[18] BWXT NEC, “Public Information and Disclosure Program,” EHS-P-RPM-003, Rev 04, 12 May 2017.	
[19] BWXT NEC Community Liaison Committee Terms of Reference, Rev 1, 22 December 2016.	

**7.2 External References**

**Table 7 - External Reference Documents**

Title	Reference
[20] CNSC, "Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2018," 11 October 2019.	
[21] CNSC, "Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2017," 5 October 2018.	
[22] CNSC, "Regulatory Oversight Report for Uranium and Nuclear Substance Processing Facilities in Canada: 2016," 13 October 2017.	
[23] CNSC, "Regulatory Oversight Report for Nuclear Processing, Small Research Reactor and Class 1B Accelerator Facilities: 2015," 2016.	
[24] CSA N286-12, “Management Systems Requirements for Nuclear Facilities,” 2012.	
[25] CSA Group, "Fire Protection For Facilities That Process, Handle, Or Store Nuclear Substances," N393-13, December 2013.	
[26] Minister of Justice, "Radiation Protection Regulations," SOR/2000-203, 22 September 2017.	
[27] CNSC, Keeping Radiation Exposures and Doses As Low As Reasonably Achievable (ALARA), G-129, Revision 1, October 2004.	
[28] CSA Group, "Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills," N288.6-12, June 2012.	
[29] CNSC REGDOC-2.10.1 Nuclear Emergency Preparedness and Response, Version 2, February 2016	
[30] CNSC Regulatory Guide G-206, Financial Guarantees for the Decommissioning of Licensed Activities, June 2000	
[31] CNSC Regulatory Guide G-219, Decommissioning Planning for Licensed Activities, June 2000	
[32] CNSC, "General Nuclear Safety and Control Regulations," SOR/2000-202, June 2015.	

Title	Reference
[33] CNSC, "Class I Nuclear Facilities Regulations," SOR/2000-204, 22 September 2017.	
[34] CNSC, "Nuclear Security Regulations," SOR/2000-209, June 2015.	
[35] CSA N294-09, Decommissioning of Facilities Containing Nuclear Substances,	
[36] CNSC, "Public Information and Disclosure," REGDOC-3.2.1, May 2018	
[37] CNSC, "Safeguards and Nuclear Material Accountancy," REGDOC-2.13.1, February 2018.	
[38] CNSC, "Developing and Using Action Levels," G-228, March 2001.	

**8 ACRONYMS AND ABBREVIATIONS**

**Table 8 - Acronyms and Abbreviations**

Acronym/Abbreviation	Definition
ALARA	As Low As Reasonably Achievable
ATS	Action Tracking System
BMS	Business Management System
BWXT NEC	BWXT Nuclear Energy Canada Inc.
BWR	Boiling Water Reactor
CANDU	Canada Deuterium Uranium
CCAB	Canadian Council of Aboriginal Business
CCME	Canadian Council of Ministers of the Environment
CLC	Community Liaison Committee
cm	Centimeter
CNSC	Canadian Nuclear Safety Commission
COI	Community of Interest
CSA	Canadian Standards Association
CTS	Critical to Safety
DRL	Derived Release Limit
ECA	Environmental Compliance Approval
EHS	Environment, Health and Safety
EMS	Environmental Management System
EOC	Emergency Operations Centre
ERA	Environmental Risk Assessment
FAQ	Frequently Asked Question
FHA	Fire Hazards Analysis

Acronym/Abbreviation	Definition
FSA	Facility Safety Analysis
GE	General Electric
IAEA	International Atomic Energy Agency
IEMP	Independent Environmental Monitoring Program
kg	Kilogram
LAQA	Licensed Activity Quality Assurance
LCH	Licence Conditions Handbook
LTI	Lost Time Injury
Mg	Megagram
MP	Member of Parliament
MPP	Member of Provincial Parliament
mSv	Millisievert
NEW	Nuclear Energy Worker
NSCA	Nuclear Safety and Control Act
PAPR	Powdered Air Purifying Respirator
PAR	Progressive Aboriginal Relations
PDP	Preliminary Decommissioning Plan
PIDP	Public Information and Disclosure Program
PIP	Public Information Program
OPEX	Operating Experience
QA	Quality Assurance
SAR	Safety Analysis Report
SAT	Systematic Approach to Training
SCA	Safety and Control Area
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
TSSA	Technical Standards and Safety Authority
UO <sub>2</sub>	Uranium Dioxide
µg	Microgram
µSv	Microsievert
WSC	Workplace Safety Committee