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August 4, 2016

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

**Cameco Corporation – Port Hope Conversion Facility Renewal of Licence FFOL-3631.0/2017 for a 10-year term**

Dear Mr. Leblanc:

With this correspondence, Cameco Corporation (Cameco) is notifying the Canadian Nuclear Safety Commission (CNSC) of the completion of its application to renew the Class IB Nuclear Fuel Facility Operating Licence (FFOL-3631.00/2017) for Cameco's Port Hope Conversion Facility (PHCF) for a period of 10 years. Following the submission of the licence application on November 20, 2015, Cameco has submitted additional documents to CNSC staff in support of the application to ensure that the information to be presented to the Commission in the hearing scheduled for November 2016 was comprehensive, met the guidance provided by CNSC staff and provides sufficient information to the Commission and the public regarding the PHCF operations. Since the licence renewal application was submitted, Cameco has completed all of the commitments made in the licence application and has fulfilled all of CNSC staff's requests for additional information regarding the application, the supporting studies and programs that comprise the licensing basis.

This correspondence provides an overview of information relevant to the Commission that:

- Was not provided or supplements information provided in the November 2015 application
- Has changed and needs to be corrected/amended from the November 2015 application

Together, the November 20, 2015 application and today's correspondence comprise the full application package for the renewal of FFOL-3631.0/2017, with this correspondence superseding the November 2015 information where the information has changed.

## Additional Information Submitted to CNSC Staff in 2016

### *Supporting Studies*

As per the commitments in the licence application dated November 20, 2015, Cameco submitted the following supporting studies to CNSC staff in the first quarter of 2016:

- Safety Report for the Port Hope Conversion Facility
- Environmental Risk Assessment (ERA) for the Port Hope Conversion Facility
- Preliminary Decommissioning Plan (PDP) for the Port Hope Conversion Facility
- Derived Release Limits (DRL) and Operating Release Levels (ORL) for the Port Hope Conversion Facility

Additional information regarding the outcomes of these studies is provided in Attachment 1 as part of the PHCF performance report and future outlook. In order to ensure that this information is available to the public, general summaries of methodology and results have been developed and the first documents were posted to Cameco's website for the Fuel Services Division ([www.camecoporthope.com](http://www.camecoporthope.com)) on June 30, 2016. The remaining two documents will be posted by the end of August 2016.

Summary documents are necessary as some of our documents contain information that is prescribed information, controlled nuclear information pursuant to the *Nuclear Non-proliferation Import and Export Control Regulations* or information that is exempted from disclosure under the *Access to Information Act*, and therefore cannot be made publicly available.

### *Licensing Documents*

As per the commitments in the licence application dated November 20, 2015, Cameco submitted the following additional information regarding activities to be carried out in the next licence period to CNSC staff in the first quarter of 2016:

- Facility Licensing Manual (FLM)
- Supplemental Vision in Motion (VIM) Submission

In order to ensure that this information is available to the public, these documents will be posted to Cameco's divisional website by the end of August 2016.

### *Facility Licensing Manual*

The FLM is Cameco's document that provides an overview of the programs, plans, procedures and other processes in place at the PHCF to meet the requirements of the Safety and Control Areas (SCAs) and ensure that the facility operates within the licensing basis. Changes in 2016 that have impacted the FLM are:

- Addition of a section regarding human performance management
- Decrease in the action level for whole body dose

- Proposal of new “Critical Receptors” and Public Dose Equations from the DRL/ORL study
- Proposal of a new limit for water discharges from the facility from the DRL/ORL study
- Inclusion of additional documents supporting the VIM project
- Inclusion of commitments to implement specific CSA standards and REGDOCs

### *Vision In Motion*

CNSC staff requested that Cameco provide additional information regarding the VIM project, including the project description, preliminary schedules and how the project will be managed within existing programs, plans and procedures. This information is provided in attachment 2 and is available on Cameco’s divisional website.

### *Supporting Documents*

A revised list of documents supporting the licence application is provided in Attachment 3. Additional documents were added to clarify information based on CNSC staff requests.

### *PHCF Performance and Future Plans*

CNSC staff requested that Cameco provide an assessment of its performance relative to the SCAs as well as plans for the upcoming licensing period as part of the licensing documentation. Also included in this document is information regarding the supporting studies described above as well as minor information details requested by CNSC staff to supplement information in the November application.

This information is provided in attachment 1 and will be posted to Cameco’s divisional website by the end of August 2016.

### Changes/Amendments to the November 20, 2015 Application

Cameco, through discussions with CNSC staff, has identified that there are several aspects of the original request for licence renewal in November 2015 that require clarification and/or Cameco is changing its request.

Cameco makes the following licensing requests of the Commission in the renewal of FFOL-3631.0/2017 for a 10-year term:

- No change to current production limits of
  - 2800 tonnes uranium as uranium dioxide (natural or depleted) from the UO<sub>2</sub> Plant
  - 12,500 tonnes uranium as uranium hexafluoride from the UF<sub>6</sub> plant, with a daily limit of 45 tonnes/day
- The following activities are requested to be removed:
  - Removal of the references to the North UO<sub>2</sub> Plant as a UO<sub>2</sub> production facility, including existing production limits

- Removal of the references to the metals plant and metals production as an activity authorized under the licence, including existing production limits
- The following requests from the November 2015 application are withdrawn:
  - Inclusion of metals plant restart requirements with designated officer authorization to resume production
  - Authorization to treat and release groundwater with designated officer authorization to commence treated groundwater release
- The following release limits are requested based upon the 2016 DRL/ORL studies

Source	Updated ORL		Current Licence	
	(kg U/y)	(kg U/h)	(kg U/y)	(kg U/h)
<u>Air:</u>				
UO <sub>2</sub> (Building 24 Main Stack)		0.24		0.15
UF <sub>6</sub> (Building 50 Main Stack)		0.28		0.29
Water (Sanitary Sewer, Groundwater and Stormwater)	1825		N/A <sup>b</sup>	
Gamma Radiation	<b>(µSv/h)</b>		<b>(µSv/h)</b>	
PHCF main site – Fisherperson at TLD 2	0.57		N/A <sup>a</sup>	
PHCF main site – Resident at TLD 13	0.40		0.14	
Dorset site – Resident at TLD 21	0.26		N/A <sup>a</sup>	

a) Not available

- A proposed financial guarantee of \$128.6 million is requested, based on the 2016 update to the PDP

Pursuant to section 15 of the *General Nuclear Safety and Control Regulations*, I have the authority to sign the application on behalf of Cameco and certify that all statements and representations made in the application and any supplementary documentation are true and correct to the best of my knowledge and are binding on Cameco.

The application for licence renewal submitted on November 20, 2015 and the information provided in this current submission, as well as their referenced material serve as the licensing basis for consideration in the renewal of FFOL-3631.00/2017 for a period of 10 years.

If you have any questions or if we can provide you with additional information to facilitate your review of this application please do not hesitate to contact me or the PHCF General Manager, Dave Ingalls, at (905) 885-4511 extension 2049.

Sincerely,

  
for Dale Clark,  
Vice President, Fuel Services Division

c.c.: K. Murthy, J. Thelen, B. Prieur (CNSC)  
D. Ingalls, T. Smith, R. Peters, S. Frankcom, L. Mooney (Cameco)

Attachments:

1. 2007-2015 Operational Performance Report and Forward Outlook in Support of the Renewal of Port Hope Conversion Facility Operating Licence
2. 2017 Licence Renewal Application Port Hope Conversion Facility February 1 Supplemental VIM Submission
3. Documents Supporting the Licence Application

Attachment 1: 2007-2015 Operational Performance Report and Forward Outlook in Support of the Renewal of Port Hope  
Conversion Facility Operating Licence



**2007-2015 Operational Performance Report and Forward  
Outlook in Support of the Renewal of:**

**Port Hope Conversion Facility  
Operating Licence  
FFOL-3631.00/2017**

**One Eldorado Place  
Port Hope, Ontario  
L1A 3A1**

Submitted to:  
**The Canadian Nuclear Safety Commission**  
P.O. Box 1046, Station B  
280 Slater Street  
Ottawa, Ontario  
K1P 5S9

Submitted on: August 4, 2016

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## **1.0 INTRODUCTION**

### **1.1 Background**

Cameco Corporation (Cameco), with its corporate headquarters located at 2121-11<sup>th</sup> Street West, Saskatoon, Saskatchewan, is committed to the safe, clean and reliable operation of all of its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees and local residents. PHCF maintains the required programs, plans and procedures in the areas of health and safety, radiation protection, environment, emergency response, fire protection, waste management, and training.

As a result of these actions, Port Hope Conversion Facility (PHCF) has continued to produce uranium products for the Canadian and international nuclear industry while at the same time maintaining radiation exposures to the workforce well below the dose limits. Environmental emissions and public radiation exposures are being controlled to levels that are a fraction of the regulatory limits and overall safety performance has improved over the last two licence periods.

As described within this report, the performance of this facility over the current and previous licence periods demonstrates that Cameco is qualified to carry out the activities permitted under the Licence for a period of 10 years. This report reaffirms Cameco's commitment to take all reasonable precautions to protect the environment and the health and safety of employees and the public, to maintain the security of the facility and the nuclear substances associated with the facility, and the necessary measures to facilitate Canada's compliance with international safeguards obligations.

## 1.2 Production Highlights 2007 to 2015

Detailed plant production information is considered “Protected Proprietary” and is submitted to the Canadian Nuclear Safety Commission (CNSC) on an annual basis under a separate cover. The following production summarizes PHCF operating performance between 2007 and 2015:

- The maximum production rate did not exceed the licence limit of 45 tonnes uranium as uranium hexafluoride (UF<sub>6</sub>)
- The annual production of uranium in the UF<sub>6</sub> plant did not exceed the limit of 12,500 tonnes uranium as UF<sub>6</sub>
- The annual production of uranium as uranium dioxide (UO<sub>2</sub>) did not exceed the licensed limit of 2,800 tonnes uranium as UO<sub>2</sub>
- Depleted uranium dissolution campaigns occurred in 2007, 2009, 2010 and 2012

## **2.0 SAFETY AND CONTROL AREAS**

### **2.1 Functional Area: Management**

#### **2.1.1 SCA - Management System**

This safety and control area (SCA) covers the framework that establishes the processes and programs required to ensure that the organization achieves its safety objectives and continuously monitors its performance against these objectives, as well as fostering a healthy safety culture.

##### Operational Performance

The quality management program manual (QMPM) at the PHCF is the framework that guides the processes and programs required to ensure safety objectives are achieved, performance is monitored and a healthy safety culture is maintained during production, maintenance, materials handling, waste management and other on-site activities. This includes, but is not limited to requirements for work planning, change control, corrective action processes, document control, audits, and management review. The application of QA requirements is scaled according to the complexity and hazard potential of a particular activity.

Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Management System SCA.

##### Forward Outlook

To continue to improve its management system, Cameco has committed to the implementation of the CSA N286-12 Standard Management System Requirements for Nuclear Facilities by the end of 2017. The requirements of the standard will be phased-in through a series of updates to the QMPM and supporting documentation throughout 2016 and 2017.

#### **2.1.2 SCA - Human Performance Management**

This SCA covers activities that enable effective human performance through the development and implementation of processes that ensure that licensee staff members are sufficient in numbers in all relevant job areas, and have the necessary knowledge, skills and tools in place, in order to safely carry out their duties.

##### Operational Performance

The regulatory requirements for this SCA between 2007 and 2015 have primarily been focused on training. Between 2007 and 2015, CNSC staff have rated PHCF as

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satisfactory in the Human Performance Management (HPM) SCA for all years except 2009, when PHCF was rated below expectations in this SCA.

Since 2009, the training program at PHCF has improved due to the implementation of a Systematic Approach to Training (SAT) based training program and the internal qualification process for operators. CNSC staff have re-evaluated this SCA to meeting expectations. PHCF has recently implemented REGDOC 2.2.2 Personnel Training.

In addition to the training program, the PHCF maintains other programs and procedures that support Human Performance Management. Aspects of human factors have been considered in the development and continual improvement of site management system programs, work instructions, engineering and operations activities, change control and the corrective action process as described in the QMPM, Facility Licensing Manual (FLM) and other supporting documents. Minimum staff complement, safety performance, operating work instruction/procedure development, change control, operating practices and continual improvement are some of the other HPM activities embedded in site programs. In 2016, this program was formally documented in the FLM under the HPM SCA.

#### Forward Outlook

In the upcoming licensing period, the development and implementation of HPM tools will continue as CNSC staff develop and publish additional guidance through applicable REGDOCs and Cameco establishes its corporate framework to meet these requirements. Cameco will review, and incorporate the applicable aspects of a human performance management program as part of the CNSC regulatory framework improvements.

### **2.1.3 SCA - Operating Performance**

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

#### Operational Performance

Throughout the period between 2007 and 2015, annual production targets were achieved for UO<sub>2</sub> operations and for the period 2010 through 2015 annual production targets were achieved for UF<sub>6</sub> operations. Unplanned shutdowns accounted for the lower than planned UF<sub>6</sub> production in 2007-2009. The PHCF continues to operate in a manner that supports safe, clean and reliable production in compliance with applicable legislation.

Cameco reports unplanned events as required by the NSCA, its regulations and the licence conditions. During the period between 2007 and 2015 incidents related to plant operations, lost time injuries and action levels for environmental releases were promptly

reported. PHCF investigated these incidents to determine their causes and took necessary corrective actions to prevent their reoccurrences.

Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Operating Performance SCA.

#### Forward Outlook

Looking ahead to the next licensing period, Cameco will implement projects to further support improved health, safety and environmental performance.

## **2.2 Functional Area: Facility and Equipment**

### **2.2.1 SCA - Safety Analysis**

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

#### Operational Performance

PHCF has a safety report that summarizes the systematic review of site operations to identify and assess hazards and potential risks to the public and environment from the PHCF. Cameco uses a hazards and operability (HAZOP) approach to assess new processes or equipment. This is a significant effort and a very effective tool that focuses on equipment, instrumentation, human actions and other factors that may impact on the process. HAZOPs are conducted prior to making any plant modifications that may affect the safety case for the facility, with the site safety report updated at least every five years to include the findings from any HAZOPs completed since the last revision to the report. The safety report was updated and submitted to CNSC staff in 2010 and 2015. The most recent update was accepted by CNSC staff in 2016.

Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Safety Analysis SCA every year.

#### Forward Outlook

Over the proposed licensing period, Cameco will update its safety report twice (every five years). Where applicable, each update will incorporate recommendations from CNSC staff, industry practice as well as applicable REGDOCs and standards to enhance the robustness of the analysis.

### 2.2.2 SCA - Physical Design

This SCA relates to activities that impact on the ability of systems, structures and components (SSCs) to meet and maintain their design basis given new information arising over time and taking into account changes in the external environment.

#### Operational Performance

Changes to the physical design of equipment, processes and the facility with the potential to impact safety are evaluated through a change control process from initial planning through to completion of the project. This review identifies impacts and potential impacts to the environment, radiation protection, health and safety and fire protection. A site design change procedure is in place, which ensures that any equipment changes or modifications will not have an adverse effect on the environment, on the health and safety of employees or on members of the public. Between 2007 and 2015, the PHCF made enhancements to processes used to ensure that the physical design of the site is maintained.

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

Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Physical Design SCA.

#### Forward Outlook

Though PHCF's existing programs meet regulatory requirements, the full implementation of CSA N286-12 will further enhance the existing design program for the PHCF. Cameco has also committed to implementation of CSA-N393-13, Fire Protection for Facilities that Process, Handle or Store Nuclear Substances by the end of 2017. While the site pressure boundary program meets the requirements of CSA B51-09 Boiler Pressure Vessel and Pressure Piping Code, the 2014 version of the code will be implemented within the first two years of the next licence period.

### 2.2.3 SCA - Fitness for Service

This SCA covers activities that impact on the physical condition of SSCs, to ensure that they remain effective over time. This includes programs that ensure all equipment is available to perform its intended design function when called upon to do so.

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### Operational Performance

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

The Operational Reliability program accounts for ageing through a number of processes designed to detect early warning signs and to prescribe rehabilitation programs or pro-active replacement strategies. The effectiveness of the program is measured by the same means as the overall maintenance program and is considered to be effective. Cameco has invested a considerable amount of time benchmarking and developing this program at the PHCF in the current operating period.

PHCF has an established Preventative Maintenance (PM) program whereby all tasks are initiated and documented through the work notification system. PM plans are issued reviewed and updated periodically to ensure the PM routines continue to be effective and adequate.

Fire protection systems are tested according to an established schedule as outlined in the Fire Protection Program. Third-party reviews are conducted to confirm required tests and inspections with respect to fire protection are completed and these review reports are submitted to the CNSC. Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Fitness for Service SCA every year.

### Forward Outlook

The implementation of N286-12, N393-13 and B51-14 in 2017 and 2018, will all have a positive impact on the Fitness for Service SCA. Other new requirements will be reviewed and implemented in accordance with existing licence conditions handbook (LCH) management practices.

## **2.3 Functional Area - Core Control Processes**

### **2.3.1 SCA - Radiation Protection**

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

### Operational Performance

PHCF has an extensive Radiation Safety Program in place to meet the requirements of the *Nuclear and Safety Control Act* and the *Radiation Protection Regulations* and ensure exposures are kept to levels as low as reasonably achievable, social and economic factors

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considered (ALARA). Review of worker dose data between 2007 and 2015 indicates that the program is highly effective in the prevention of unreasonable risk to the health and safety of workers (Cameco employees and contractors). All worker doses were well below the CNSC regulatory limits for effective dose for Nuclear Energy Workers (NEWs) of 50 millisieverts (mSv) per year and no more than 100 mSv over a specified five year period.

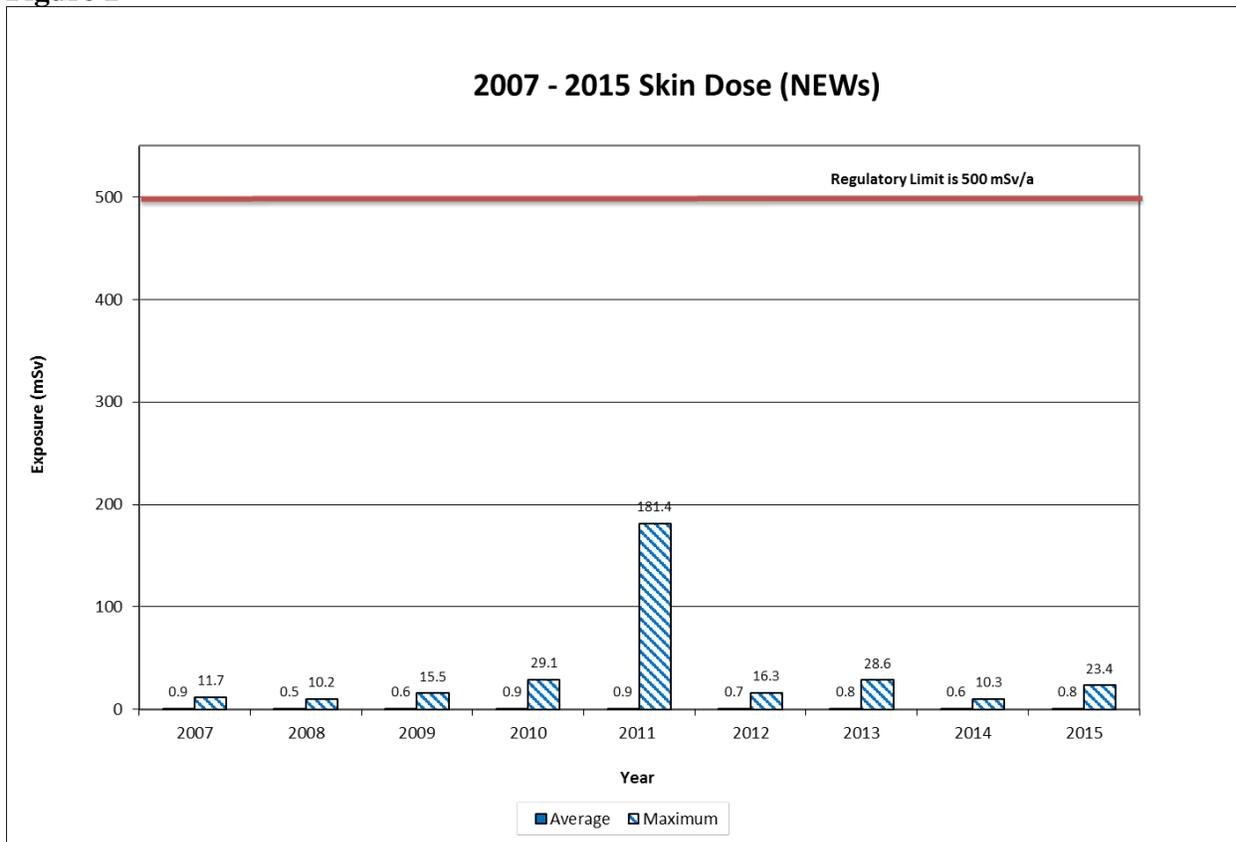
PHCF uses a licensed dosimetry service provider that is accredited by the CNSC for external dosimetry. Internal doses are assigned through urine analysis and lung counting programs, which are part of Cameco's licensed internal dosimetry service.

Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Radiation Protection SCA every year.

#### *Equivalent Dose Limits - Skin Dose*

Dose to skin is measured using dosimeters and compared to the corresponding equivalent dose limit of 500 mSv in the *Radiation Protection Regulations*. Figure 1 shows the average and maximum individual skin dose for NEWs in the period from 2007 – 2015. Skin exposures are typically low, with less than 0.07% of all annual measurements above the site ALARA target of 20 mSv/year. There was one significant skin exposure reported during this period following an incident which occurred on February 10, 2011 during which a UF<sub>6</sub> operator sustained a cut to the left hand while changing the blade of a drum dryer. The event was reported to CNSC staff once it became apparent that an intake had occurred and was discussed with the Commission during the 2011 licence renewal hearings. Average skin dose is variable from year to year. Between 2007 and 2015, the average and maximum individual skin doses were a very small fraction of the CNSC annual limit of 500 mSv for skin dose.

**Figure 1**



### *Effective Dose Limits*

As per the *Radiation Protection Regulations*, effective dose for NEWs at the PHCF is determined through the dose received from outside the body, as measured by optically stimulated luminescence (OSL) dosimeters as well as the dose received by and committed to the worker from sources inside the body, as measured through lung counting and urine analysis.

### *Whole Body Dose*

The average whole body doses for NEWs are consistent and extremely low during the period from 2007 to 2015. The average annual whole body dose for NEWs is typically around 0.2 mSv. Less than 0.03% of all annual whole body doses were above the site ALARA target of 5 mSv/year for external exposure. Managing external exposure dose at these levels ensures that total effective dose for workers remains a small fraction of the CNSC annual limit of 50 mSv.

### *Urine Analysis*

The average internal doses for NEWs from urine analysis are extremely low during the period from 2007 to 2015. Through this period, the urine analysis dose assignment system was implemented to automatically assign dose to all dosimetry samples above the detection level, first with employees and then contractors. The average annual internal dose from urine analysis for NEWs is less than 0.07 mSv. Less than 0.10% of all internal exposure doses were above the site ALARA target of 1 mSv/year for the urine internal exposure component. Managing the internal dose component from urine analysis at these levels ensures that total effective dose for workers remains a small fraction of the CNSC annual limit of 50 mSv.

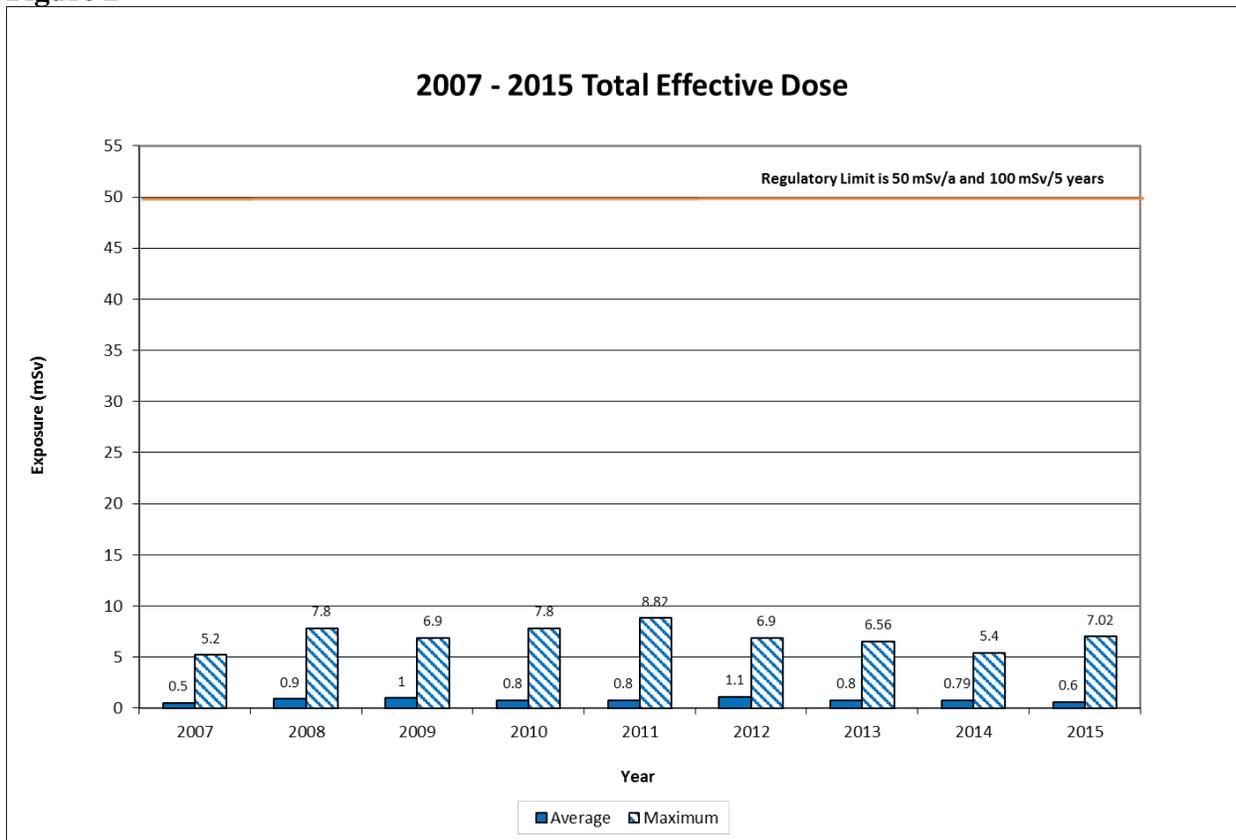
### *Lung Counting*

As part of the licensed internal dosimetry program, Cameco employs the use of a lung counter to monitor and assess uranium exposure in the lungs of NEWs working at PHCF. The average internal doses determined through lung counting are consistent during the period. The average annual internal dose from lung counting for NEWs is at or below 1 mSv. Less than 0.11% of total annual doses from lung counting over this period were above the ALARA target of 4 mSv/year for internal exposure from lung counting. Managing the internal dose component from lung counting at these levels ensures that total effective dose for workers remains a small fraction of the CNSC annual limit of 50 mSv.

### Total Effective Dose (TED)

Figure 2 presents the total effective dose for workers (employees and contractors) designated as NEWs during the 2007-2015 period. The TEDs over the period are extremely low and the regulatory limit of 100 mSv five-year effective dose was not exceeded in the regulatory periods that bracket 2007 to 2015.

**Figure 2**



Other Radiation Monitoring

The inventory of sealed and unsealed sources that are used or possessed on site was maintained between 2007 and 2015. Regular inspection and leak tests of the sealed sources were carried out and demonstrated that sources are in a state of safe operation and pose no undue risk to workers.

The radiation monitoring instrumentation was maintained in accordance with regular calibration and maintenance schedules.

Forward Outlook

The RP Program is mature and enables Cameco to keep radiation exposures ALARA. The PHCF will continue to enhance the program through physical, procedural and monitoring improvements as identified by the radiation protection sub-committee (part of the employee-led safety program), the audit and corrective action processes and new regulatory requirements.

### 2.3.2 Conventional Health and Safety

This SCA covers the implementation of a program to manage non-radiological workplace health and safety hazards and to protect personnel and equipment.

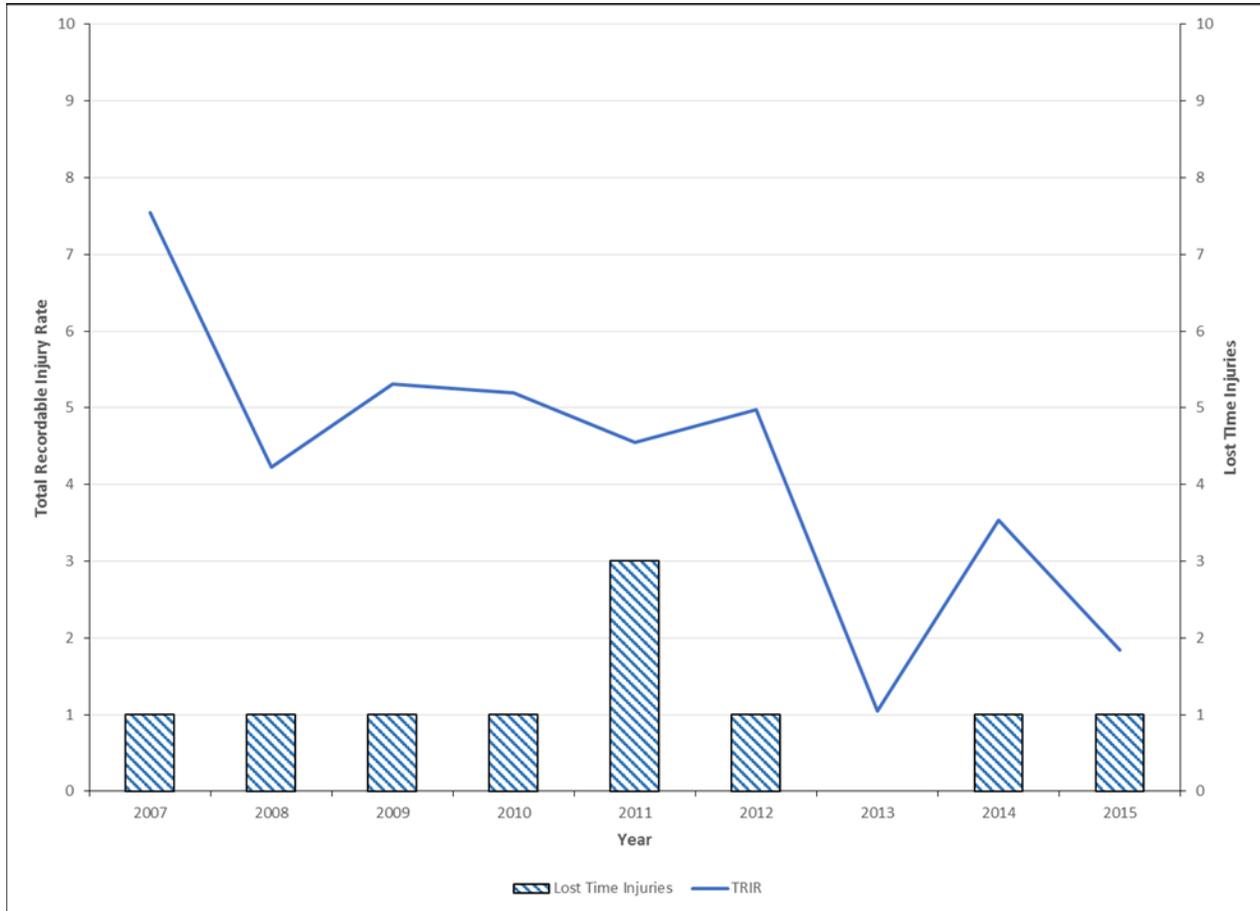
#### Operational Performance

The health and safety of workers at PHCF is assured through site-specific safety and health management programs. The PHCF Occupational Health and Safety Program Manual describes the site conventional health and safety program.

Within the current licence period, following extensive benchmarking, the PHCF adopted a new approach to occupational health and safety that is supported by the Conversion Safety Steering Committee (CSSC). The CSSC is an employee-led committee that reviews and discusses matters involving occupational health and safety (OH&S) policies, procedures and programs, safety performance, safety program performance, work refusals, safety related projects, and joint union/management OH&S issues that may arise from time to time. The employee-led approach strives to involve all employees in safety through committee and sub-committee involvement, participation in inspections or other activities that promote or enhance safety.

This change in approach has led to improved site safety culture as seen in the site safety statistics. Two common safety metrics are shown in Figure 3. Lost time injuries have remained relatively stable over the period, averaging one per year in the current licensing period (2012-2015). Total recordable injury rate (TRIR) is a tool to measure the frequency of less severe injuries in the workplace – specifically the number of injuries requiring medical treatment or restricted work per 100 employees per year. This gives a number that can compare safety performance year to year - the lower the TRIR the better the safety performance. The figure demonstrates an overall decreasing trend in TRIR over the period all injury types in the period 2007 through 2015. Our employees have demonstrated that they can work safely in any environment, even one which includes hazardous materials, if they have the right training, proper personal protective equipment and most importantly the right attitude. The site was recognized for its 2013 safety performance with the corporate Mary-Jean Mitchell Green safety award presented annually to a Cameco site in recognition of their safety performance.

**Figure 3**



Between 2007 and 2015, CNSC staff have rated PHCF as satisfactory in the Conventional Health and Safety SCA every year.

### Forward Outlook

Cameco will continue to implement new corporate safety standards as well as maintain and enhance its safety program where opportunities are identified during the upcoming licence period. We continue to strive for zero injuries through all of our operations.

### **2.3.3 Environmental Protection**

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

### Operational Performance

There are both federal and provincial regulatory authorities that have legislative jurisdiction over environmental protection at the facility. The PHCF's Environmental Protection Program (EPP) monitors the following parameters to ensure protection of people and the environment:

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

### *Environmental Improvements*

Though the environmental programs have been demonstrated to be effective, PHCF implemented several improvements to the operations over the past two licence periods that have benefitted the EPP. These improvements have included:

- the development of a liquid management program and the rehabilitation of process buildings to meet this criteria
- soil excavation in select areas of the facility to remediate some of the subsurface contamination
- installation of HEPA Filters on HVAC fans in production buildings
- improvements to scrubbing systems for hydrogen fluoride and uranium at the UF<sub>6</sub> plant
- upgraded the UO<sub>2</sub> main stack air emission monitoring system
- improvements to the stormwater system, including a reduction in the number of discharge points, repairs to subsurface lines and implementation of a maintenance program
- implementation and expansion of a groundwater pump-and-treat system to control subsurface contamination

### *Changes to the Regulatory Framework for Environmental Protection*

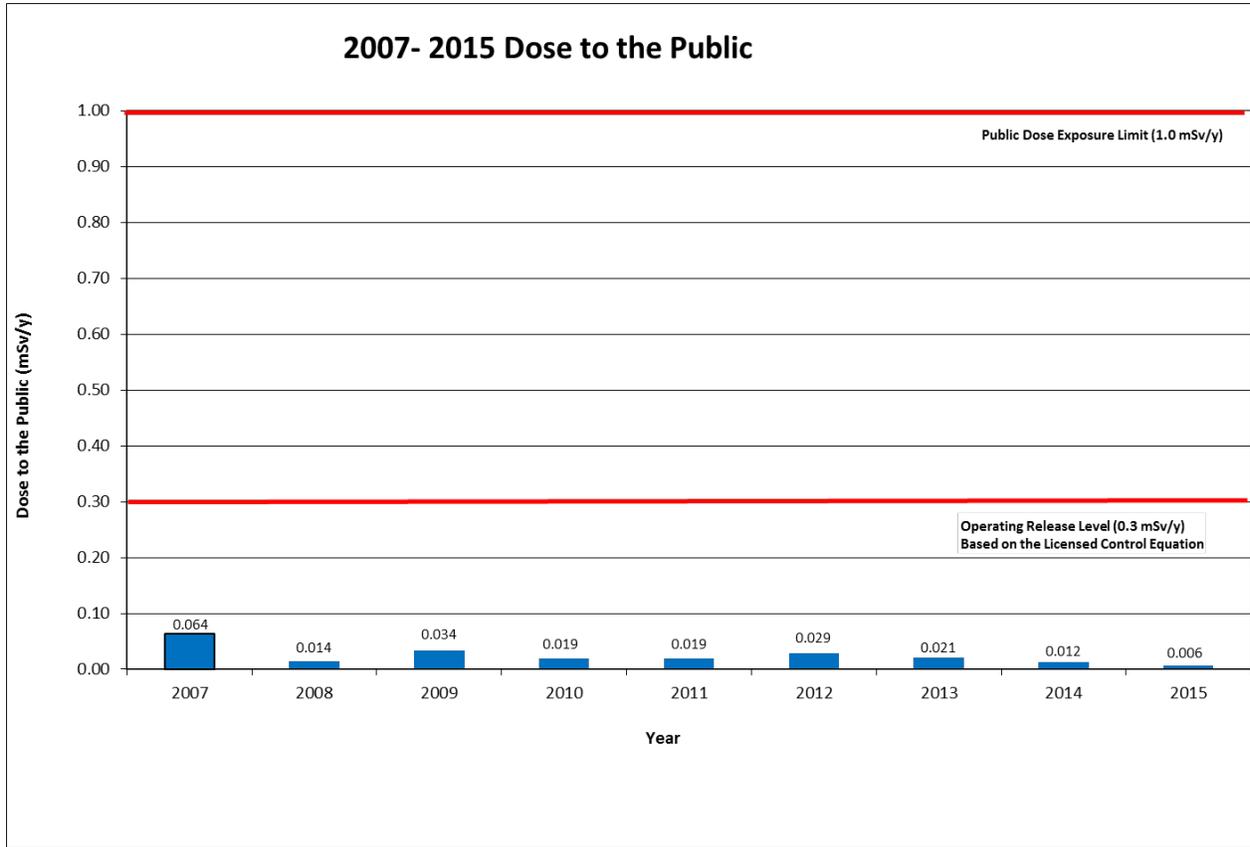
The PHCF maintains an acceptable EPP that meets the requirements of the ISO14001 standard, REGDOC 2.9.1 (2013) and Cameco's corporate requirements. During the current licence period, PHCF initiated a project to align its EPP with the applicable CSA N288 series standards, which provide guidance on the framework and methodology for establishing a standardized EPP that is protective of people and the environment. This includes the assessment of risk and the development of monitoring programs to address these risks and demonstrate regulatory compliance.

### *Estimated Dose to the Public*

Within the regulatory framework the radiation doses to the public are considered in the environmental protection SCA. The annual dose limit for a member of the public is 1.0 mSv. The annual dose to the public from PHCF operations is determined by the use of a critical receptor who, given their proximity to the facility and the theoretical length of time that could be spent at this location, would be expected to receive the highest possible radiation dose that any member of the public could receive. An operating release level (ORL) equation that has been developed to account for all public dose exposure pathways – gamma, air and water. The ORL equation is based on a total dose of 0.3 mSv/year to the critical receptor with the air and water components each being less than 0.05 mSv/year and gamma component being less than 0.3 mSv/year to ensure the dose to the public remains well below the annual regulatory dose limit for a member of the public of 1.0 mSv.

The annual dose to the critical receptor, located at gamma monitoring station 14 at the Centre Pier, for the 2007 through 2015 period is shown in Figure 4. The dose to the critical receptor used to estimate dose to the public from Cameco's operation is only a small percentage of the public dose limit of 1 mSv/year and the licensed limit of 0.3 mSv/year.

**Figure 4**



*Gamma Monitoring*

Fenceline gamma emissions are monitored continuously and reported monthly around the main facility (Site 1) as well as the Dorset Street warehouses (Site 2) to ensure that levels are maintained ALARA. The gamma emissions for both site 1 and site 2 are measured at key locations along the fenceline of each site using environmental dosimeters supplied by a licensed dosimeter service. This information is used to calculate the dose to the public. The gamma emissions from the facility are extremely low and have been well controlled over the past two licence periods.

### *Discharge to Air*

The PHCF collects and analyzes daily samples from the main stacks on the UF<sub>6</sub> and UO<sub>2</sub> operating plants. All other stacks are sampled on an occasional or as requested basis. In the current licence period, PHCF has focused emissions reduction activities on reducing uranium emissions through projects that are part of its air emissions management strategy. This has included installation of HEPA filters and the installation of a new tail gas Venturi scrubber in January 2014. The site received the Cameco Environmental Leadership Award (CELA) in 2015 for the tail gas scrubber project, which reduced the UF<sub>6</sub> main stack uranium emissions by more than 50%.

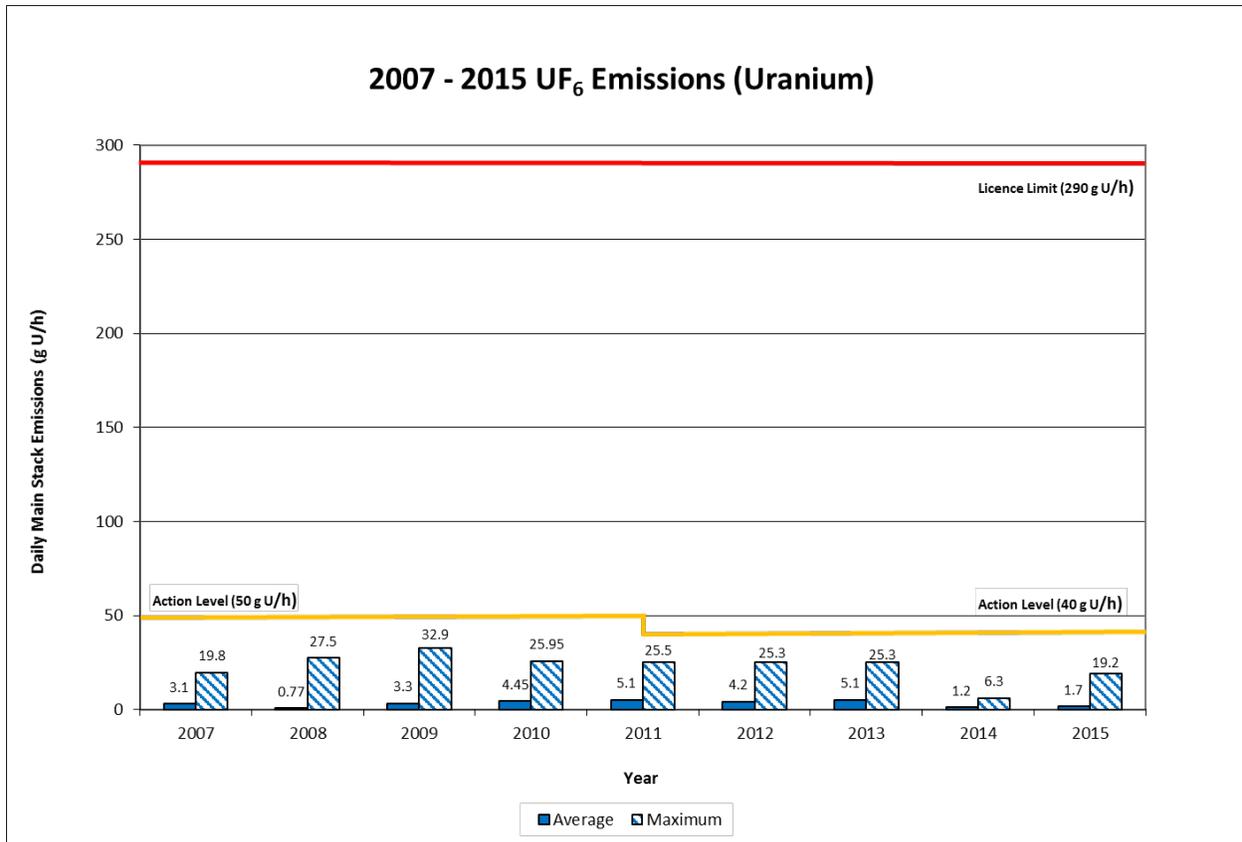
### Stack Monitoring Program

#### *Uranium*

The stack monitoring program is used to determine the airborne uranium emission rates on a daily basis from the main stacks of the UF<sub>6</sub> and UO<sub>2</sub> plants. The action level for the UF<sub>6</sub> plant main stack is 40 g U/h. The action level for the UO<sub>2</sub> plant main stack is 7 g U/h. Third party stack testing is completed at least every two years to ensure the accuracy of Cameco's monitoring system.

No action levels were exceeded for uranium emissions from the UF<sub>6</sub> plant main stack between 2007 and 2015. The action level was reduced in 2011. The annual average and maximum uranium emissions have typically remained low as shown in Figure 5.

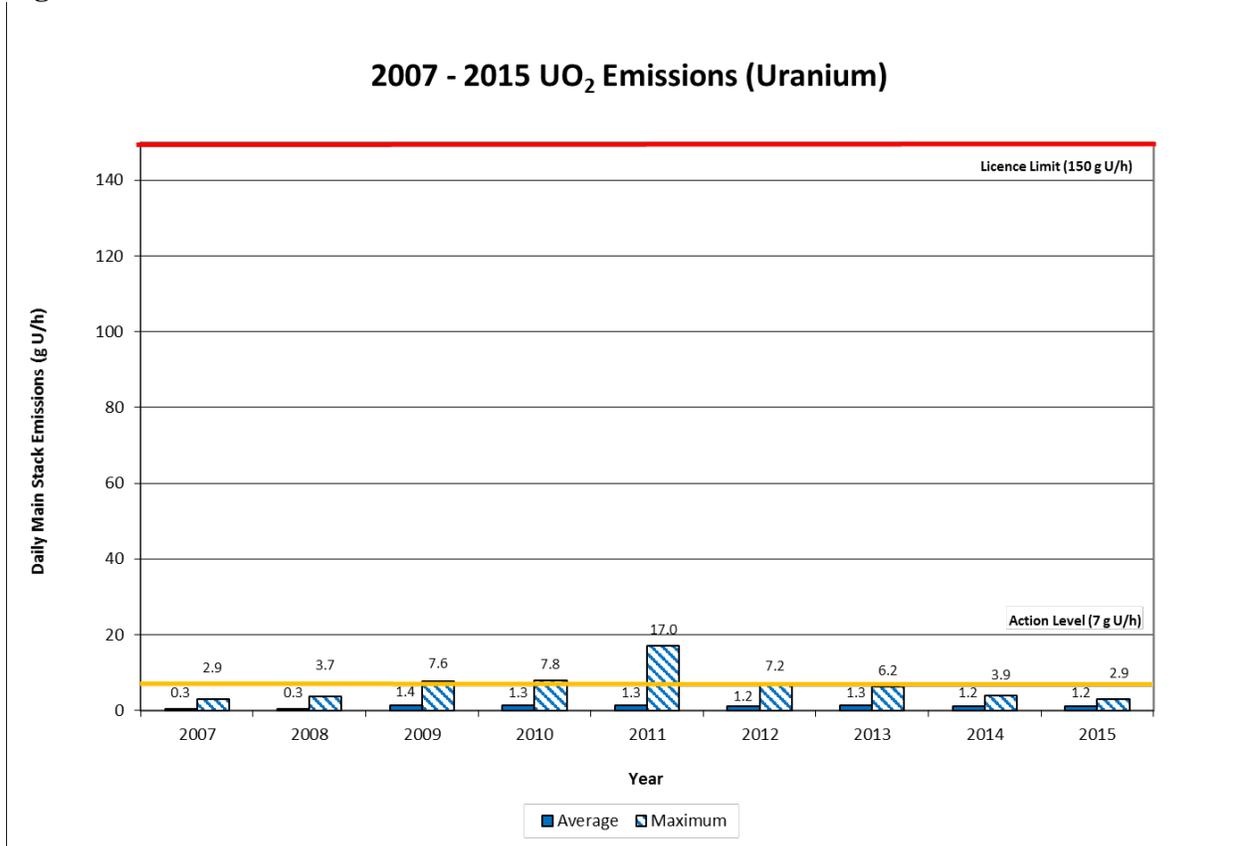
Figure 5



Between 2009 and 2012, the UO<sub>2</sub> plant main stack experienced four action level exceedences for uranium emissions. Through investigation into the 2009 and 2010 events, it was identified that improvements were required to the UO<sub>2</sub> plant main stack uranium emission monitoring system that included both equipment upgrades and sampling procedural improvements. This work was verified in December 2011. The two events in 2011 and 2012 were investigated and determined to be related to plant maintenance. Changes to start-up procedures were made to address these issues.

The annual average uranium emissions from the UO<sub>2</sub> plant main stack are typically low as shown in Figure 6.

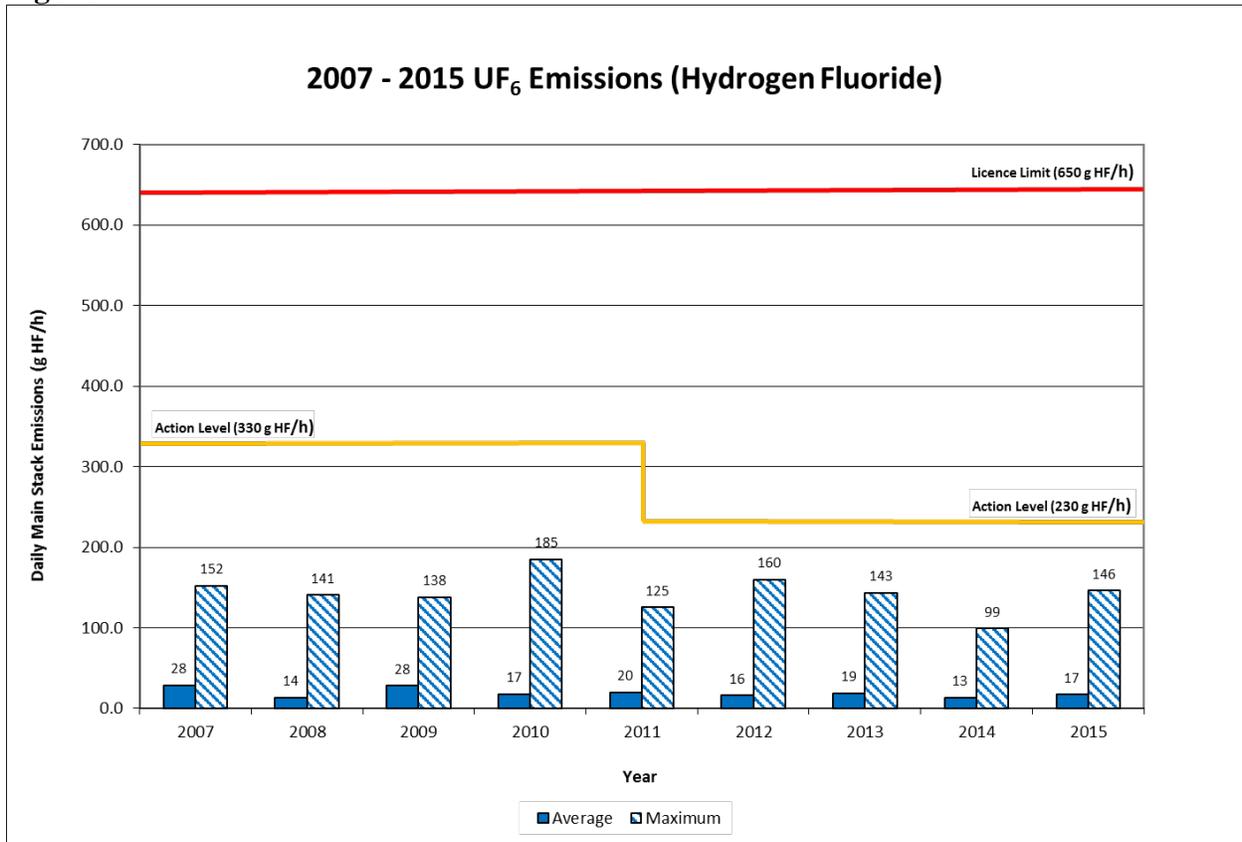
Figure 6



*Fluoride*

Fluoride emissions from the UF<sub>6</sub> main stack are sampled and analyzed on a continuous basis using an on-line analyzer and the data is collected on the plant computer system. No action levels were exceeded for fluorides (as HF) for the UF<sub>6</sub> plant main stack between 2007 and 2015. The action level was reduced in 2011. These emissions are shown in Figure 7.

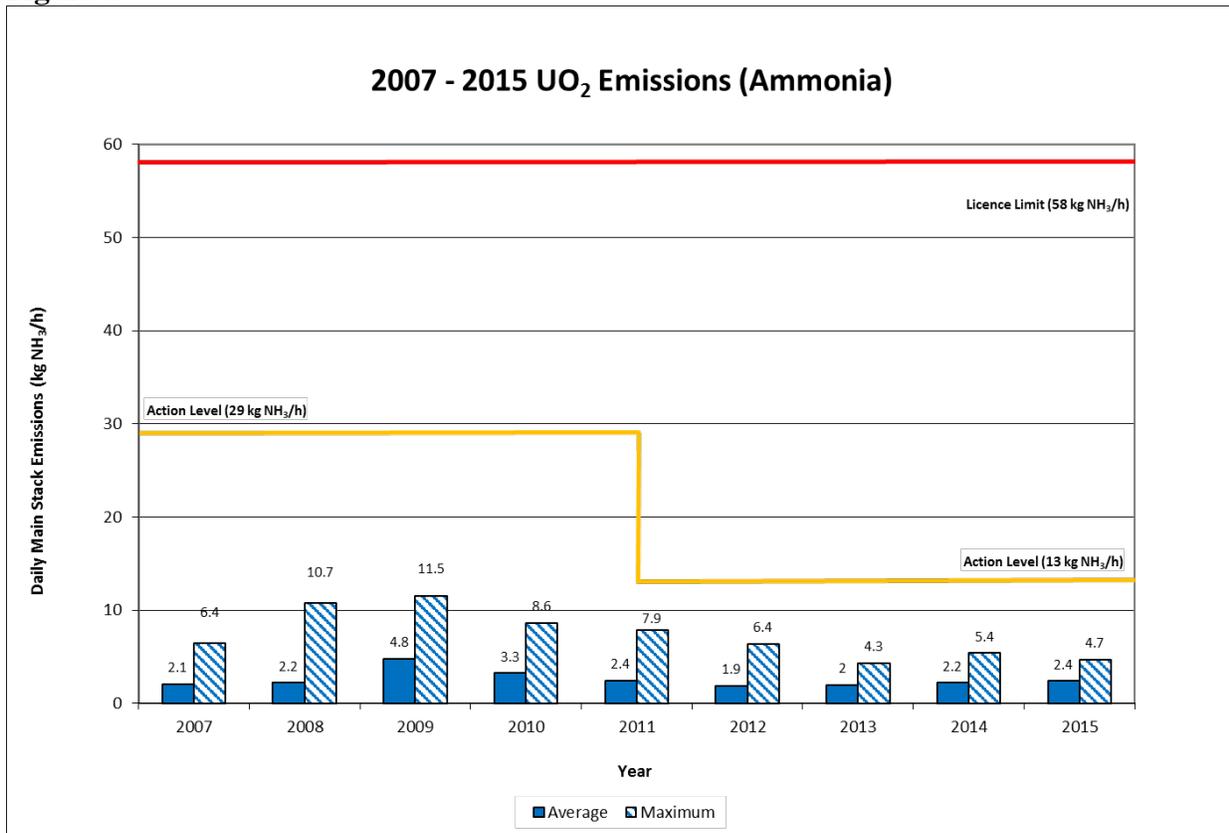
**Figure 7**



*Ammonia*

The UO<sub>2</sub> main stack is also continuously sampled for ammonia to determine the ammonia emission rate from the UO<sub>2</sub> plant main stack. No action levels were exceeded for ammonia for the UO<sub>2</sub> plant main stack in between 2007 and 2015. The action level was reduced in 2011. These emissions are shown in Figure 8.

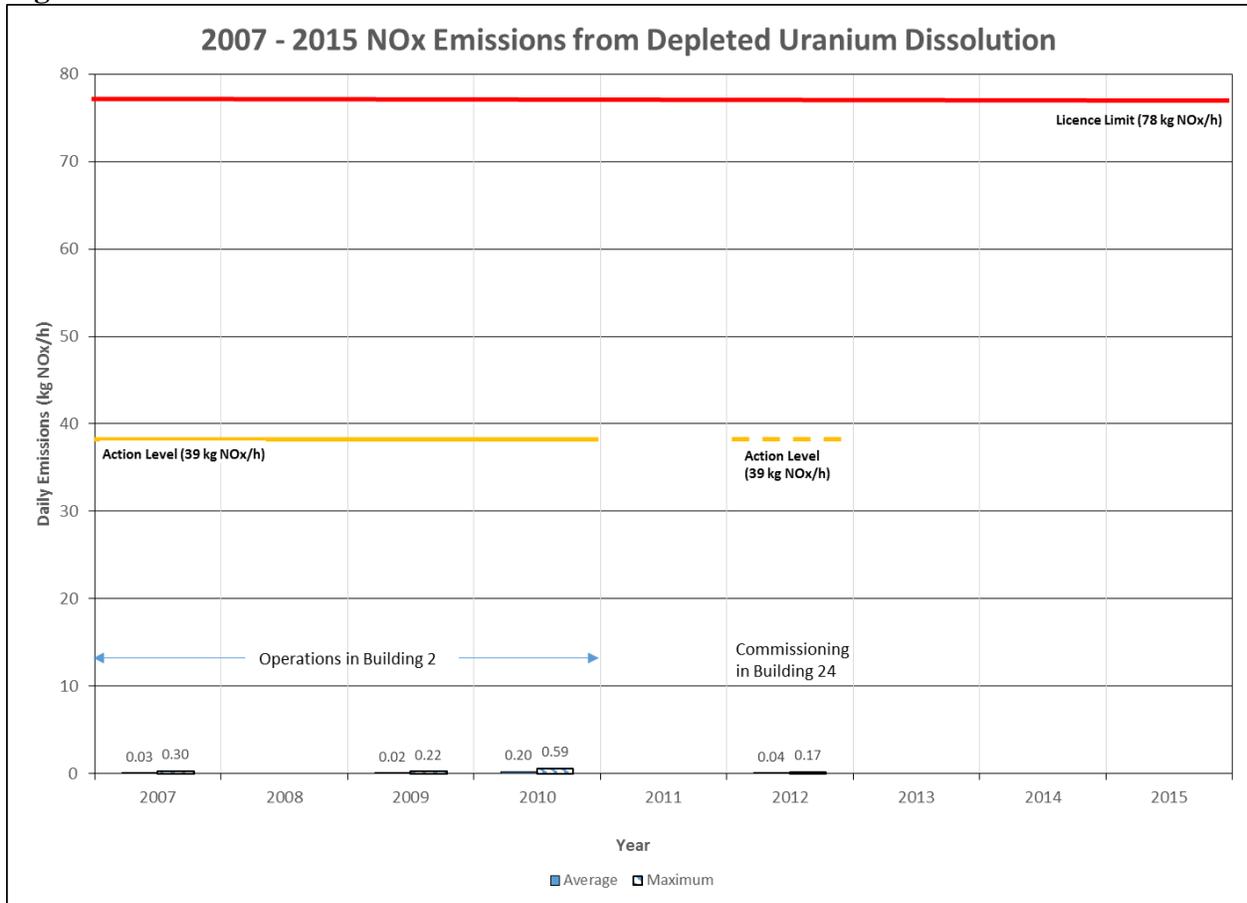
**Figure 8**



*NO<sub>x</sub>*

NO<sub>x</sub> emission reporting is a requirement during depleted uranium dissolution campaigns. Campaigns occurred in 2007, 2009 and 2010 in the circuit in Building 2 (North UO<sub>2</sub> Plant). The depleted uranium dissolution activities were relocated from Building 2 to Building 24 (UO<sub>2</sub> Plant) in 2012. No licensed limits were exceeded for NO<sub>x</sub> emissions (expressed as NO<sub>2</sub>) from the depleted uranium SCR stack during the 2012 commissioning campaign, which was the only campaign in the current location and during the current licence term. The monitoring results are shown in Figure 9. The action level for this parameter will be re-evaluated in the next licence period.

**Figure 9**



### *Ambient Air Monitoring*

In support of the stack sampling program, an ambient air program has been established to measure uranium and fluoride in air near the PHCF and within the community.

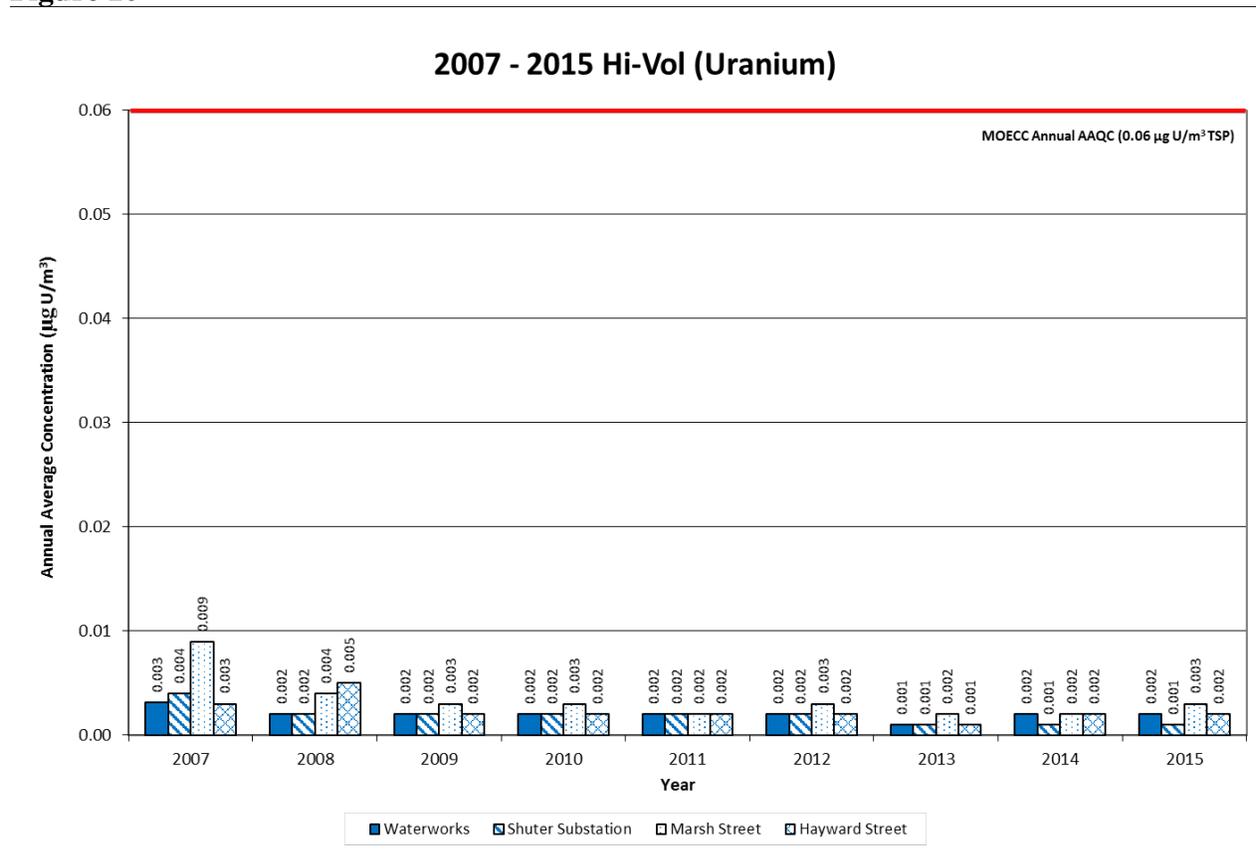
### *Uranium*

The Ministry of Environment and Climate Change (MOECC) annual average uranium point of impingement (POI) standard of 0.03 µg/m<sup>3</sup> (PM<sub>10</sub>) took effect July 1, 2016. This regulates emissions for uranium using a modelled approach in which all U air emission sources are estimated or measured to determine an emission rate. Together with stack and building information, terrain and weather data, the air dispersion model predicts a POI concentration. This predicted concentration is compared against MOECC POI standards. Facility emissions and predicted concentrations are summarized as a % of the standard and PHCF meets the new standard.

The high volume (hi-vol) air-sampling program monitors the concentration of total uranium suspended in the air at four locations near the facility.

The Ministry of Environment and Climate Change (MOECC) ambient air quality criteria (AAQC) for uranium in total suspended particulate (TSP) is an appropriate reference for performance of ambient air emissions. Annual hi-vol results are consistent at all locations between 2007 and 2015 and well below the AAQC as shown in Figure 10.

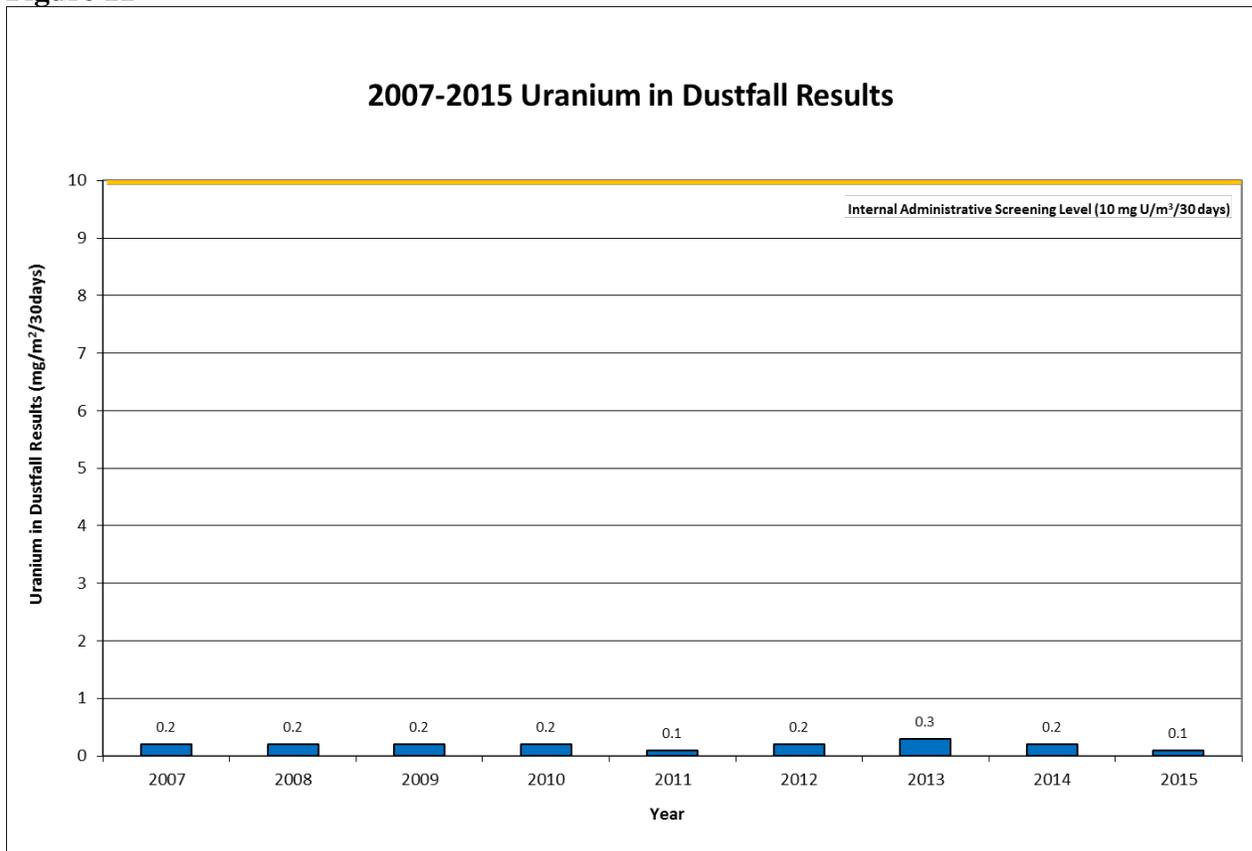
**Figure 10**



The deposition rate of uranium is measured using dustfall monitoring. This is conducted by collecting particulate matter in a container, termed a dustfall jar, over a one-month period, and analyzing it to determine the uranium collected over that period. There is no regulated standard for uranium content in dustfall. Dustfall uranium results observed from 2007 to 2015 are near method detection levels, indicating a very low rate of uranium deposition in the community.

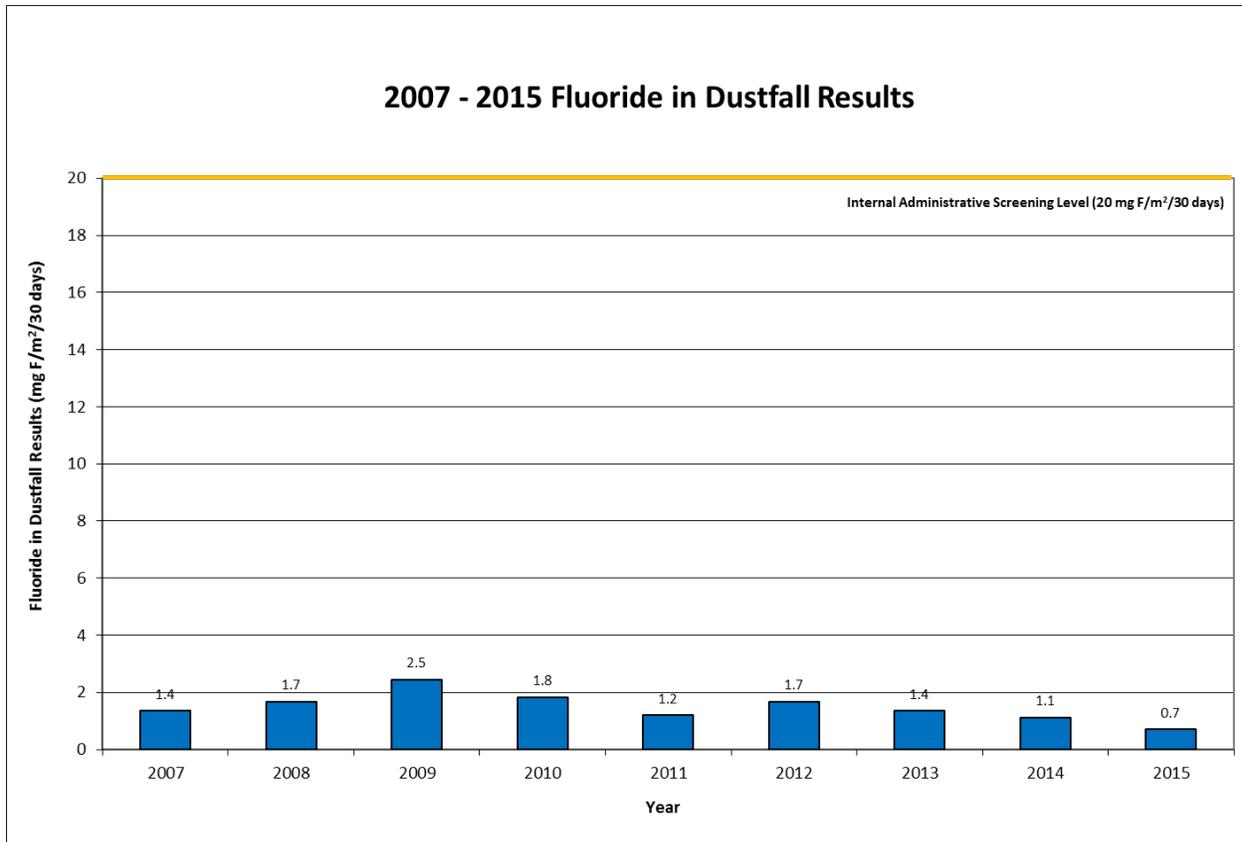
Figure 11 shows the average uranium content in dustfall results at and near the site from 2007 through 2015.

**Figure 11**



In addition to the uranium analysis discussed above, the fluoride content of the dustfall jars provides information on fluoride in air near the facility. There is no regulated standard for fluoride content in dustfall. The annual all-station average fluoride content in dustfall jars at and near the PHCF in 2007 through to 2015 is presented graphically in Figure 12. This demonstrates good control of fluoride emissions to the ambient environment.

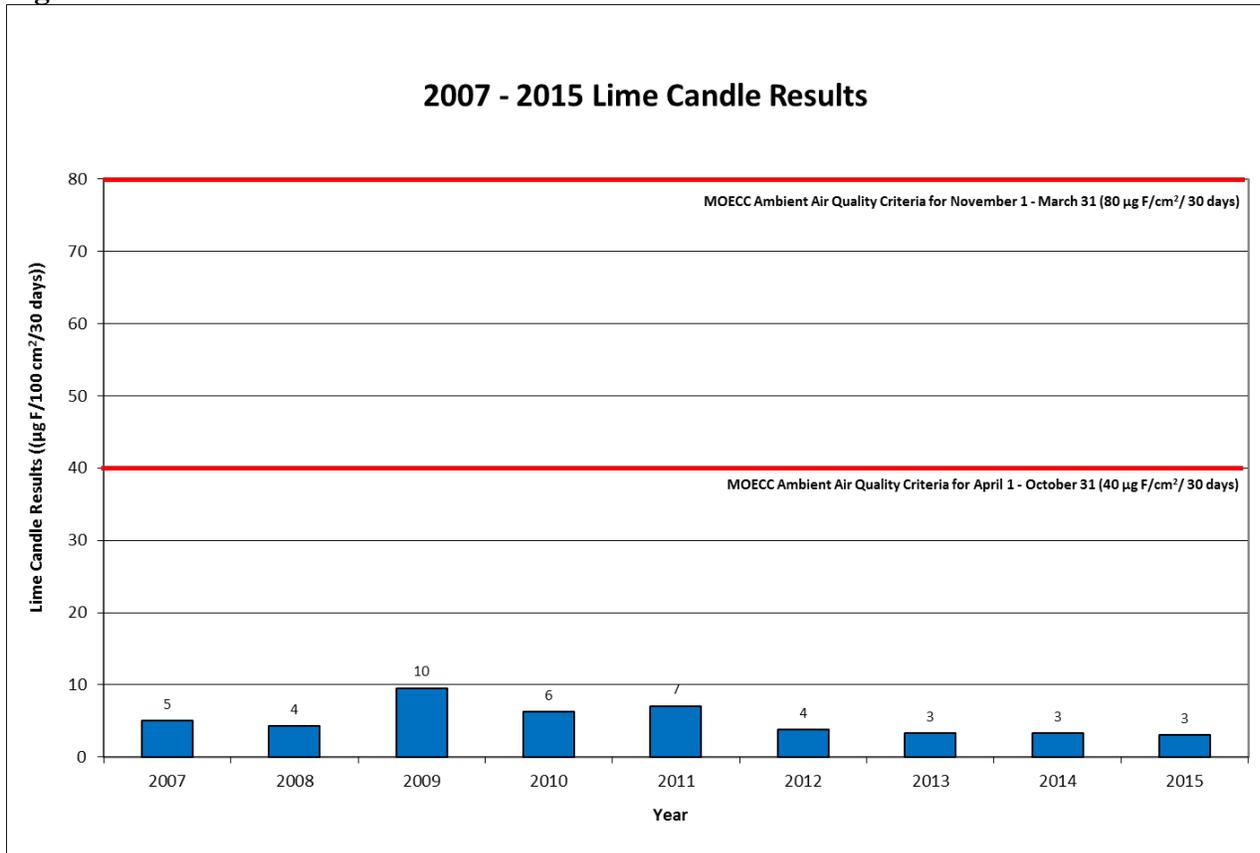
**Figure 12**



Fluorination rate is an indirect measurement of the gaseous fluoride concentration in the ambient air. Cameco uses an established lime candle methodology on weekly and monthly frequencies to measure the gaseous fluoride concentration in ambient air.

The results are compared to the MOECC Ambient Air Quality Criteria (AAQC) for fluoridation of 40 µg F/100 cm<sup>2</sup>/30 days from April 1 to October 31 and 80 µg F/100 cm<sup>2</sup>/30 days from November 1 to March 31. These criteria are based on the protection of foraging animals. The annual all-station average remained below the MOECC AAQC between 2007 and 2015 as shown in Figure 13.

**Figure 13**



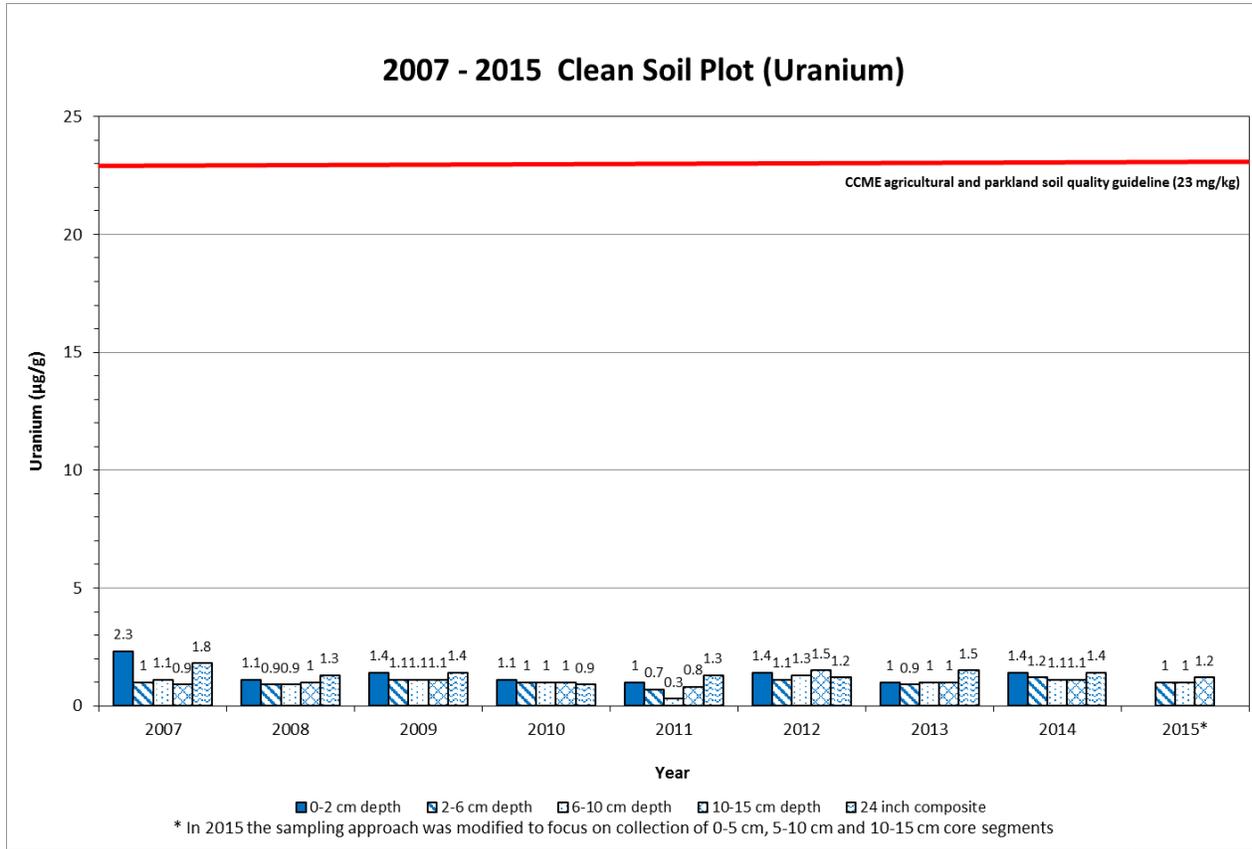
### *Soil Monitoring*

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

The 2007 through 2015 uranium in soil in a clean fill soil plot data is provided in Figure 14.

All individual sampling location values were below the Canadian Council of Ministers of the Environment (CCME) agricultural and residential/parkland land use soil quality guideline of 23 mg/kg (ppm). Moreover, all clean fill soil plot results were below the MOECC Table 1 full depth background site condition uranium standard of 2.5 µg/g (ppm) for residential/parkland/institutional/industrial/commercial/community land use.

Figure 14



### Vegetation Sampling

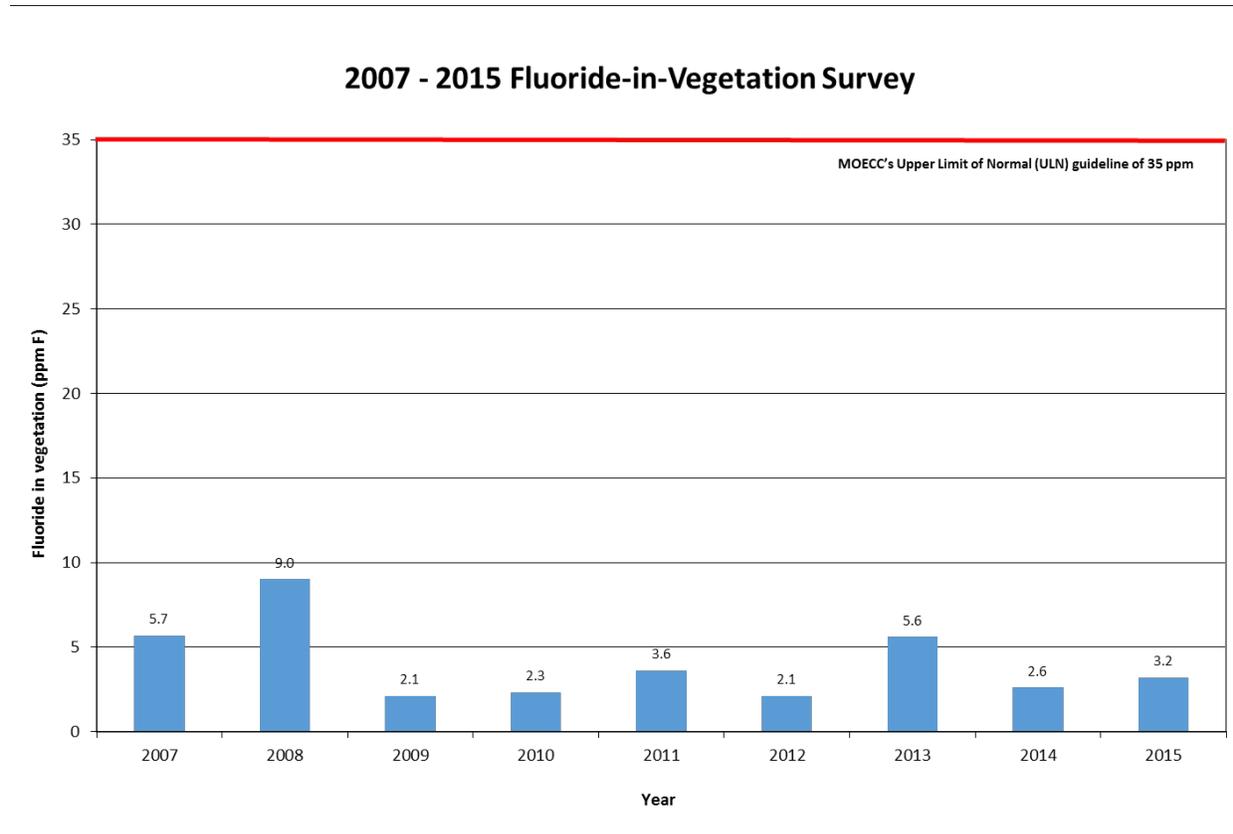
The focus of the vegetation monitoring program is foliar fluoride concentrations within the Municipality of Port Hope. Although the facility emissions control systems minimize the discharge of fluorides to the environment, the PHCF is an anthropogenic source of fluoride to the local environment.

Samples of fluoride-sensitive vegetation are collected in late-August or early September for fluoride analysis and assessed for visible foliar damage. The monitoring program is completed in conjunction with the MOECC and samples are obtained from locations adjacent to PHCF and throughout the surrounding community.

All fluoride results were well below the MOECC's Upper Limit of Normal (ULN) guideline of 35 ppm.

Figure 15 illustrates the mean vegetation survey results for 2007 through 2015.

Figure 15



*Discharge to Water*

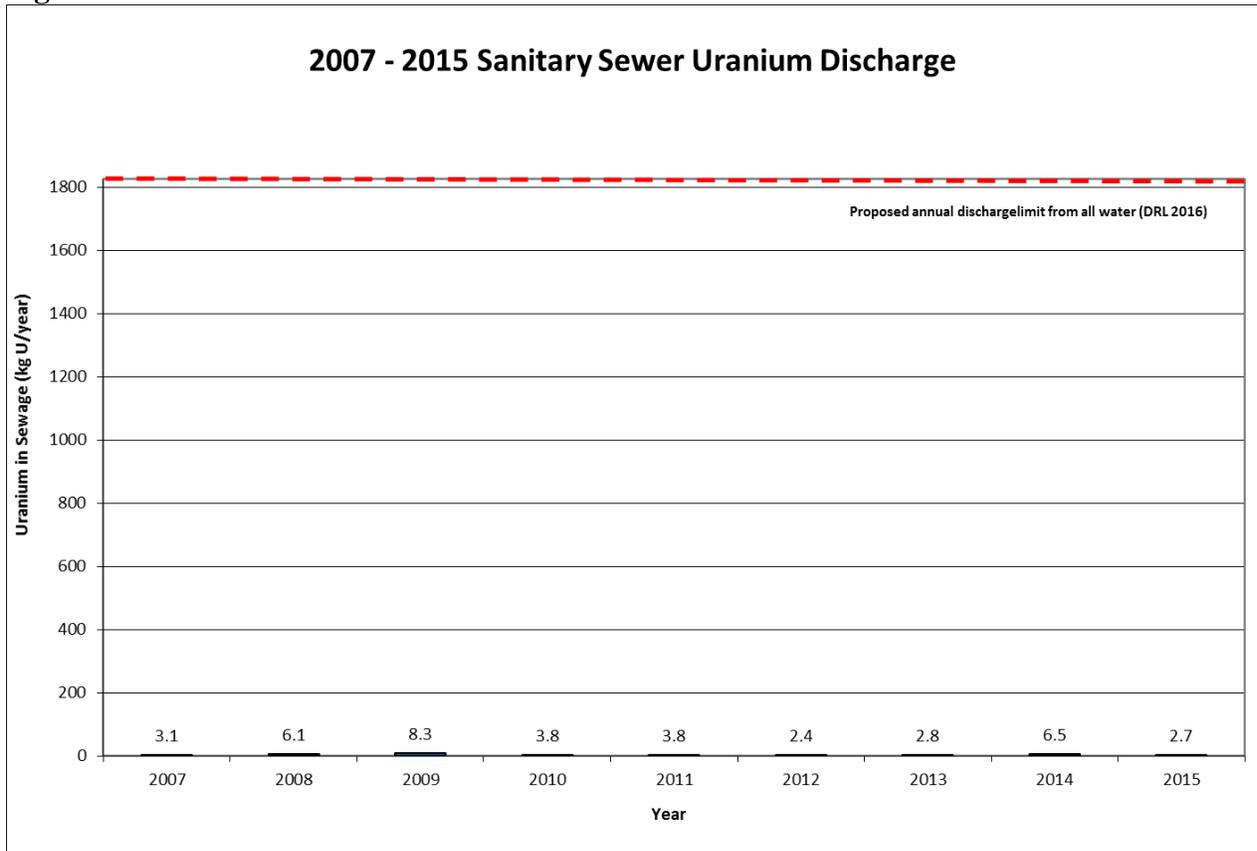
This section summarizes the PHCF liquid discharges and associated monitoring programs. Liquid discharge monitoring at the PHCF is divided into the following categories: Port Hope harbour water quality; liquid discharge monitoring; and sanitary sewage monitoring.

The PHCF uses a harbor water once-through cooling water system, supplemented with municipal potable water. The cooling water system takings, operations and discharges are regulated by MOECC via a Permit to Take Water (PTTW) and an Environmental Compliance Approval (ECA).

The municipal sewage treatment plant processes the sanitary sewer discharges from PHCF, included are standard domestic contributions from facility washrooms and showering facilities, as well as Powerhouse effluent (i.e. boiler blowdown), among other items.

The combined PHCF sanitary sewer return is sampled on a continuous basis using daily composite sampling. Figure 16 annual uranium loadings to the Municipality of Port Hope (MPH)'s sanitary sewer system. This discharge point has not previously had a release limit from the CNSC or MPH, however in the 2016 DRL report, based on the CSA N288.1 standard, Cameco has proposed a limit of 1825 kg U/year from all water (sanitary, groundwater and stormwater) discharges. Cameco will develop an action level for the sanitary discharge later in 2016.

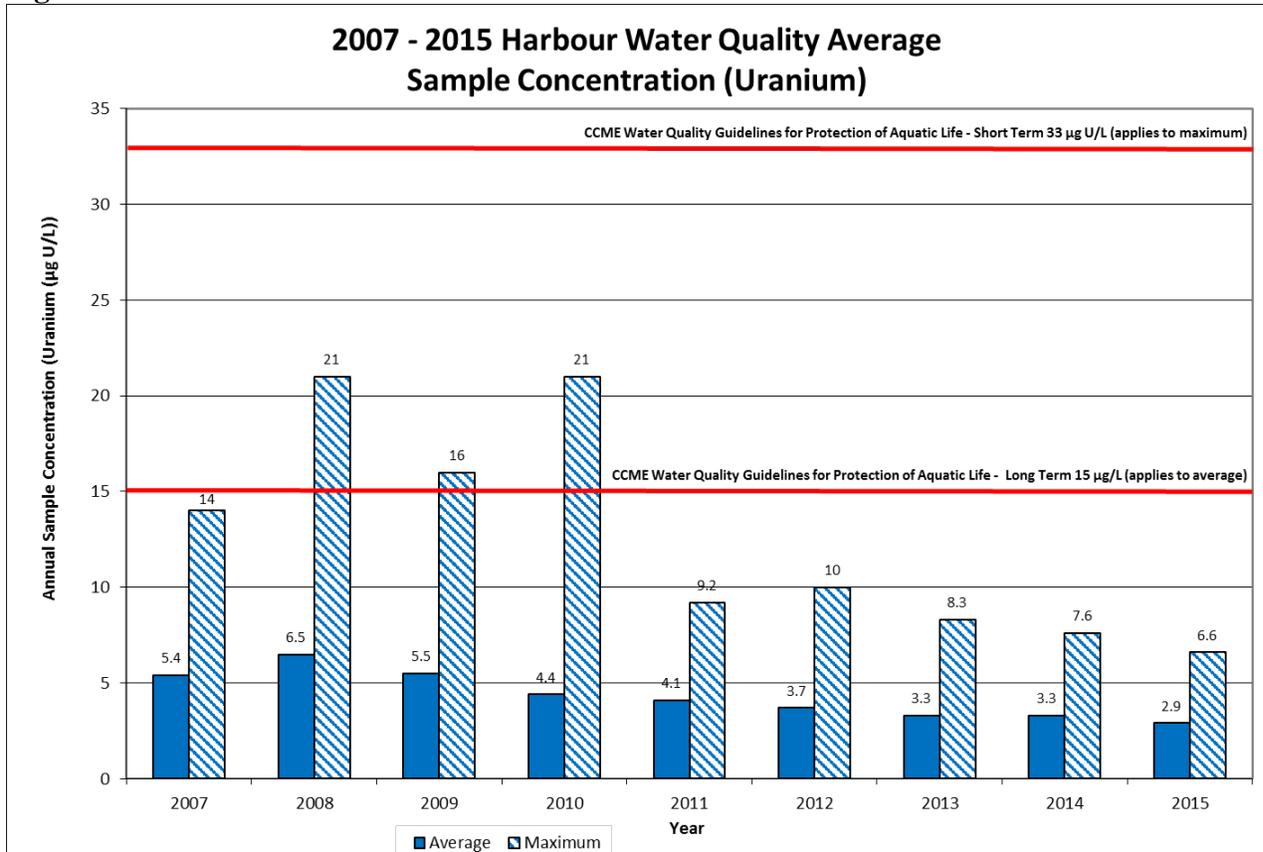
**Figure 16**



### Harbour Water Monitoring

Water quality in the Port Hope harbour is sampled on a continuous basis by collecting daily composite samples from the facility's south cooling water intake (SCI). The results of the harbour water quality for 2007 through 2015 are illustrated in Figure 17 which shows that uranium concentrations have generally decreased over the period.

**Figure 17**



### Storm Water Monitoring

A Storm Water Control Study (SWCS) was completed in 2011 following MOECC guidance. Following the SWCS, PHCF initiated stormwater system maintenance which has included CCTV inspections and flushing/cleaning of storm sewer network pipes, manholes and catch basins. In addition, numerous small scale projects have been completed to abandon inactive storm sewer outlets, as well as cross-connections and tie-ins to the storm sewer network that are not required, reducing the potential for the storm sewer to act as a conduit to the harbor.

A revised stormwater monitoring program was implemented in 2012 as a follow-up to the SWCS. The revised monitoring program for water quality is carried out on a semi-annual

schedule at select active storm sewer outlets discharging to the Port Hope harbour. The PHCF industrial sewage works Environmental Compliance Approval (ECA) regulates the once-through non-contact cooling water system operations, reflects a portion of the current facility storm sewer system operations and provides limited operational flexibility regarding modifications to the aforementioned sewage works. Further enhancements will be made to the system and the monitoring program in the next licence period as part of the VIM project. The industrial sewage works ECA will be amended to reflect the planned sewage works modifications and upgrades.

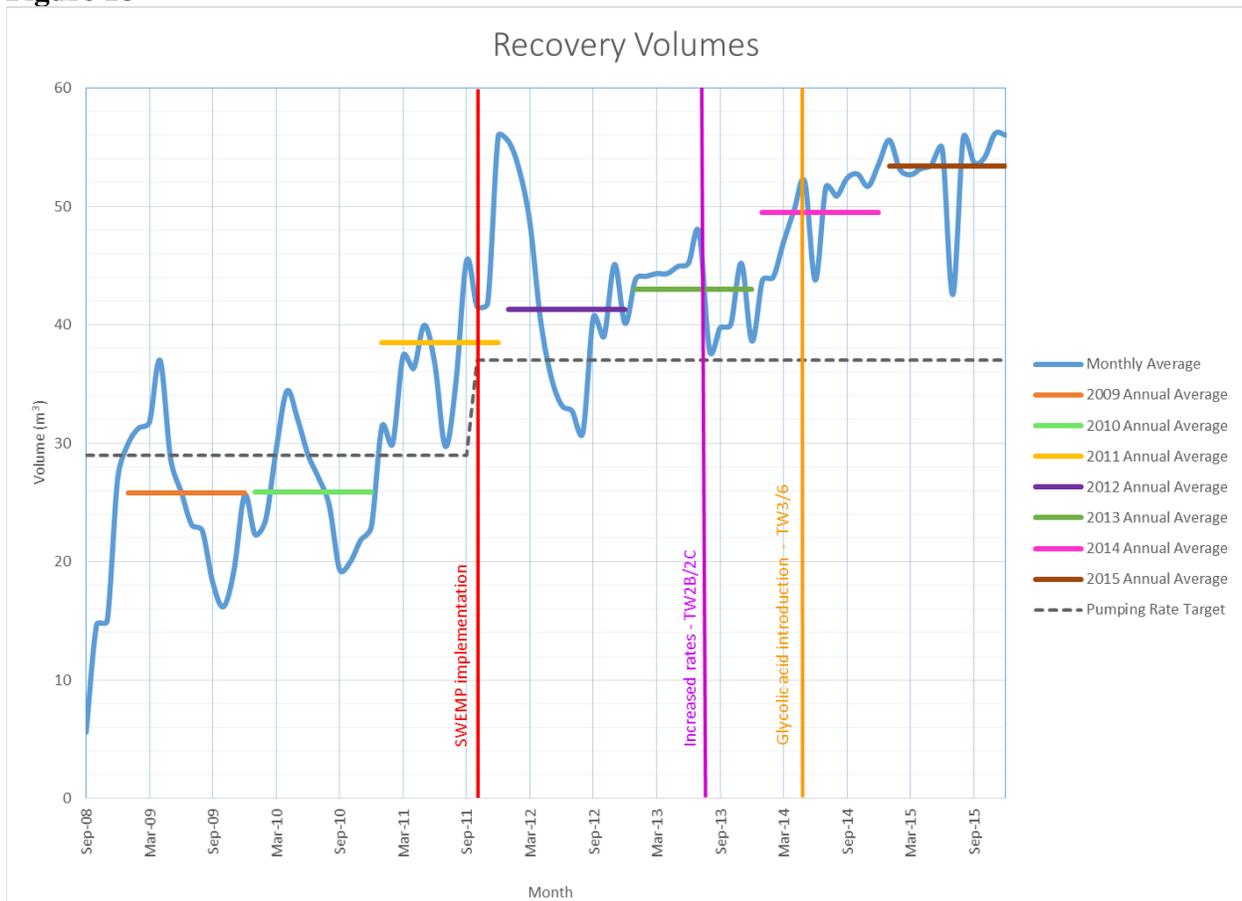
#### *Groundwater Collection and Monitoring*

The PHCF long-term groundwater monitoring program covers five key areas of the site: the refinery wells; the east plume associated with the UF<sub>6</sub> plant; the south plume associated with the UF<sub>6</sub> plant; the former UF<sub>6</sub> plant area; and the UO<sub>2</sub> plant area. Monitoring includes groundwater level monitoring and groundwater sampling under three separate schedules: monthly sampling of the operating treatment wells; quarterly sampling of overburden wells covering five key areas of the site; and annual sampling of bedrock wells.

At present, 12 groundwater collection (pumping) wells are in operation under baseline conditions. Pump-and-treat system recovery targets are validated and/or updated as part of the annual third party groundwater and surface water review reporting.

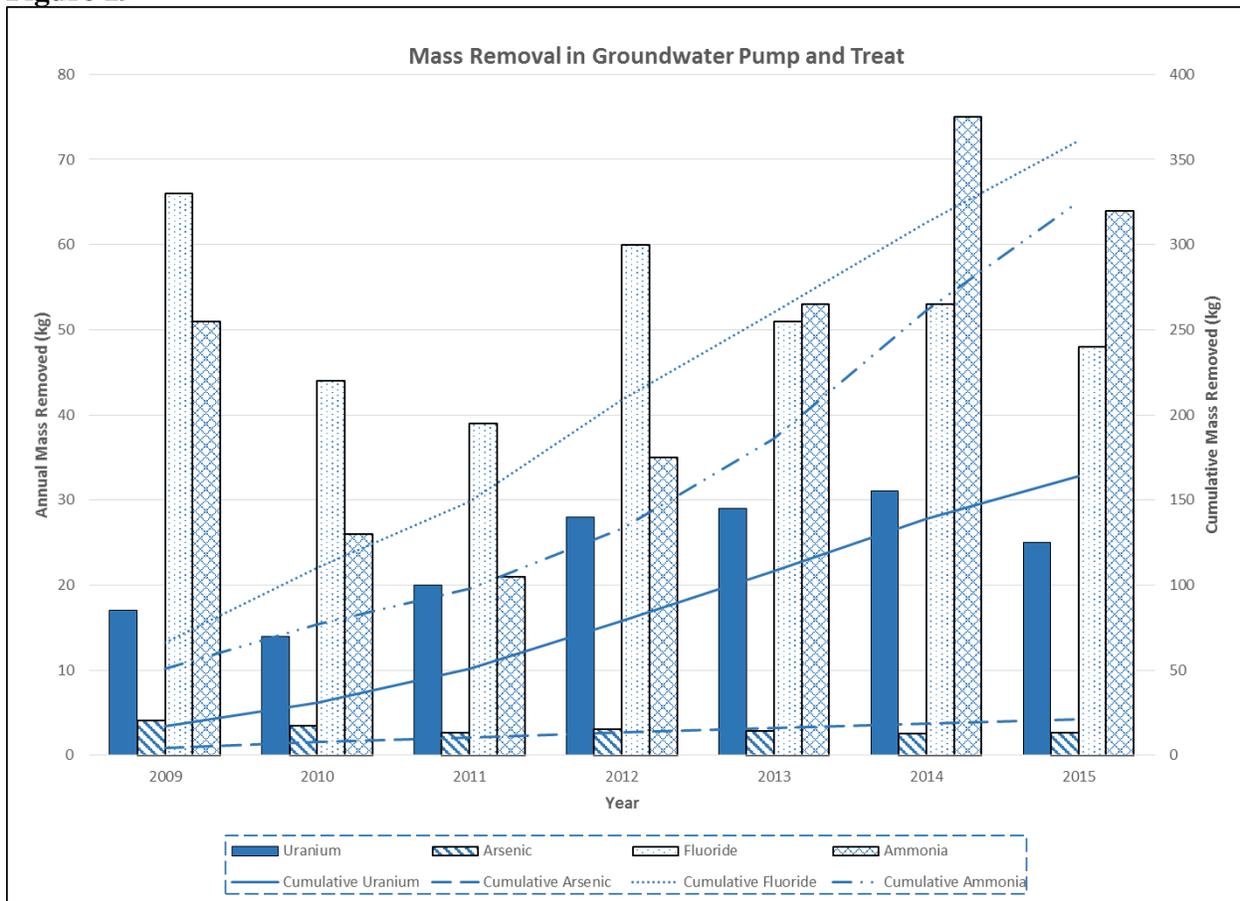
Mean pumping well recovery rates have significantly and steadily increased from 2009, the first full year of system operations. The 2015 mean recovery rate was approximately 53.4 m<sup>3</sup>/day, a 107% increase from 2009. Improvements in recovery volumes have resulted from continual improvements to the well maintenance program, targeted increases in recovery rates at the UO<sub>2</sub> plant, improved reliability of wastewater treatment plant operations, and a 2011 pumping well expansion. Figure 18 illustrates the average monthly and annual total system recovery volumes observed since 2008 with reference to the current target cumulative pumping rate.

Figure 18



Estimated mass removals of primary contaminants of potential concern (COPC) since operations began are summarized in Figure 19. This demonstrates that since its installation, the pump-and-treat system operations has had a positive environmental impact in terms of COPC mass that is no longer being discharged to the harbour. Annual reviews of groundwater and surface water data are submitted to CNSC and MOECC monitor the zone of groundwater control, the removal of source material from the subsurface, movement of COPC mass into the zone of groundwater capture and impact on the Port Hope harbour.

**Figure 19**



In 2007, following the identification of uranium and other process materials in the subsurface beneath the UF<sub>6</sub> plant, PHCF was rated at below expectations in the Environmental Protection SCA by CNSC staff. Since the implementation of the corrective actions for that event in 2008 and each year until 2015, CNSC staff have rated PHCF as satisfactory in this SCA.

In 2016, CNSC staff accepted PHCF's Environmental Risk Assessment (ERA) that was completed to meet the requirements of CSA standard N288.6-12 Environmental risk assessments at class I nuclear facilities and uranium mines and mills. The ERA did not identify any areas of significant risk to people or the environment and the recommendations will be incorporated into future work.

Also in 2016, CNSC staff accepted PHCF's Derived Release Limit (DRL) report that was completed to meet the requirements of CSA standard N288.1-14 Guidelines for calculating derived release limits for radioactive material in airborne and liquid effluents for normal operation of nuclear facilities. The conceptual model for the DRL and ORL

for water releases has been improved in the 2016 study. The previous DRL/ORL included a process effluent discharge to the Port Hope harbour, which has since ceased, and did not include a discharge to the municipal sewer system, which should be included. In addition to these changes, the current ORL incorporates a dose contribution from stormwater and groundwater discharges from the facility. This ensures that all potential exposure pathways for the public have been assessed. The water ORL's are also set at the ALARA level of 0.05 mSv/y.

### Forward Outlook

The PHCF has a well-established and mature Environmental Protection Program. However, to align better with the CNSC Regulatory framework, Cameco has committed to update its environmental program documents to meet the requirements of CSA standard N288.4-10, Environmental Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills and CSA standard N288.5-11, Effluent Monitoring Programs at Class I Nuclear Facilities and Uranium Mines and Mills. This will be completed by the end of 2017 as described in the LCH.

Over the proposed licensing period, Cameco will update the following documents which form the basis for the Environmental Protection Program twice (every five years):

- Environmental Risk Assessment (N288.6)
- Derived Release Limit (N288.1)

Each update will incorporate where applicable, recommendations from CNSC staff, industry practice, scientific literature, operating experience and/or regulatory documents and standards to enhance the robustness of the analysis. Recommendations from these assessments may drive additional changes to the Environmental Protection Program.

Early in the next licensing period, the PHCF plans to undertake the following work to further enhance its environmental protection program:

- Inclusion of EA follow-up reporting for the VIM project into routine compliance reports (2017)
- Systematic review of the scientific rationale for the non-uranium stack emission limits (completed in 2018-2019)

For the following REGDOC and CSA standards, Cameco will agree to a divisional implementation date and request that these be incorporated into the LCH for tracking of the commitments.

- Review of the groundwater program against N288.7-15 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills

- Evaluation of action levels for all monitored parameters as per N288.8 Guidelines for establishing and implementing environmental action levels to control emissions from nuclear facilities
- Update to meet changes to REGDOC 2.9.1 following its revision

As described in the VIM Supplemental Submission, physical upgrades to the PHCF during the next licensing period are expected to have benefits to the environmental protection program. These upgrades include physical works on the stormwater system, the addition of groundwater collection wells at the south end of the facility, source removal of subsurface contamination at the north end of the facility, a reduction in the footprint of the facility around the harbour, and landscaping to improve flood protection at the facility.

#### **2.3.4 Emergency Management and Response**

This SCA covers emergency plans and emergency preparedness programs. These procedures must exist for emergencies and for non-routine conditions. This also includes the fire protection program and any results of emergency exercise participation.

##### Operational Performance

Emergency planning for nuclear facilities is a requirement of the NSCA, the *Class 1 Nuclear Facilities Regulations* and the operating licence. In addition to the CNSC licensing requirements, Environment and Climate Change Canada and the MOECC have requirements related to emergency planning and spill prevention. The federal *Environmental Emergency Regulations* identify specific chemicals and quantity levels that require the facility to develop release scenarios and conduct drills at prescribed frequencies as part of an Environmental Emergencies Plan (E2 Plan). Ontario Regulation 224/07 *Spill Prevention and Contingency Plans* requires the site to maintain a site-specific Spill Prevention and Contingency Plan (SPCP) as a resource for preventing, detecting and responding to spills.

The site has well-established measures to prevent or mitigate the effects of accidental releases of nuclear and other hazardous substances. The measures and response actions are documented in the current versions of the site Emergency Response Plan (ERP), Fire Protection Program (FPP) and Fire Safety Plan (FSP) and referenced procedures. The E2 Plan and SPCP support the site ERP. These plans outline the actions to be taken in order to minimize the worker and public health hazards and environmental hazards, which may result from fires, explosions, or the release of hazardous materials. Interaction with off-site authorities is also addressed in the plans.

Emergency preparedness and response training is provided on an ongoing basis to ensure that responders have the knowledge and skills necessary to provide for an effective emergency response. The facility maintains personnel onsite to allow for an entry team,

and a rapid intervention team to respond to incidents at the facility 24-hours a day when the facility is operating.

Each year, PHCF conducts a number of internal drills and training exercises to test the effectiveness of the site and the emergency response organization. The following is a general list of the types of internal drills and activities in which the emergency response organization participated in between 2007 and 2015:

- Full simulations with uranium materials such as UF<sub>6</sub>
- Hazardous and/or radioactive materials response drills and full simulations, to include anhydrous hydrogen fluoride, nitric acid, ammonia, uranium hexafluoride, other uranium compounds and hydrogen fire response;
- Fire alarm response drills;
- Medical assistance drills;
- Building evacuation drills;
- ERT recall drills; and
- Joint exercises with the Municipality of Port Hope.

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

Between 2007 and 2015, CNSC staff have assessed the Emergency Management and Fire Protection SCA in the Annual Performance of Uranium Fuel Cycle and Processing Facilities Report as meeting all regulatory requirements and expectations every year.

#### Forward Outlook

It is expected that PHCF will continue to meet or exceed regulatory requirements and expectations in this SCA over the next licence period. The requirements of CSA standard N393-13 Fire protection for facilities that process, handle or store nuclear substances and REGDOC 2.10.1 Nuclear Emergency Preparedness and Response will be fully incorporated into the ERP, FSP, FPP and lower tier documents by the end of 2017, as described in the licence renewal application.

### **2.3.5 Waste Management**

This safety and control area covers internal waste and by-product-related programs which form part of the facility's operations, up to the point where the waste is removed from the

facility to a separate waste and/or by-product management facility. This SCA also covers the ongoing decontamination projects and planning for decommissioning activities.

### Operational Performance

#### *Waste Management*

Ongoing wastes are those generated at the facility as a result of activities authorized by the licence. Some of these wastes are infrequently generated such as waste associated with a depleted uranium dioxide production campaign.

Solid wastes contaminated by uranium are reprocessed, recycled and re-used to the extent possible. Waste materials that cannot be reprocessed, recycled or re-used are safely stored on site until appropriate disposal options are available. Between 2007 and 2015, PHCF safely managed ongoing waste streams as described in the waste management plan through:

- Placement in a local landfill
- Recovery at a recycling facility
- Fluoride product processing for uranium recovery at a licensed facility
- Ammonium nitrate to a local fertilizer company
- Combustible materials to the BRR incinerator
- Metal decontamination to free-release and recovery at a scrap metal facility
- Disposal of contaminated materials at appropriately licensed hazardous waste facilities
- Storage of materials not meeting the above streams

During the current licensing period, disposal or recycling pathways have been identified for all wastes currently being generated and Cameco does not anticipate any significant accumulation of ongoing wastes beyond 2018.

Legacy wastes are those designated as legacy waste, historic waste or Cameco Decommissioning Waste in the waste management plan and include:

- materials arising from the decommissioning of Cameco owned and/or operated processing facilities utilized by Eldorado Nuclear Ltd (Eldorado) prior to 1988 in the Town of Port Hope and eligible for placement in the LTWMF
- stored wastes that were generated prior to 1988 and are eligible for placement in the Port Hope long term waste management facility (LTWMF); and
- the wastes that were previously generated and/or managed at PHCF that are not expected to be generated under the current operating licence.

Legacy wastes have inherent additional requirements compared to ongoing wastes due to volumes (both high and low), limited waste characterization, mixture of hazardous and radioactive waste types, and unusual materials with no commercial waste outlet/repository. Disposal of these materials must be managed as discrete projects in order to ensure that they are characterized, shipped/processed and managed at facilities that are permitted/licensed and technically capable of dealing with the wastes. Between 2007 and 2016, PHCF managed projects for the characterization and/or disposal of materials such as PCBs, contaminated soil and concrete, the historic carbon anode inventory, and depleted metal and sludges. During the last licensing period, the FSD has developed a divisional waste management strategy that aims to divest PHCF, BRR and CFM of legacy waste within the next five years, assuming availability of the LTWMF on current schedule.

#### *Decontamination Projects – Clean-Up Program*

The Clean-Up Program (CUP) is in place to remove obsolete buildings, equipment and materials for the purpose of reducing environmental obligations, creating useable space and improving the appearance of the PHCF under the waste management plan. CUP activities can be generally broken down into routine operations and projects in the following areas:

- Decontamination
- Scrap Metal Processing
- Waste Management
- Dismantling/Demolition of equipment or buildings
- Rehabilitation/Repurposing of areas or buildings

The VIM project will be carried out under the requirements of the CUP. In preparation for this, during the current licence period, more formalized work planning for larger CUP projects was developed to include a general scope of work that defines the project, the end-state for the project, supplemental monitoring requirements (personal, radiation and environment) and the expected timeframe during which the work will be completed. Hazards for this work are managed through existing site monitoring and control processes for health, safety, radiation protection, fire protection, environment, and quality, or may require additional project-specific monitoring and controls.

Between 2007 and 2015, CUP has safely carried out numerous small and large projects to remove redundant equipment and clean-up under-utilized buildings. In 2014 and 2015, large-scale SuperCUP campaigns were carried out, during which additional employees were temporarily transferred to CUP, where they were trained and qualified to remove redundant equipment and clean-up in several buildings at the PHCF.

In late 2015 and early 2016, Cameco safely demolished the above-grade portions of Buildings 42 and 43A on the Centre Pier. A third building, Building 41, may be demolished as early as 2017, all other buildings on the Centre Pier are used for storage of legacy waste, and will remain in place until those materials are transferred to the Port Hope LTWMF. The work will improve the management of radiation, safety and environmental risks associated with the structures. In addition, these projects, along with the SuperCUP Projects have allowed the development and testing of planning, execution and monitoring strategies that will be used during the VIM project.

#### *Decommissioning Planning*

Cameco maintains a Preliminary Decommissioning Plan (PDP) and financial guarantee for the PHCF as required by the Licence and LCH. The PDP is reviewed and revised as appropriate every five years in accordance with the CSA Standard N294-09 Decommissioning of Facilities Containing Nuclear Substances, G-219: Decommissioning Planning Guide for Licensed Activities (June 2000) and G-206: Financial Guarantees Guide for the Decommissioning of Licensed Activities (June 2000). The PDP was updated in 2010 and 2015, with CNSC staff acceptance in 2016. Once the value of the financial guarantee has been approved by the Commission, Cameco will secure irrevocable letter(s) of credit to cover the full amount required by the updated PDP. At least two updates to the PDP will occur in the proposed licence period, with the next update to the PDP scheduled in 2020.

Between 2007 and 2015, CNSC staff have assessed the Waste Management SCA in the Annual Performance of Uranium Fuel Cycle and Processing Facilities Report as meeting all regulatory requirements and expectations every year.

#### Forward Outlook

Looking ahead to the next licensing period, the FSD has an aggressive plan to divest these legacy waste materials to an appropriate recycle or licensed hazardous waste management facility within the next five years, assuming the LTWMF is available according to the current schedule. As the legacy waste aspect of the plan is implemented, focus will turn to divisional efficiencies in managing waste where possible.

The Vision in Motion (VIM) project provides Cameco with an opportunity to deliver an allowance of qualifying waste materials to the Port Hope LTWMF and to remediate and redevelop the PHCF. The VIM project meets the criteria of a large CUP project and is expected to be implemented during the proposed licence period in conjunction with the PHAI Port Hope project being implemented by Canadian Nuclear Laboratories (CNL).

The VIM project is responsible for the preparation and transport of the wastes destined for the Port Hope LTWMF, including stored wastes, building materials, contaminated soils and other decommissioning waste. Additional information regarding the VIM activities planned for the next licence period are described in the VIM supplemental submission from January 2016. Cameco and CNL personnel have established working groups for various aspects of both projects that require coordination between the organizations. These working groups include management oversight, legal agreements, technical/engineering planning (remediation, demolition), regulatory requirements coordination (licensing, safeguards), technical support (environment, radiation protection, waste management), and communications. Individual working groups report on their progress to the senior management team at least quarterly at the oversight meeting.

As part of the ongoing improvements to the regulatory framework, in the next licence period, PHCF will implement the relevant aspects of N292.3-14 Management of Low- and Intermediate-Level Radioactive Waste and N292.0-14 General Principles for the Management of Radioactive Waste and Irradiated Fuel. This commitment and implementation will be managed through the LCH. Given the robust processes in place at the PHCF, the divisional focus on waste management for the next five years and the implementation of the VIM project in the upcoming licence period, it is expected that this SCA will continue to meet or exceed regulatory requirements and expectations during the next licensing period.

### 2.3.6 Nuclear Security

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

#### Operational Performance

PHCF maintains a comprehensive Facility Security Plan (Security Plan) which meets the requirements of the *General Nuclear Safety and Control Regulations*, the *Nuclear Security Regulations* and other CNSC requirements.

The Security Plan provides the basis for security operations at the facility and identifies the systems and processes in place to meet security program objectives; accordingly, this document is considered prescribed information and is subject to the requirements of the *General Nuclear Safety and Control Regulations*. PHCF ensures that security operations and procedures are reviewed (and revised as needed) in order to maintain compliance with *General Nuclear Safety and Control Regulations*, the *Nuclear Security Regulations* and other CNSC requirements.

Between 2007 and 2015, CNSC Staff have rated PHCF as satisfactory in the Security SCA every year.

#### Forward Outlook

Cameco will continue to maintain and enhance if necessary, its Security Plan during the upcoming licence period.

### **2.3.7 Safeguards and Non-proliferation**

This safety and control area covers the programs required for the successful implementation of the obligations arising from the Canada/International Atomic Energy Agency (IAEA) safeguards agreements, as well as all other measures arising from the *Treaty on Non-Proliferation of Nuclear Weapons*.

#### Operational Performance

The PHCF complies with the IAEA Document SG-SGOB-3105, Integrated Safeguards Procedure for conversion and fuel fabrication.

The facility maintains a natural uranium inventory system in which receipts and shipments are recorded as per the requirements of RD-336 Accounting and Reporting of Nuclear Material. Periodic audits of the inventory system are conducted by the IAEA, the CNSC and by Cameco internal auditors. During the period 2007-2015, a total of 13 Short Notice Random Inspections, six Physical Inventory Verifications, 16 International Shipment Inspections and six other inspections were carried out by the IAEA and CNSC as part of safeguards activities.

Over the preceding two licence periods, CNSC staff have consistently assessed the Safeguards SCA as meeting regulatory requirements and expectations. Cameco anticipates making further enhancements to this area and expects that this SCA will continue to meet regulatory requirements and expectations during the next licensing period.

#### Forward Outlook

In the upcoming licensing period, PHCF anticipates improvements to this SCA as wastes that will be transferred to the LTWMF will be characterized and transferred from retained waste to the LTWMF. Cameco is working with CNSC staff, PHAI and IAEA on the requirements to complete this work under safeguards obligations.

### **2.3.8 Packaging and Transport of Nuclear Substances**

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

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### Operational Performance

Uranium dioxide (UO<sub>2</sub>) is produced, packaged in drums and transported by road from the PHCF to Cameco's Fuel Manufacturing facility in Port Hope and/or other domestic fuel manufacturing facilities. UO<sub>2</sub> is also packaged in drums and transported by road and marine overseas to Japan, Korea and Romania. There is also a small amount of material transported by air for customer evaluation purposes. The drums used for air transport meet the Type IP-3 packaging requirements; all other drums meet the Type IP-1 packaging requirements as specified in the CNSC *Packaging and Transport of Nuclear Substance Regulations, 2015*.

Uranium hexafluoride (UF<sub>6</sub>) is produced and transported in 48X or 48Y cylinders certified by the CNSC as Type H(M) and H(U) packages for transport by road, rail or marine from the PHCF to the USA or overseas, including but not limited to, the United Kingdom, Germany, Holland and Japan.

In addition to UO<sub>2</sub> and UF<sub>6</sub>, scrap material is transported by road, rail or marine to the PHCF from the USA and Europe.

Between 2007 and 2015, four minor transportation events were reported by the PHCF. These were investigated, corrective actions put into place, and no environmental impacts occurred as a result. In addition, over this period, PHCF provided response assistance to other sites and/or licensees as per the terms of the Cameco emergency response assistance plans.

Between 2007 and 2015, CNSC Staff have rated PHCF as satisfactory in the Packaging and Transport of Nuclear Substances SCA every year.

### Forward Outlook

Cameco will continue to comply with the existing and new regulatory requirements in this SCA in the next licensing period.

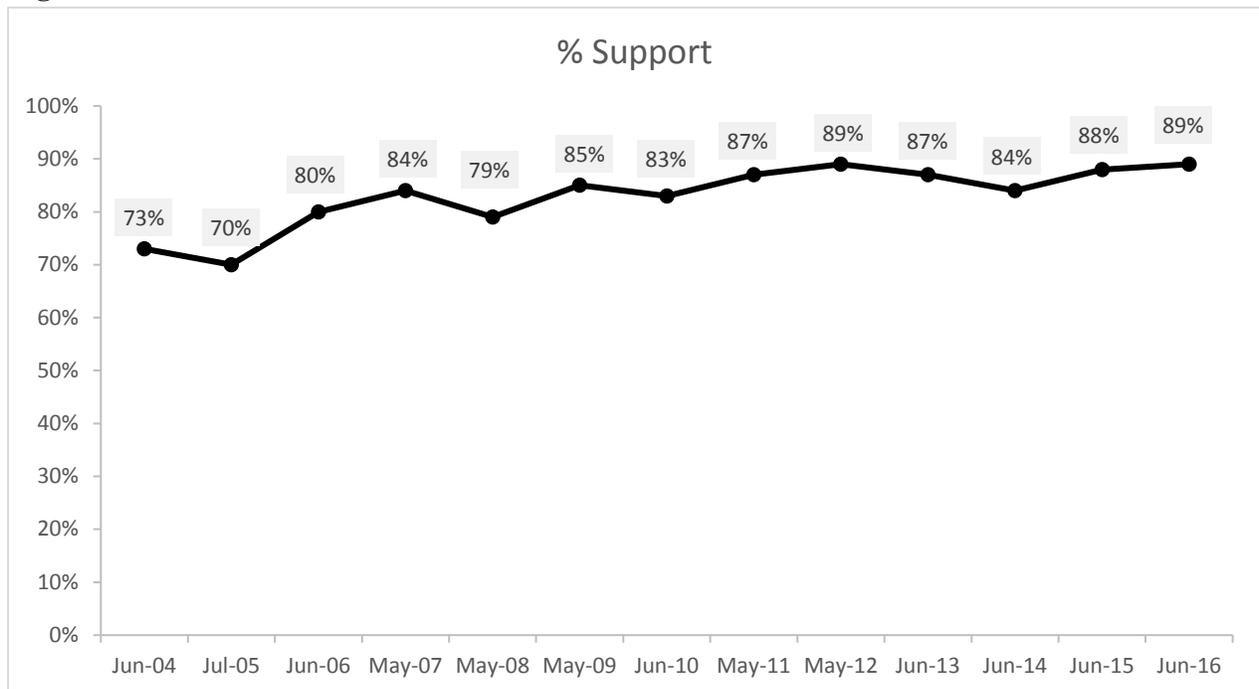
## **3.0 OTHER MATTERS OF REGULATORY INTEREST**

### **3.1.1 Public Information Program**

The PHCF maintains a Public Information Program (PIP) that meets the requirements of CNSC RD/GD 99.3, Public Information and Disclosure programs. The objective of the program is to foster open dialogue between the company and persons living in the vicinity of the PHCF.

Cameco has retained outside expertise for more than a decade to measure public opinion in Port Hope to help determine the effectiveness of its public information program. Looking at the results for the period 2007 – 2016 shown in Figure 20, the majority of residents remain supportive of the continuation of Cameco’s operations in Port Hope. In fact, these levels of support are considered “best in class” for many industries and communities.

**Figure 20**



The results of this public opinion research confirm that Cameco’s public information program is seen as effective and appropriate by the vast majority of Port Hope residents.

Since 2007, Cameco has adapted its PIP to include social media (Twitter and Facebook), and further developed the FSD website to make information on local operations easier to access for the community. Conventional media and public disclosure tools such as advertisements, newsletters, and press releases, as well as outreach activities such as community forums, presentations to town council, involvement in community activities (i.e. fall fair) and facility tours have also been maintained.

Cameco will continue to enhance its PIP as needed in the next licensing period to maintain the very strong levels of support in our community.

### **3.1.2 Aboriginal Consultation**

Cameco is committed to provide opportunities to engage with First Nation and Métis communities regarding the PHCF's ongoing operations and Cameco's VIM project.

Cameco includes the Chiefs of the five nearest First Nations bands and the Métis Nation of Ontario on our mailing list to ensure that Aboriginal stakeholders are aware of all community forums and other community events. Cameco will continue outreach to the local First Nations and Métis communities throughout the licensing process and subsequent licence period.

### **3.1.3 Financial Guarantee**

The PHCF maintains a Preliminary Decommissioning Plan (PDP), which is prepared based on guidance provided in the CNSC Regulatory Guide G-219, Decommissioning Planning for Licensed Activities. The current financial guarantee, maintained in the form of irrevocable letter of credit for \$101.7 million reflects the PDP accepted by the Commission during the previous licensing proceedings.

The PDP has recently been updated and reviewed by CNSC staff in support of the current licence renewal. The plan outlines the general requirements for returning the site to the status of unrestricted use and outlines the controls required for the protection of the environment during the decommissioning process. As part of this process the financial guarantee was re-evaluated in accordance with the criteria set out in CSA standard N294-09 and CNSC regulatory documents G-219 and G-206. Once the value of the financial guarantee has been approved by the Commission, Cameco will secure an irrevocable letter of credit to cover the full amount of \$128.6 million as determined through the updated PDP.

### **3.1.4 Nuclear Liability Insurance**

As required by the operating licence and associated LCH, the PHCF maintains valid nuclear installation liability insurance and annually provides proof of this insurance to CNSC staff.

#### 4.0 CONCLUDING REMARKS

Cameco is committed to the safe, clean and reliable operations of all of its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees and the people in neighbouring communities.

Over the past two licence periods, PHCF exhibited strong performance in all safety and control areas. As a result of the effective programs, plans and procedures in place, the PHCF was able to maintain individual radiation exposures well below all regulatory dose limits. In addition, environmental emissions continued to be controlled to levels that are a fraction of the regulatory limits, and public radiation exposures are also well below the regulatory limits.

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

As described above, Cameco is committed to continual improvement in all aspects of the PHCF performance. The following have been identified as priorities for the next licensing period:

- Alignment of site programs with standardized regulatory expectations as described in CSA standards and REGDOCS
  - The N288 series and REGDOC 2.9.1 for environmental protection
  - N286 for Management Systems
  - N393 and REGDOC 2.10.1 for Fire Protection and Emergency Response
  - B51 for Pressure Boundary Program
  - N292 for Waste Management
  
- The VIM project to clean up and renew the PHCF will also be of significant focus in the next licensing period. Specifically, the project will facilitate:
  - the clean-up and demolition of a number of old or underutilized buildings;
  - the removal of contaminated soils, building materials and stored wastes; and
  - the proposed construction and modifications to buildings at the PHCF with associated landscaping and infrastructure.

Attachment 2: 2017 Licence Renewal Application Port Hope Conversion Facility February 1 Supplemental VIM Submission



**CAMECO CORPORATION  
FUEL SERVICES DIVISION**

**2017 LICENCE RENEWAL APPLICATION  
FOR THE  
PORT HOPE CONVERSION FACILITY**

**Supplemental VIM Submission**

**February 1, 2016**

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## **1.0 INTRODUCTION**

### **1.1 Vision in Motion Project**

In the upcoming licence term, Cameco Corporation (Cameco) is proposing to undertake a major site cleanup and renewal of its Port Hope conversion facility (PHCF), which is located in the Municipality of Port Hope (MPH), Ontario. This undertaking is known as the Vision in Motion (VIM) project. The VIM project will be implemented during the applied-for licence period. A 10-year licence term will provide sufficient flexibility to address potential delays to the project due to internal or external factors.

This project is a unique and timely opportunity that has been made possible because of the Port Hope Area Initiative (PHAI). The PHAI Port Hope project is being undertaken by Canadian Nuclear Laboratories (CNL) and includes the construction of a long-term waste management facility (LTWMF) in the Municipality of Port Hope. VIM will require effective co-ordination with the PHAI to ensure the success of both projects. Remediation activities in the Port Hope Harbour area as well as the transfer of drummed waste and soil that meet the waste acceptance criteria (WAC) to the LTWMF are among the activities where effective coordination is paramount. A framework for coordination of activities between PHAI and Cameco is in place to link the teams in each organization working on similar aspects of the project such as Centre Pier remediation, regulatory activities, public outreach and communication and environmental monitoring. A senior management coordination team regularly reviews the progress of the project teams at a joint meeting.

VIM entails an extensive remediation and redevelopment of much of the PHCF and includes:

- the clean-up and demolition of a number of old or underutilized buildings;
- the removal of contaminated soils, building materials and stored wastes; and
- the proposed construction of new replacement buildings, additions or modifications to existing buildings at the PHCF with associated landscaping and infrastructure.

Proposed changes at the PHCF will result in modifications in the ongoing management of the site related to uranium trioxide (UO<sub>3</sub>), uranium dioxide (UO<sub>2</sub>) and uranium hexafluoride (UF<sub>6</sub>) storage as well as wastewater treatment. Overall, VIM will allow for environmental remediation, improved site operations, enhancement of site safety and security through site design, and improved aesthetics.

#### **1.1.1 Current Licensing Basis**

The PHCF Clean-Up Program (CUP) (also referred to as Waste Management Program - 02 or WMP-02) has been in place for many years. WMP-02 describes how Cameco will manage CUP activities within the existing licensing basis. CUP was established to remove obsolete buildings, equipment and materials for the purpose of reducing

environmental obligations, addressing health and safety hazards in underutilized buildings, creating useable space and improving the appearance of the PHCF. CUP may involve undertaking these activities at any of the three properties that make up the PHCF.

CUP activities are ongoing and consist of routine work and clean-up projects. Planning for CUP activities incorporates an assessment of the relevant safety and control areas from a demolition, decontamination and waste management perspective. This assessment determines whether project-specific programs or procedures are required to supplement existing site programs to ensure the objectives of the licensing basis are maintained.

### **1.1.2 Project Overview**

VIM is a specific project to carry out clean-up and renewal activities at the PHCF and will be completed in accordance with WMP-02. The original project description was submitted to the Canadian Nuclear Safety Commission (CNSC) in 2006 under the name Vision 2010 Project. The project was rebranded as Vision in Motion when it became clear that work would not begin until well after the original project timelines anticipated for both completion of the environmental assessment for Vision 2010 and the PHAI.

VIM will facilitate environmental remediation at the PHCF site, improve the operational efficiency and environmental performance of the PHCF and enhance site safety and security through site design. VIM also presents an opportunity for Cameco to make the PHCF more visually appealing, return the Centre Pier to the MPH and improve public access to the waterfront. The project consists of removing several old or underutilized buildings; removing contaminated soils, building materials and stored wastes; transporting those soils and wastes to the LTWMF; and constructing associated new infrastructure and building modifications. The layout of the current PHCF Main Site and the site post VIM are provided in Figures 1 and 2, respectively.

### **1.1.3 Project Timeline**

VIM is progressing with design activity based on the defined scope. The resulting plans will cover aspects such as engineering, procurement, project execution (including environmental monitoring, risk management, site-project interactions) and the construction strategy and schedule. It is anticipated that the current planning phase of the project will be completed in the summer of 2016.

The implementation of most VIM activities is dependent on when the LTWMF is able to accept wastes from Cameco. It is anticipated that most aspects of VIM, particularly building demolition, soil remediation, groundwater treatment program expansion, and transfer of wastes will occur over a four to five year period after the LTWMF is open to receipt of wastes.

Figure 1 – Port Hope Conversion Facility Existing Site Layout

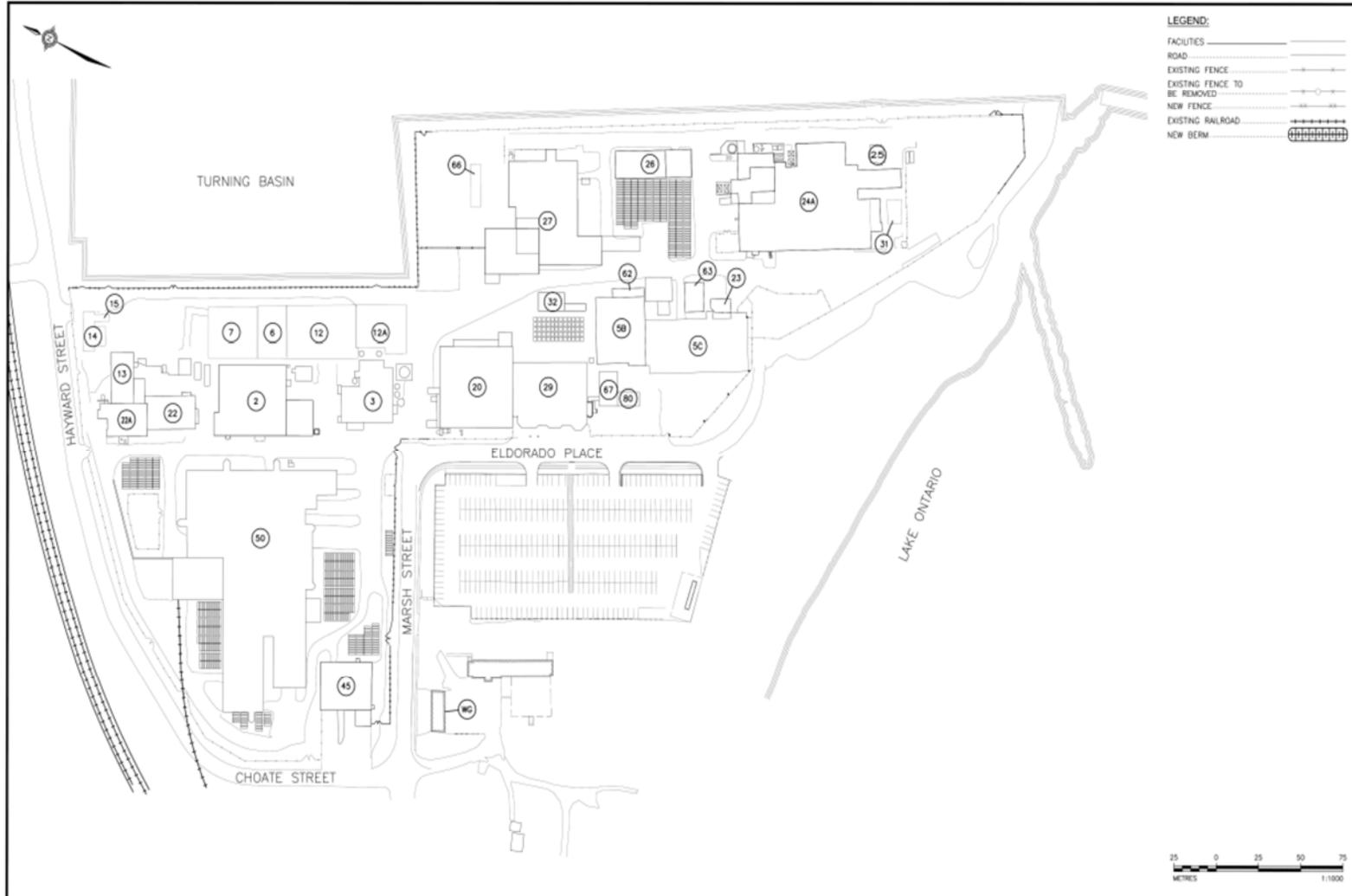
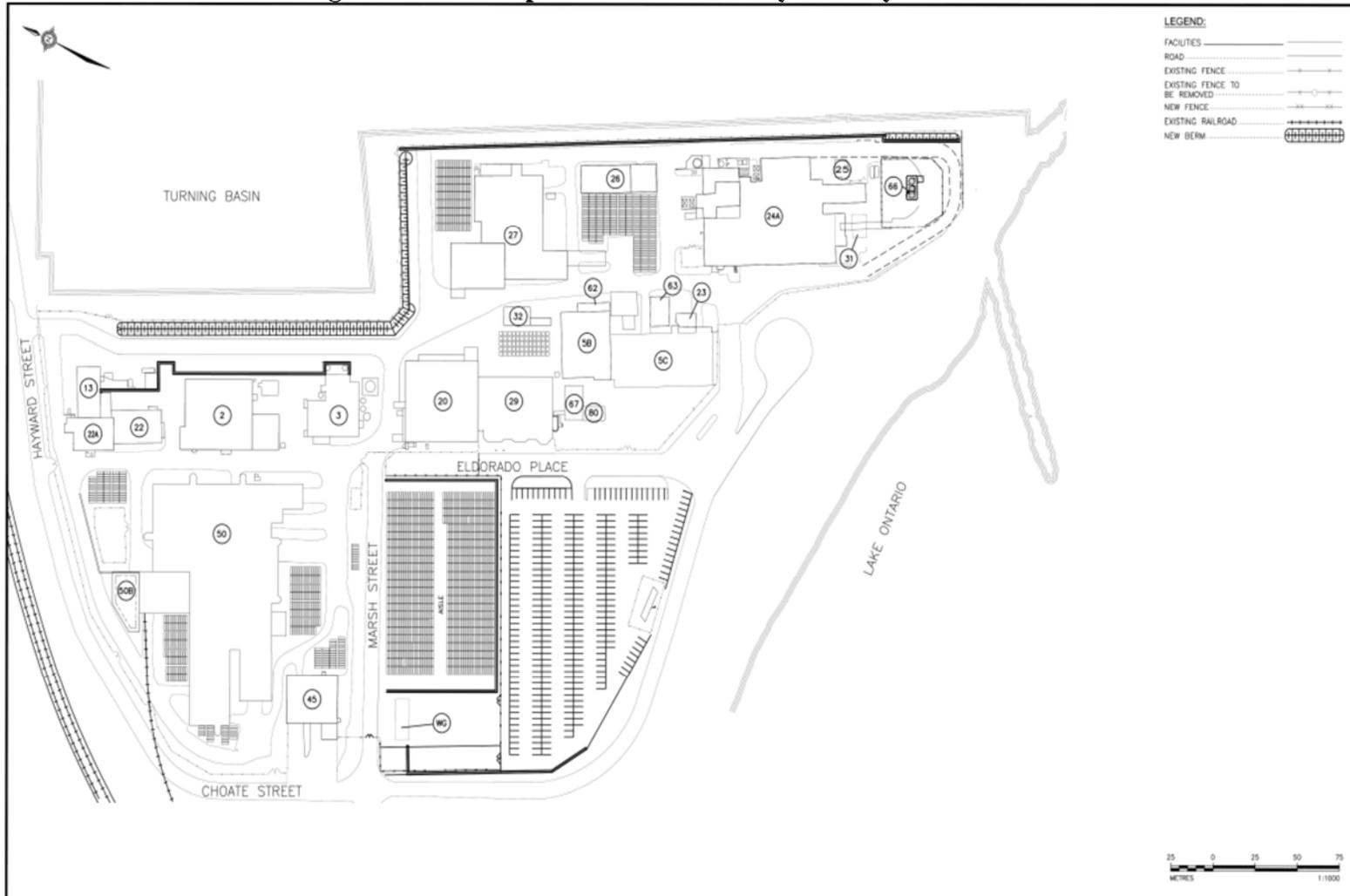


Figure 2 – Port Hope Conversion Facility Site Layout Post VIM



## 1.2 Application for Licence Renewal Related to VIM

Within the requested licence period of 10 years, the PHCF expects to continue with current licensed operations including carrying out its VIM project to clean up and renew the facility. A licence renewal application was submitted to the CNSC on November 20, 2015 and this follow-up document outlines the objective of the licensing basis for the ongoing CUP operations including the VIM project.

As part of licence renewal activities occurring in 2016, Cameco requests that the operating licence for the PHCF specifically provide the authorization for PHCF to engage in clean-up, decontamination, demolition and remediation activities (including VIM) that are currently part of the licensing basis.

In support of increased clean-up, decontamination, demolition and remediation activities, including discharge of treated groundwater at the PHCF, Cameco completed a federal environmental assessment (EA) pursuant to section 5(1)(d) of the *Canadian Environmental Assessment Act (CEAA)*. Cameco prepared an Environmental Impact Statement (EIS) for Vision 2010 (Cameco 2010) (now VIM) in accordance with the EA requirements under *CEAA* and the project specific EA Guidelines developed by the CNSC in 2009.

The EIS was submitted to the CNSC in December 2010 and the Comprehensive Study Report (CSR) (CNSC 2012) was accepted by the Commission in May 2012. In December 2012, Canada's Environment Minister announced that this proposed project for PHCF is not likely to cause significant adverse environmental effects and the project was referred back to the CNSC for appropriate action.

Acronyms and abbreviations used throughout this document are found in Appendix 1.

## **2.0 VIM PROJECT DESCRIPTION**

The VIM project provides Cameco with an opportunity to deliver an allowance of qualifying waste materials to the LTMWF and to remediate and redevelop the PHCF. The VIM project is a large CUP project under WMP-02 and is expected to be implemented within the next 10 years in conjunction with the PHAI Port Hope project being implemented by Canadian Nuclear Laboratories (CNL).

### **2.1 History**

The 2001 federal/municipal agreement establishing the PHAI specifies that approximately 150,000 m<sup>3</sup> of Cameco decommissioning waste materials arising at the PHCF and other specified locations are to be accommodated in the LTMWF, which is to be located in the MPH. This agreement provides Cameco with a limited window of opportunity, during the time that the LTMWF is receiving wastes, in which to transport waste for long term management at the LTMWF.

Since 2001, the scope of the VIM project has been evolving and, during this period, Cameco has promoted the project through various forums and with a variety of stakeholders (including local government, regulatory agencies, Aboriginal and community groups and the general public). In late 2005/early 2006, prior to completion of the Project Description, Cameco engaged in an extensive public consultation involving more than 600 local residents and other stakeholders, including the Municipality of Port Hope and non-governmental organizations. The results of these consultations provided direction to Cameco as it explored options for site redevelopment that considered the input received.

Cameco continued to both formally (public meetings, workshops) and informally (phone calls, one-on-one conversations) consult with the public throughout the EA process. The community was also informed about project developments through its community forums, newsletters, website and other public information activities. This dialog with the community has been ongoing since that time.

Cameco has worked very closely with the Municipality of Port Hope to ensure that VIM is as consistent with community planning objectives for waterfront redevelopment as possible.

One of the areas in which the direction from both the community and MPH was clear from both early and ongoing consultations was a desire to see the facility move away from the harbour, wherever possible. With the Centre Pier becoming publically accessible following completion of VIM and the PHAI, there was a desire to open up that area of the waterfront for increased public use.

The CSR was the subject of a CNSC public hearing in May 2012, and as noted above, the EA's conclusions for Vision 2010 were accepted by the Federal Minister of the

Environment in December 2012. The project was subsequently rebranded Vision in Motion (VIM). Work was then undertaken to refine the scope of the project. In January 2014, Cameco engaged in consultation with its three primary regulators, the CNSC, Environment Canada (EC) and the Ontario provincial Ministry of the Environment (now Ministry of the Environment and Climate Change (MOECC)) and provided an overview of the scope for VIM at a joint regulatory meeting in Port Hope. In February 2014, the three regulatory agencies provided Cameco with letters supporting the further development of the VIM project as outlined at the January meeting.

### **2.1.1 EA for Vision 2010 as it Applies to VIM**

The EA for Vision 2010 that was the subject of the CSR issued in May 2012, evaluated four different alternative means to carrying out the project. Although a preferred alternative was identified at the time, the effects assessment evaluated the activities that would potentially lead to the maximum environmental effects associated with all of the alternatives.

In general, the scope of the VIM project has refined the original Vision 2010 activities to include a greater re-purposing of existing buildings. Consequently there will be fewer demolition and construction activities than were considered in the original assessment. Ultimately this reduced level of activity will ensure that the effects associated with VIM remain within the bounds of the assessment in the 2012 CSR.

Similarly, for activities associated with remediation, a more targeted approach to remediation will be undertaken, focusing on removing the most contaminated material. This remediation will significantly reduce the source of groundwater contaminants at the PHCF site, and thereby greatly reduce the potential for groundwater contamination. Despite the fact that environmental risk assessments (SENES, 2009a; SENES 2009b; SENES 2010; Arcadis, 2015) completed for the current facility conclude that no additional groundwater management is required to remain protective of the environment, the VIM project involves the installation of additional groundwater collection wells. These wells are intended to further reduce the flux of contaminated groundwater discharging to the Port Hope Harbour and will be operated under the existing permit from the MOECC. This activity will more than offset the groundwater loading due to PHCF soil contamination evaluated in the CSR.

Further, because of this refinement in remediation activities, less soil excavation and backfill will be involved, reducing the potential environmental effects (airborne dust, etc.) evaluated in the Vision 2010 EA (and CSR). Consequently, the effects evaluated as part of the CSR will bound the potential effects associated with the VIM project.

Overall, the VIM project will not increase the radiological, human health or environmental hazards that were evaluated in the CSR and does not change the decision that the project is not likely to result in significant adverse environmental effects.

## 2.2 Facility Location and Layout

Detailed descriptions of the PHCF site are provided in the 2017 License Renewal Application and are not repeated herein. The VIM Project will take place within the three PHCF sites, including the PHCF Main Site, the Centre Pier and the Dorset Street East site. The Site Study Area illustrations in Figures 3 and 4 from the original EIS for the Vision 2010 project illustrate the area assessed in the EA, which includes property within the PHCF fenceline, as well as adjacent land that is accessible to the public. An element of the project involves relocating drums and low level radioactive waste (LLRW) from all three PHCF properties to the PHAI LTWMF. The transportation route is illustrated in Figure 5.

Figure 3 – Port Hope Conversion Facility Site Study Area – PHCF Main Site and Centre Pier

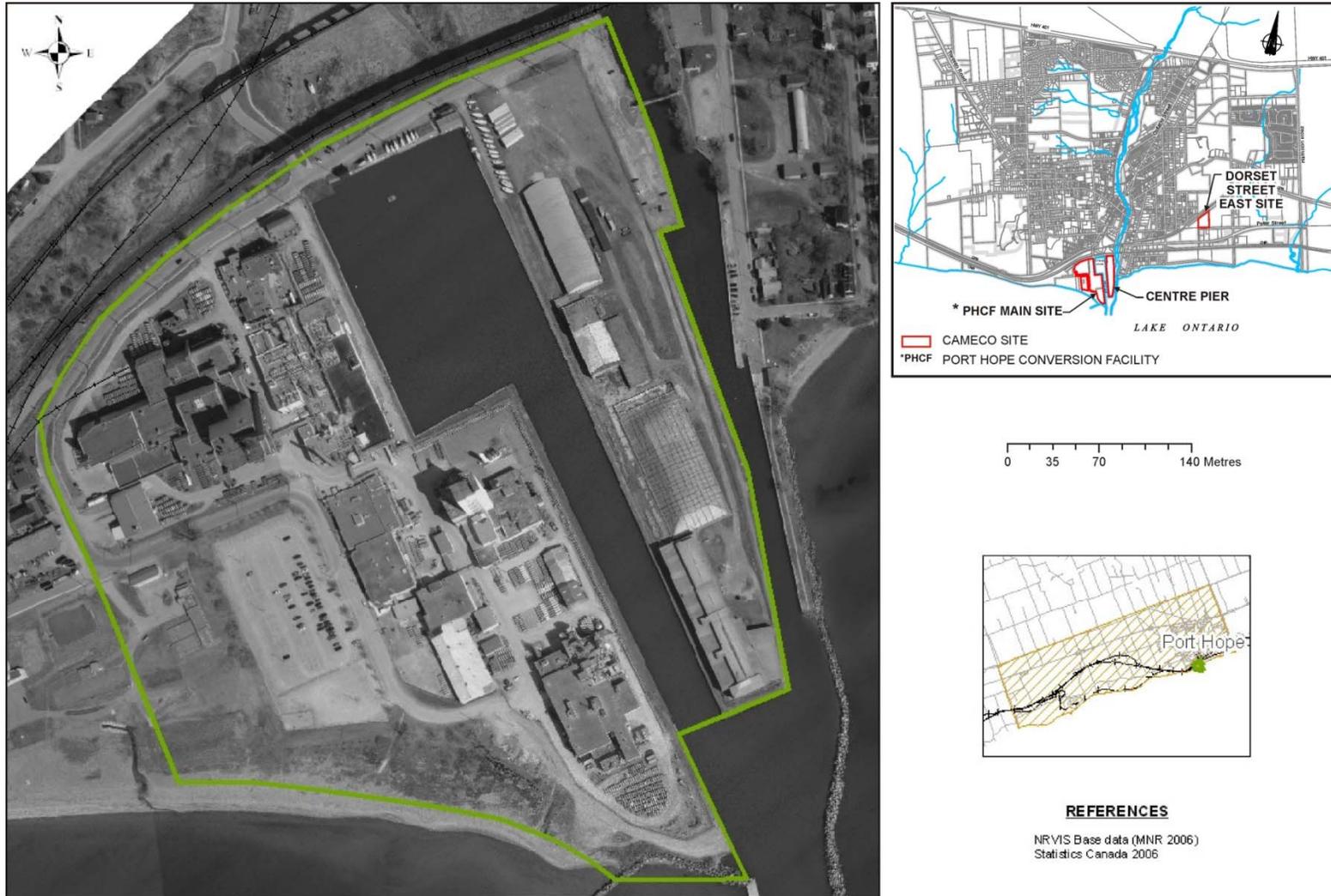


Figure 4 – Port Hope Conversion Facility Site Study Area – Dorset Street East Site

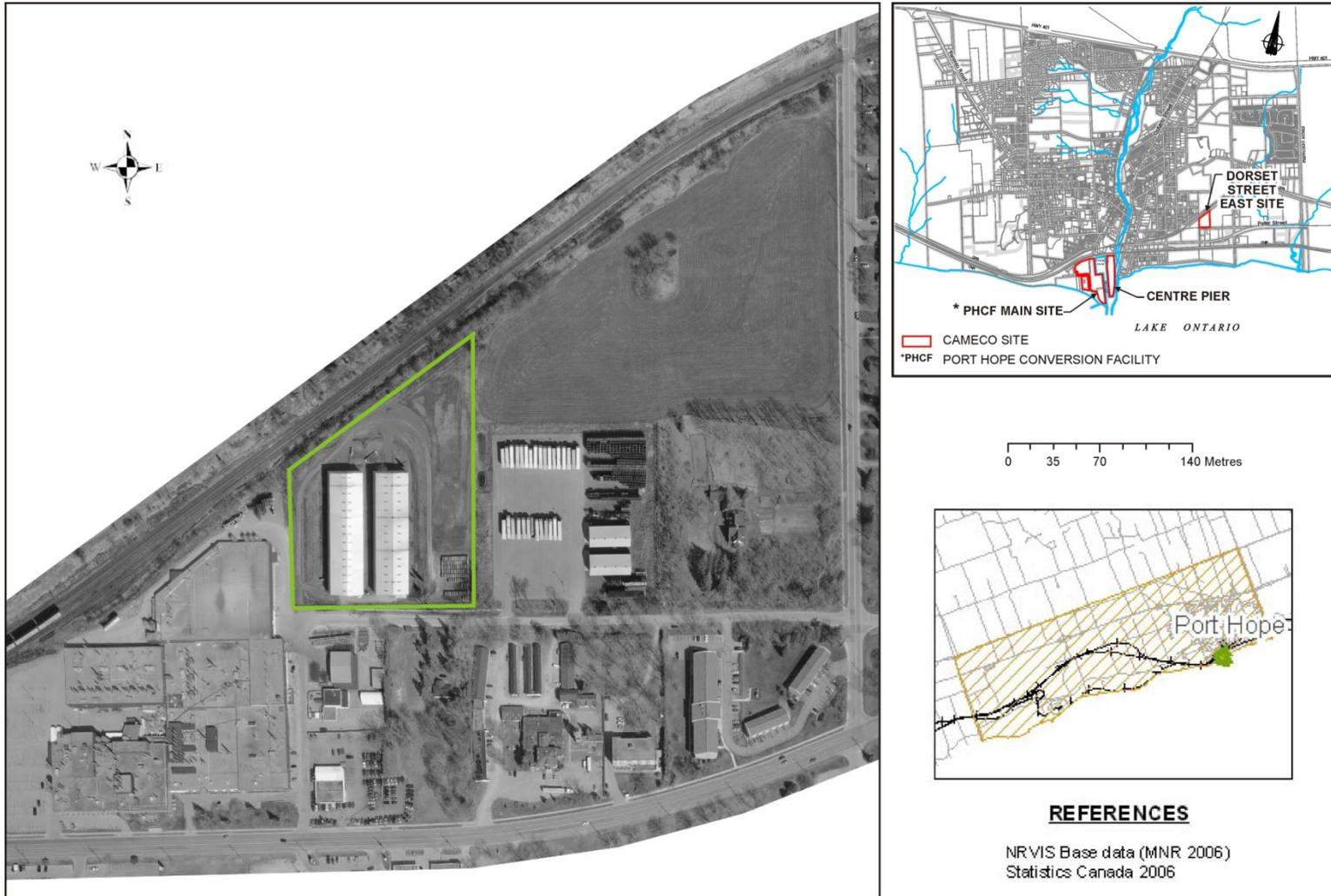
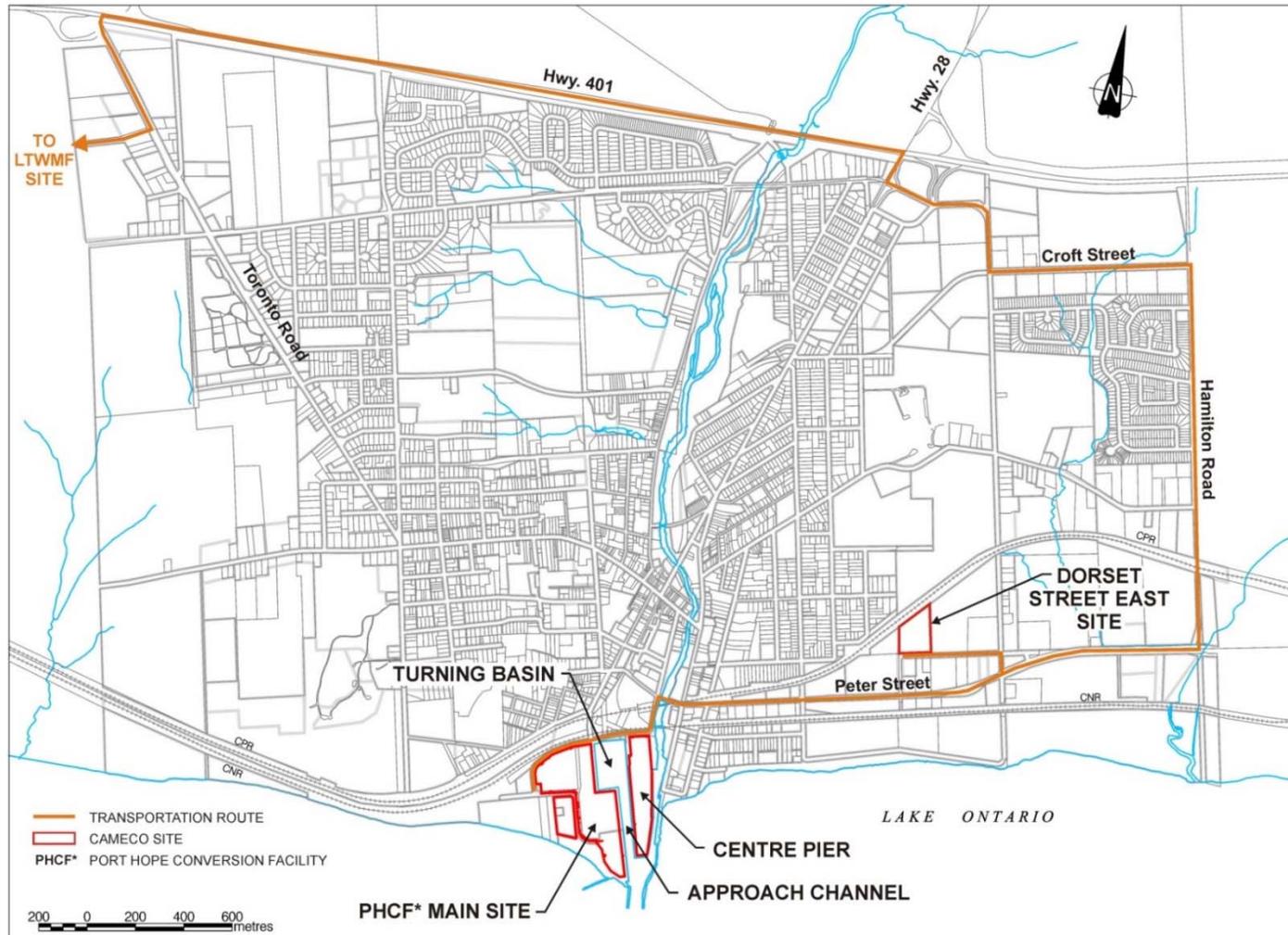


Figure 5 – VIM Transportation Route to LTWMF



### 2.3 VIM Project Scope

The VIM project is a relatively straight-forward project with distinct boundaries for remediation and defined activities. Specific tasks that will be undertaken as part of the VIM project at the PHCF Main Site, Centre Pier and the Dorset Street East Site include:

- Drums identified to be part of the VIM project (eligible for the LTWMF) will be sent to the LTWMF (including drums at Centre Pier, Cameco's Dorset Street East Site and the PHCF Main Site)
- Fenceline shift in accordance with land-transfer agreements (as shown in Figure 8)
- Parking lot modifications;
- Installation of flood protection barriers which will also provide gamma, noise and visual shielding as needed along the eastern fenceline;
- Improvements to stormwater management infrastructure including installation of new oil-grit separators and upgrades to existing underground piping to prevent groundwater intrusion into the stormwater system;
- Building demolition (Figure 6, illustrated on the redeveloped Main Site):
  - Main Site - Buildings 6, 7, 12, 12A, 14, 15 and 27 tower;
  - Centre Pier Buildings 40, 41, and 43;
- Equipment removal from buildings that will not be demolished:
  - Buildings 2, 5B, 5C and 31
  - Portions of Building 27 that will be repurposed
- Modifying buildings on Main Site:
  - Building 5C improved for CUP and waste management;
  - Building 26 façade improvements;
  - Building 27 repurposed for UO<sub>2</sub> product drum storage and shipping on the ground floor and varied storage on the second floor;
- New Building Construction on Main Site:
  - Building 50B constructed, housing the new waste water treatment facility;
  - Building 66 (Liquid Hydrogen Storage Compound) relocated to south of Building 24;
- Soil remediation for the VIM project on the Main Site is being targeted to specific areas (Figure 7, illustrated on the existing Main Site). The scope is based on modelled improvements to groundwater; and
- Five new pump and treat wells installed.

At the completion of the VIM project, Cameco will have successfully reduced the PHCF operational footprint to two licensed properties in the MPH, safely transferred wastes to the LTWMF and markedly improved the environmental performance of the site through the targeted removal of heavily contaminated soils and enhancement of the groundwater treatment system. Complete remediation of the site is not required as part of the VIM project because Cameco will continue to operate the PHCF under a CNSC licence

following the project. This will ensure that appropriate regulatory oversight will be provided to confirm that Cameco continues to safely operate the facility and manage the subsurface contamination. This includes ongoing environmental monitoring, annual reporting of the performance of the groundwater management program, waste management, the periodic review of the ERA, and the periodic review of the facility preliminary decommissioning plan (PDP) and associated financial guarantee.

Figure 6 – Demolition and Construction Plan – PHCF Main Site

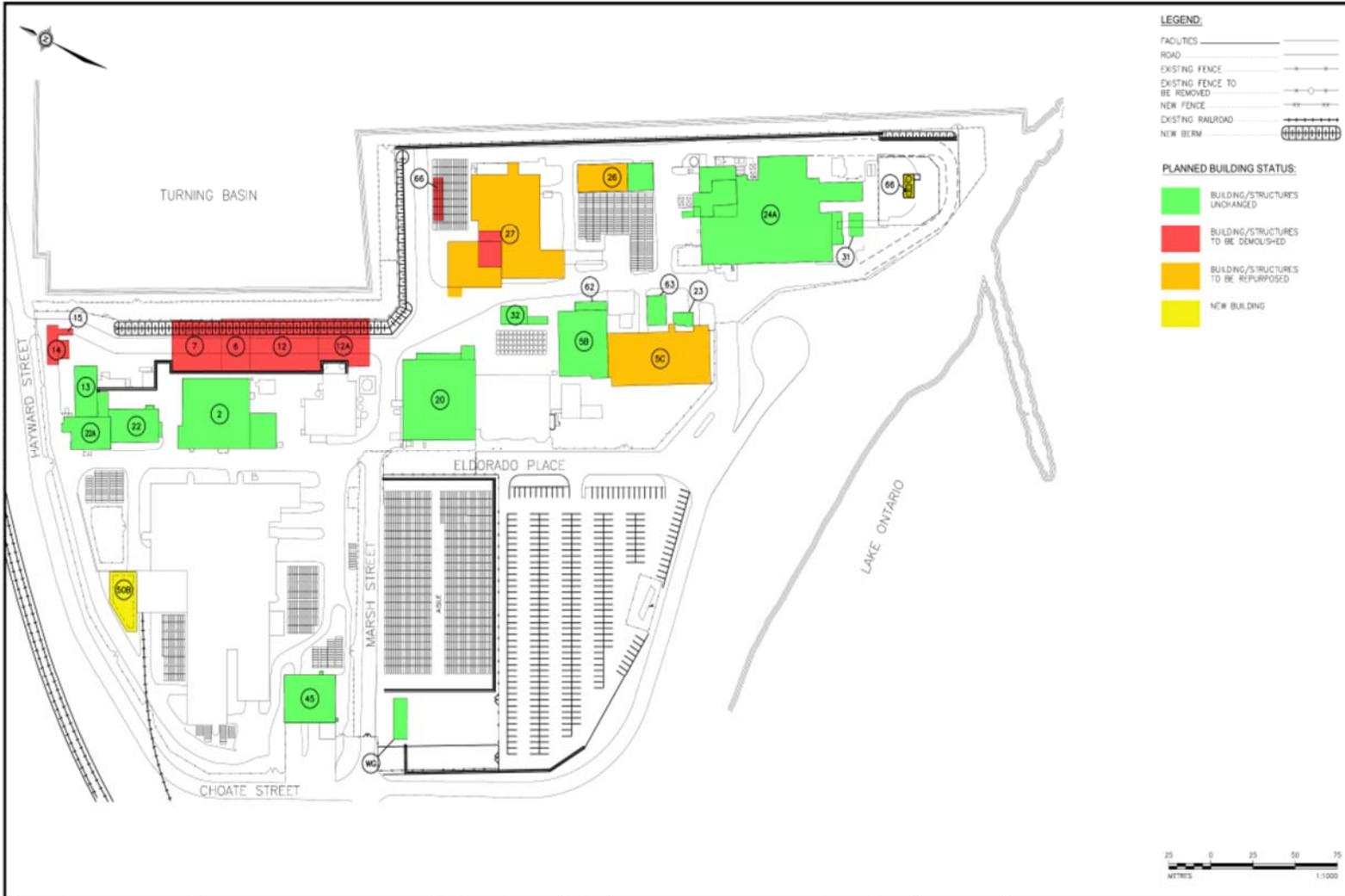
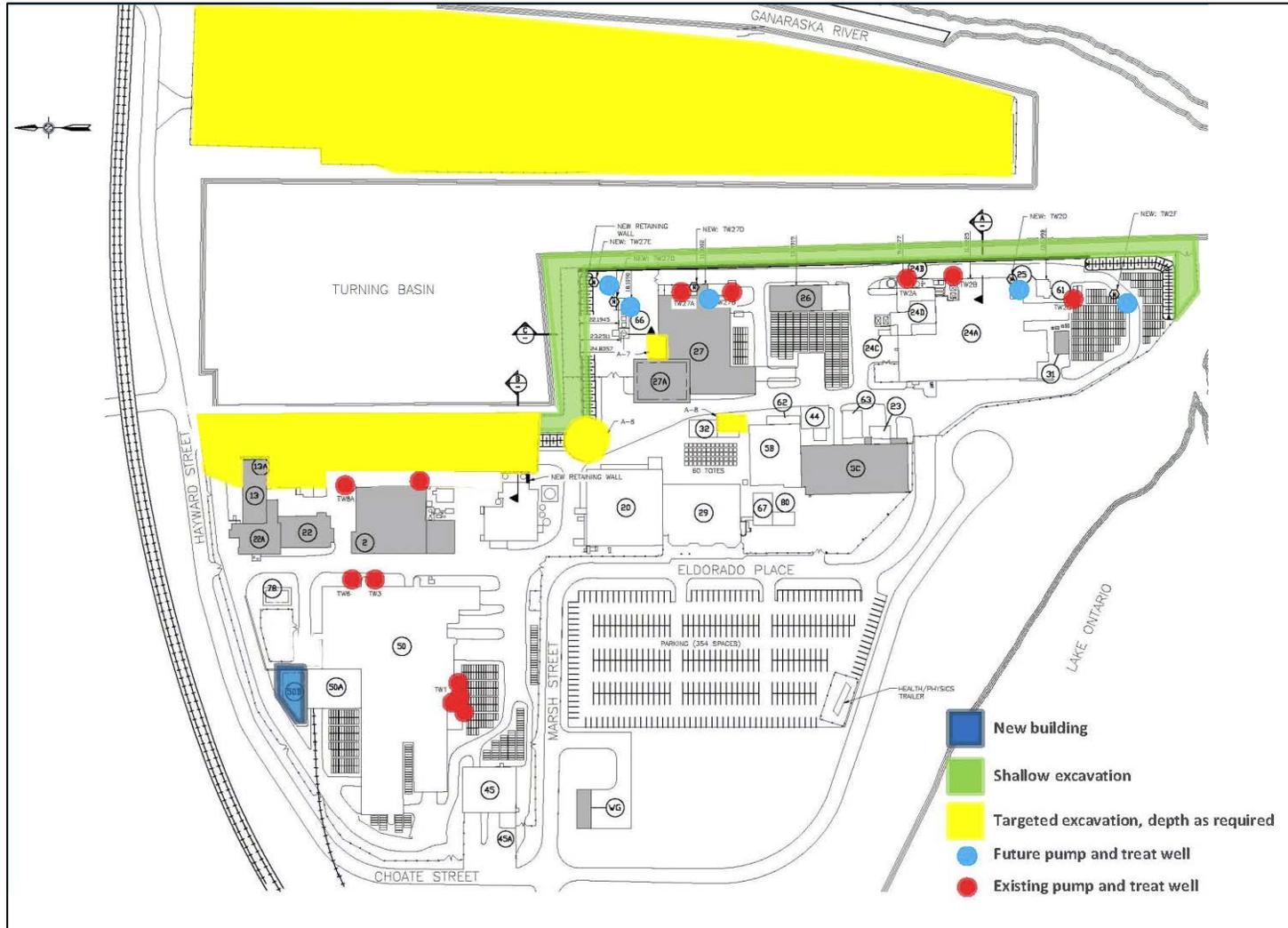


Figure 7 – VIM Remediation Plan



## **2.4 Demolition, Excavation, Construction and Waste Management Activities Carried Out Through the Clean-Up Program**

Cameco routinely undertakes projects safely with activities similar to the VIM project. CUP permits Cameco to remove obsolete buildings, equipment and materials for the purpose of reducing environmental obligations, creating useable space and improve the appearance of the facility. Within the licensing period, Cameco progressed several CUP projects that influence the ongoing VIM project planning and include the following:

- SuperCUP 2014 – Additional employees were temporarily transferred to CUP, where they were trained and qualified to remove redundant equipment and clean-up in several buildings on the Main Site. This allowed portions of some of these buildings to be repurposed. Materials removed were processed through the outlets described in the site Waste Management Plan (WMP-01).
- VIM Trial Excavation – In 2015, Cameco carried out a trial excavation on the Main Site, which involved the excavation of two large test pits to collect information regarding subsurface condition characteristics. The information gathered is being used to help define the excavation approach for the VIM project.
- SuperCUP 2015 – Campaign of redundant equipment removal and clean-up of underutilized buildings on the Main Site. Materials removed were processed through the outlets described in WMP-01.
- Centre Pier Demolition 2015 – At the time of this application, Cameco was demolishing the above-grade portions of Buildings 42 and 43A on the Centre Pier. The work will improve the management of radiation, safety and environmental risks associated with the structures.

## **2.5 Past Remediation Activities at Port Hope Conversion Facility**

Following the discovery of subsurface contamination beneath the UF<sub>6</sub> plant in July 2007 and the discovery of subsurface contamination beneath the UO<sub>2</sub> plant in October 2008, Cameco undertook extensive investigations, which indicated that the contamination had moved beyond the building footprints.

Environmental management plans that included soil removal, rehabilitation of the plant and groundwater management to prevent the further movement of contamination from beneath the building footprint were developed to address the subsurface contamination and were implemented in numerous phases between 2008 and 2011. All of these activities were successfully completed and similar activities are included in the VIM project. The data collected as part of an enhanced groundwater and surface water monitoring program continues to demonstrate the effectiveness of these remediation activities.

## **2.6 Community Support**

Cameco employees are proud to be active and responsible members of the communities in which they live, work and play. As a major employer in Northumberland County and a high-profile business, Cameco plays an important role in supporting organizations and community events that contribute to the high quality of life enjoyed in Northumberland County.

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

One of the methods Cameco uses to measure the success of its PIP is annual polling of Port Hope residents. Over the past 10 years, support for Cameco's operations has been measured at 80 percent or higher, with the community consistently indicating high levels of trust in the company and employees.

During the Vision 2010 EA, public surveys showed a high level of awareness and support of the Vision 2010 Project. The large majority of respondents who were aware of the project thought that it was "very important" or "somewhat important" for Cameco to undertake this initiative. There was a sense in the community that the Vision 2010/VIM project is needed, will benefit the community, and will help push forward other initiatives to improve the waterfront and the community as a whole.

Since the project was first announced to the public in late 2002, Cameco has recognized the importance of VIM as it relates to municipal and community plans for waterfront redevelopment after the PHAI is completed. Extensive public consultations were involved prior to and during the EA process and Cameco has attempted to accommodate community planning objectives wherever possible.

As the project has evolved, MPH and the public have been kept apprised through presentations to local groups, community forums, newsletters and the FSD website. Cameco will continue to reach out to the community during the relicensing process by making licensing documents publicly available, meeting with key stakeholders and providing additional information through its usual communication vehicles such as community forums, newsletters, the FSD website, advertisements and social media postings.

## **2.7 Aboriginal Consultation**

Cameco is committed to provide opportunities to engage with First Nation and Métis communities regarding the PHCF's ongoing operations and Cameco's VIM project. The

five First Nations identified as potentially being interested in the PHCF licence renewal and the VIM project are:

- Alderville First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island
- Mohawks of the Bay of Quinte
- Curve Lake First Nation

These five First Nations were all identified as being potentially interested in the Vision 2010 (now VIM) project and were notified of public outreach activities and key milestones during the environmental assessment process.

Cameco includes the chiefs (or designate) of the five identified First Nations and the Métis Nation of Ontario (MNO) on our mailing list to ensure that the First Nations and MNO are aware of all community forums and other community events. No concerns were raised regarding Vision 2010 during the previous or current licence period when we reached out to the identified First Nations. Cameco will continue outreach to the local First Nations and MNO throughout the licensing process and subsequent licence period.

As part of our pre-licensing consultation, Cameco will be sending a letter to the identified Aboriginal groups outlining our request for a new licence, significant planned activities and the length of the licence term. The letter will also include an invitation for a meeting. The letter will be followed up to confirm the letter receipt and to confirm whether there is interest in a meeting. Cameco anticipates the letters will be sent during the first quarter of 2016.

### **3.0 PROJECT SCHEDULE**

The preliminary VIM Project Schedule is provided in Figure 8. This schedule is contingent on the PHAI LTWMF being available to receive LLRW in mid-2018. This schedule shows the general timeframe expected for each of the primary tasks outlined in Section 2.3. Also provided in Figure 9 is an illustration outlining some of the the major tasks and changes to the PHCF site over time, such as relocation of cylinder storage and fenceline shifts.

**Figure 8 – Preliminary VIM Project Schedule**

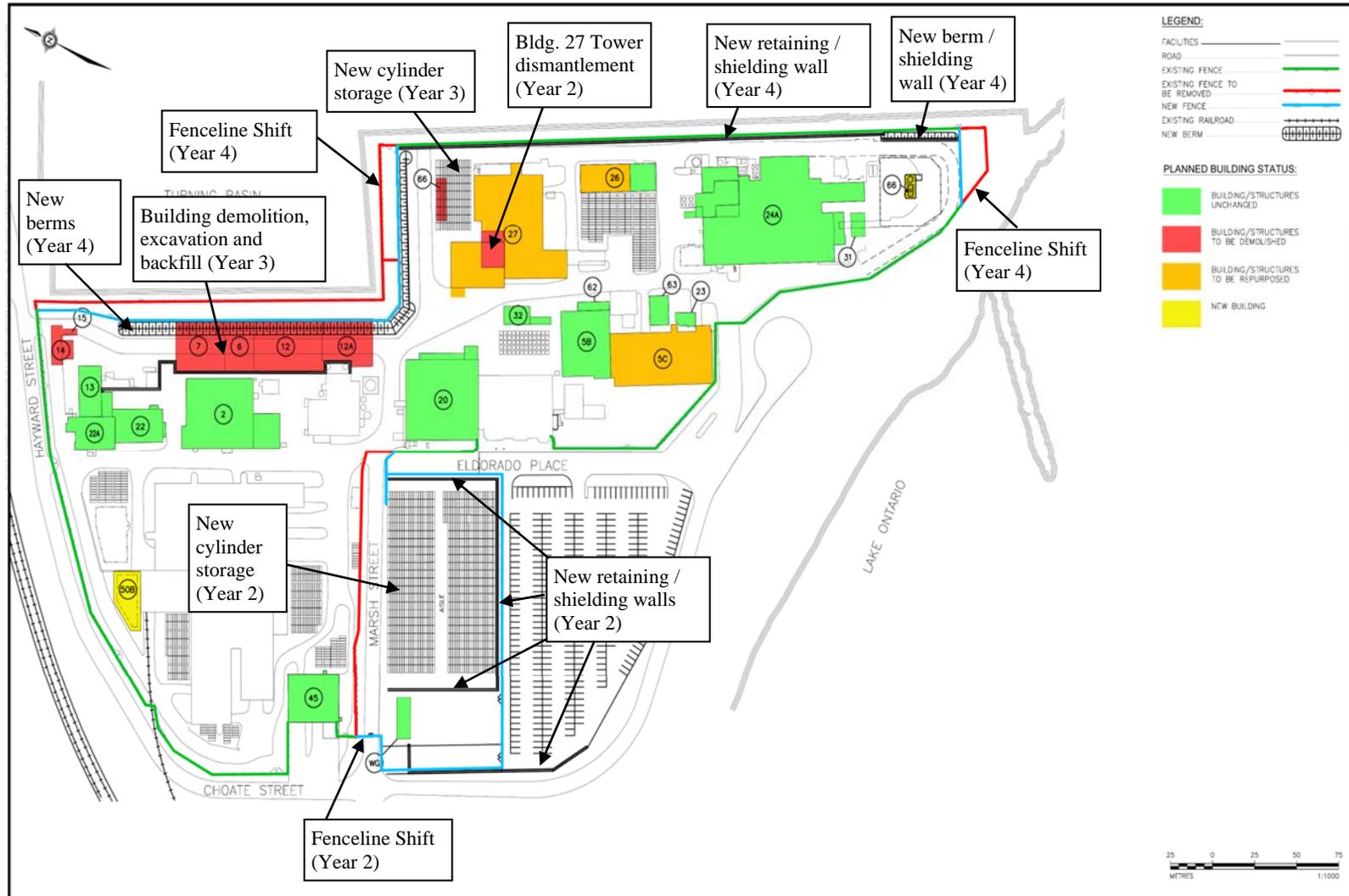
Task Name	2016	2017	2018	2019	2020	2021	Ongoing
Task Name	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Ongoing
<b>CNSC Licence for PHCF Renewed</b>		◇					→
<b>LTWMF Opens</b>			◇				
<b>VIM Starts</b>			◇				
<b>SuperCUP 2016-2017</b>							
<b>Main Site Building Demolition and Equipment Removal</b>							
<b>Centre Pier Building Demolition</b>							
<b>Centre Pier Site Transfer to PHAI</b>							
<b>Centre Pier Soil Remediation by PHAI</b>							
<b>Main Site Soil Remediation</b>							
<b>Accumulated Waste Processing</b>							
<b>Site Infrastructure Modifications</b>							
<b>Building Construction and Modifications</b>							
<b>Environmental Monitoring</b>							
Reporting	○ ○	● ○ ○	● ○ ○ ○	● ○ ○ ○	● ○ ○ ○	● ○ ○ ○	●

**Notes**

- ◇ Milestone
- Annual Compliance Report
- Quarterly Compliance Report

- VIM Activities
- Preliminary / Follow-up VIM Activities
- Current CUP Projects
- Preliminary PHAI Activity
- PHAI Activity

Figure 9 – VIM PHCF Site Changes



#### **4.0 PROJECT RESOURCES**

Cameco has committed the resources to ensure the successful implementation of VIM. Cameco has the in-house expertise to undertake many of the specific technical tasks associated with the VIM project as well as oversight of contractors.

While resource planning is still in progress, Cameco expects that the majority of work undertaken by this project will be carried out by contractors with Cameco oversight. For example, demolition activities will be undertaken by a contractor with expertise in the demolition of industrial buildings. However, some aspects of the project, such as support services for work execution may be provided by Cameco employees or suitably qualified contractors.

All personnel involved in the project will follow existing site processes for work planning and contractor management to ensure that hazards are identified and that mitigation or controls are in place for radiation protection, health and safety including industrial hygiene, fire protection, environmental protection and quality. Wherever practicable, procedures or work instructions will be developed for frequent activities and existing non-routine work control processes (i.e. JHA, TASC and/or radiation protection work permit) will be used where appropriate to ensure that worker and public safety will be maintained at or above the standard of the current programs. Cameco will ensure that VIM is planned and executed in a safe manner with oversight consistent with the requirements of the facility QMPM.

## 5.0 REGULATORY FRAMEWORK

Cameco operates under Nuclear Fuel Facility Operating Licence (FFOL-3631.00/2017). Cameco's Licence Renewal Application fully demonstrates the adherence of the PHCF's operations to the *Nuclear Safety and Control Act* (NSCA) and associated regulations. Further, to meet the CNSC's stringent regulatory requirements, Cameco is responsible for implementing and maintaining environmental protection programs that identify, control and monitor all releases of radioactivity and hazardous substances and effects on the environment, including the public, from the PHCF. Cameco maintains programs, plans and procedures as described in the Facility Licensing Manual that meet the regulatory requirements for its on-going operations.

With the current request to specifically provide in the operating licence, the on-going authorization to engage in clean-up, decontamination, demolition and remediation activities (including VIM), this submission provides an overview of how existing programs, plans and procedures encompass these activities, and where project-specific documentation is required.

### 5.1 VIM Project Regulatory Oversight

The CNSC regulates nuclear facilities and activities in Canada to prevent unreasonable risk to the environment in a manner that is consistent with Canadian environmental policies, acts (including the NSCA) and regulations, and with Canada's international obligations.

Cameco submits quarterly and annual compliance reports to the CNSC which detail the results of the environmental protection programs related to the operations of the PHCF. VIM project specific monitoring will be reported to the CNSC through these reports.

### 5.2 PHCF Environmental Risk Assessment

The updated ERA to meet the requirements of Canadian Standards Association (CSA) standard N288.6-12, Environmental Risk Assessment at Class I Nuclear Facilities and Uranium Mines and Mills is the most recent ERA completed for the site and includes a screening for contaminants of potential concern, a Human Health Risk Assessment (HHRA), Ecological Risk Assessment and additional studies regarding physical stressors such as temperature and entrainment. This recently completed work has been provided to the CNSC and a summary will be made publically available. The ERA made the following recommendations, which will be taken into consideration during the planning, implementation and follow-up to the VIM project:

- Contamination in the grass patch along the harbour walls needs to be addressed, in coordination with VIM and PHAI;
- Cameco should ensure that decision-making during VIM is risk-informed where appropriate; and,

- Once remediation activities under VIM are complete, Cameco should review its soil monitoring program to ensure that it is adequate for the new conditions.

### **5.3 Environmental Assessment Reviews**

The comprehensive study EA for the Vision 2010 project was completed in 2011 under CEAA. The CNSC was the only Responsible Authority for the project with Federal Authorities including Health Canada, Fisheries and Oceans Canada, and Natural Resources Canada with EC providing technical expertise during the review process. As previously outlined, the CSR was the subject of a CNSC public hearing in May 2012, and the EA for Vision 2010 was accepted by the Federal Minister of the Environment in December 2012.

#### **5.3.1 EA Follow-up Monitoring Program**

The preliminary scope of the EA Follow-up Monitoring Program focused on the potential environmental effects of the project, namely airborne particulate, radioactive constituents associated with the particulate (uranium and  $^{226}\text{Ra}$ ) and noise. Appendix 2 provides the EMP-VIM.

Throughout the VIM and PHAI Port Hope projects, PHCF will carry out its Environmental Monitoring Plan (EMoP) to the extent practicable. Certain aspects of the plan may require partial or full suspension to accommodate the activities of the two projects. Examples include:

- Soil monitoring results during VIM and PHAI will be inconclusive with respect to differentiating the impact of PHCF or VIM activities due to influence from other projects (i.e. PHAI). If the soil monitoring locations in the current program remain accessible, Cameco will continue to collect soil samples on an annual basis, with the caveat that interpretation of the results will not be feasible during this time.
- The surface water monitoring program will be suspended during the period of time that the PHAI has the harbour isolated and is carrying out harbour remediation activities.
- In order to facilitate different parts of VIM, some groundwater wells (monitoring and/or collection wells) may require abandonment or may be inaccessible due to adjacent activity. This may result in temporary deviation from the groundwater monitoring and/or collection programs.

All deviations from the EMoP would be documented in the quarterly compliance reports with an explanation of the rationale, expected timeframe and mitigative measures (if required) that are in place. Section 6.3 provides a summary of the Follow-up Verification or Changes to EMoP related to VIM.

Post-VIM/PHAI, Cameco will re-evaluate the site operations, potential impacts and determine what modifications may be required to the programs, following the guidance of

the applicable standards and regulatory documents listed in the PHCF Licence Conditions Handbook (LCH). These potential changes to the EMoP will require prior notification to CNSC staff.

## 6.0 PROJECT HAZARDS AND CONTROLS

From an environmental, radiological and health and safety perspective, the activities associated with the tasks described in section 3.0 can be grouped as follows:

- Transfer of accumulated wastes: These activities include the preparation and transfer of drummed and bagged wastes from storage to the LTWMF.
- Demolition activities: These activities include removal of hazardous materials from interiors; removal of equipment, material and building services; cleaning of building interiors; building dismantlement; and management of removed demolition waste.
- Excavation activities: These activities include the targeted removal of soil at both the Main Site and the Centre Pier. The excavation method to be used will depend on the subsurface soil and groundwater conditions, the depth of excavation, and the proximity to facilities. Excavation will include shallow excavations above the groundwater table and excavations that extend to or below the groundwater table.
- Construction activities: These activities include modifications to existing buildings, potential construction of a new building or building addition and upgrades to site infrastructure, such as pipe racks, underground utilities as well as on-site roads, parking, fencing and lighting and finished grading.
- Transportation and disposal of contaminated and non-contaminated materials: Contaminated wastes will be transported to the LTWMF. Non-contaminated waste materials may be transported to other waste outlets. Materials to be transferred to the LTWMF include drummed wastes, contaminated soils, demolition debris, and asbestos-containing material.

The VIM project will be undertaken within the general framework of the programs and plans currently in place at the PHCF, with project-specific documentation put in place where required. From the activities described above, the following Safety and Control Areas (SCAs) may be affected:

- Management System
- Human Performance Management – Training
- Safety Analysis
- Physical Design
- Radiation Protection
- Conventional Health and Safety
- Environmental Protection
- Emergency Management and Fire Protection
- Waste Management
- Security
- Safeguards
- Handling, Storing, Packaging and Transport

- Facility Specific
  - Public Information Program
  - Aboriginal Engagement

## **6.1 VIM Project - Management Systems**

The VIM project will be executed through the existing PHCF CUP (WMP-02) framework and site management system (QMPPM). Consequently the programs and procedures defined in the QMPPM and WMP-02 are applicable to VIM. Planning for CUP projects incorporates an assessment of the relevant safety and control areas. Further discussion is provided in Table 2.

Appendix 2 of this document provides the Supplemental Environmental Monitoring Plan for VIM (EMP-VIM). This plan was developed to augment Cameco's existing EMoP, which monitors the effects of Cameco's on-going operations. The Environmental Monitoring Plan (EMP-VIM) for the VIM project is focused on monitoring for the expected demolition, construction, remediation and radiological effects that are possible as a result of VIM activities and will only be applied for the period of the VIM project.

## **6.2 PHCF Programs, Plans and Procedures**

The following table outlines the existing site documentation that fulfil these requirements, and where applicable, what supplemental plans/assessments may be required.

**Table 1: Summary of PHCF Environmental and Health and Safety Programs, Plans and Procedures**

Area of Interest	Relevant Site Program/Plan/Procedure	Non-routine Process or Supplemental Plan Required
Management System	The PHCF Quality Management Program Manual (QMPPM) and all requirements therein apply to the VIM project.	N/A
Human Performance Management - Training	No change to existing training measures are needed for this project. The existing training/orientation requirements for this work are defined in WMP-02 and contractor training is managed as per the requirements of the Contractor Safety Management Plan.	Any specialized contractor requirements would be defined through the procurement process, and the appropriate documentation provided for Cameco review and acceptance prior to work commencing.
Safety Analysis	The EA provided a comprehensive assessment of the project and any potential impacts. Additional assessments have been completed as part of the project planning, including a screening-level risk assessment and gamma modelling.	All work will require a Job Hazard Analyses (JHA), procedure or other work instruction that will identify potential hazards and controls for specific tasks within the project.
Physical Design	All CUP-type projects require adherence to the Process and Design Change Control Procedure (CQP-113).	N/A
Radiation Protection	The project work areas have potential for radiation exposure. Radiation protection for employees and contractors involved in the project will follow the current practices described in the Radiation Protection Program Manual (RPPM). All workers with the potential for a dose greater than the public dose limit will be trained and designated as Nuclear Energy Workers (NEWs). All NEW workers will be monitored through the internal and external dosimetry programs described in the RPPM and associated procedures. Other measures described in the RPPM pertaining to zone control, contamination control and work planning are also applicable.	Radiation Protection Work Permits (RPWP) will be issued if specific activities have the potential for increased radiation exposure. A combination of operational controls and limited work duration may be necessary to ensure that the potential dose is kept as low as reasonably achievable.
Conventional Health and Safety	Conventional health and safety, including industrial hygiene will be managed in accordance with the Occupational Health and Safety Management Program Manual and the Contractor	The following risk mitigation tools may be used to augment the JHA and TASC assessments to ensure work is completed as safely as possible.

Area of Interest	Relevant Site Program/Plan/Procedure	Non-routine Process or Supplemental Plan Required
	Safety Management Plan. Activities under the VIM project will require the use of procedures, work instructions, JHA and/or Task Analysis Safety Card (TASC) assessments to identify and manage potential hazards.	<p>The specific risk mitigation tool requirement(s) for each will be determined during the development and approval of the JHA for each job.</p> <ul style="list-style-type: none"> <li>- Notification and Safety Clearance</li> <li>- RPWP</li> <li>- Confined Space Entry Permit</li> <li>- Hot Work Permit</li> <li>- Safety Clearance for High Voltage Equipment and Hazardous Electrical Work</li> <li>- Exception to Zero Energy State Permit</li> <li>- Excavation Permit</li> </ul>
Environmental Protection	The existing EMoP is primarily designed to monitor the ongoing impacts of the current production operations. While ambient monitoring programs will continue, and will provide data that may be relevant to the project, supplemental monitoring will be required that is appropriate to the project tasks. Existing operational controls such as designated processing areas with emission and noise controls, and contamination control practices will support the environmental protection aspects of the project.	A supplemental EMP for VIM will be implemented during the VIM project. This plan outlines monitoring appropriate to specific activities and is not intended to be applied in its entirety for the duration of the project, rather used to define the specific monitoring parameters (i.e. ambient air and acoustical measurements) to be applied to each work package.
Emergency Management and Fire Protection	No change to existing emergency preparedness measures are needed for this project. The existing Emergency Response Plan, Fire Safety Plan and Fire Protection Plan and associated work controls such as hot work permits will be used to prevent and/or mitigate an emergency during the project.	Project sequencing will take into consideration accessibility for the emergency response vehicles to different areas of the facility during VIM to ensure that areas of the facility are not isolated/stranded.
Waste Management	All materials removed during the VIM project will be processed in accordance with WMP01 – Waste Management Plan and WMP02 – Clean-Up Program. This will involve segregation at source (where practical) into recyclable,	Special handling is required for wastes identified to contain depleted uranium or enriched uranium; to be polychlorinated biphenyl (PCB)-contaminated; and asbestos or other hazardous



Area of Interest	Relevant Site Program/Plan/Procedure	Non-routine Process or Supplemental Plan Required
	<p>contaminated combustible, contaminated non-combustible and uncontaminated waste. Processing of materials will occur in designated areas.</p> <p>The VIM project includes transfer of materials meeting the WAC to the LTWMF being constructed by the PHAI.</p>	<p>material (ie. hydrogen fluoride) –containing. Any of these wastes would be segregated and managed as per the WMP-01.</p>
Security	<p>The security of the licensed site will be maintained as per the Facility Security Plan for the duration of the project.</p>	<p>Temporary deviations from existing security measures (i.e. during fenceline shift or licence transfer of Centre Pier) will be completed in a manner to ensure an equivalent measure of security.</p>
Safeguards	<p>All transfers of stored wastes and/or wastes generated during the VIM project will be managed in accordance with Cameco’s existing safeguards practices, including inventory and reporting as per RD-336 Accounting and Reporting of Nuclear Material.</p>	<p>N/A</p>
Handling, Storing, Packaging and Transport	<p>Existing site procedures for handling, storing, loading, transporting and receipt of nuclear substances and other dangerous goods are sufficient to cover the aspects of this project.</p>	<p>N/A</p>
Facility-Specific	<p>The tools within the Public Information Program for the facility are sufficient to provide ongoing information to interested members of the public as well as outreach to First Nations, municipal officials and other key stakeholders.</p>	<p>N/A</p>

### **6.3 VIM Hazards and Mitigation**

The VIM specific plans that will be developed to guide VIM specific activities include:

- environmental monitoring plan (EMP-VIM) (Appendix A); and
- building-specific equipment removal and demolition plans

Table 2 provides a summary of the potential environmental effects (hazards) associated with the VIM Project and commitments to mitigate the effects as identified in the CSR for the Vision 2010 Project. A summary of any VIM monitoring will be included in Cameco's quarterly and annual compliance reports.

**Table 2: Summary of Potential Environmental Hazards and Mitigation for the VIM Project**

Potential Environmental Effects (Hazards)	Project Activities	Mitigation and Monitoring During VIM	Follow-up Verification or Changes to EMoP
Radiation and Radioactivity - Potential public and worker exposure to elevated dose levels	On-going site activities (totes, drums and cylinder storage)	<ul style="list-style-type: none"> <li>a. soil berm or concrete barrier</li> <li>b. fenceline gamma monitoring (ongoing)</li> <li>c. worker dosimetry program</li> </ul>	1. Post-VIM follow-up fenceline gamma monitoring and final report to confirm effectiveness
Air Quality - Generation of airborne particulate and associated contaminants of concern	Demolition, soil excavation and construction activities	<ul style="list-style-type: none"> <li>a. employing effective dust mitigation techniques</li> <li>b. ensuring that all mobile equipment used on site is in good repair</li> <li>c. air monitoring as part of EMP-VIM</li> </ul>	1. Soil monitoring program scope and objectives to be reviewed post-VIM and deposition during the project should be considered.
Air Quality - Generation of airborne particulate and vehicle exhaust	Transportation activities	<ul style="list-style-type: none"> <li>a. ensuring that all dump trucks travelling to and from the PHCF site are in good repair and fitted with functioning mufflers</li> <li>b. dump trucks will be appropriately covered when transporting contaminated soils</li> </ul>	N/A – only applicable during project.
Noise - Elevated levels at sensitive receptors	Demolition activities	<ul style="list-style-type: none"> <li>a. prohibiting the use of explosives</li> <li>b. limiting demolition activities to daytime hours to the greatest extent possible</li> <li>c. ensuring that all mobile equipment used on site is in good repair, fitted with functioning mufflers and comply with the noise emission standards outlined in MOECC guidelines</li> <li>d. ensuring that all dump trucks travelling to and from the PHCF site are in good repair and fitted with functioning mufflers</li> <li>e. complying with the time and place restrictions stipulated for construction activities in the local noise by-law</li> <li>f. noise monitoring as part of EMP-VIM</li> </ul>	N/A – only applicable during project.
	Excavation activities	<ul style="list-style-type: none"> <li>a. limiting excavation activities to daytime hours to the greatest extent possible</li> </ul>	N/A – only applicable during project.

Potential Environmental Effects (Hazards)	Project Activities	Mitigation and Monitoring During VIM	Follow-up Verification or Changes to EMoP
		<ul style="list-style-type: none"> <li>b. ensuring that all mobile equipment used on site is in good repair, fitted with functioning mufflers and comply with the noise emission standards outlined in MOECC guidelines</li> <li>c. complying with the time and place restrictions stipulated for construction activities in the local noise by-law</li> <li>d. noise monitoring as part of EMP-VIM</li> </ul>	
	Construction activities	<ul style="list-style-type: none"> <li>a. ensuring that all mobile equipment used on site is in good repair, fitted with functioning mufflers and comply with the noise emission standards outlined in MOECC guidelines</li> <li>b. limiting construction activities to daytime hours, to the greatest extent possible</li> <li>c. maximizing the separation distance between the construction staging areas and nearby receptors to the greatest extent possible</li> <li>d. maintaining on-site construction haul roads to prevent pot holes and ruts thereby avoiding the loud noises caused by construction vehicles travelling over uneven road surfaces</li> <li>e. complying with the time and place restrictions stipulated for construction activities in the local noise by-law</li> <li>f. noise monitoring as part of EMP-VIM</li> </ul>	N/A – only applicable during project.
	Transportation of waste	<ul style="list-style-type: none"> <li>a. ensuring that all dump trucks travelling to and from the PHCF site are in good repair and fitted with functioning mufflers</li> <li>b. limiting on-site truck traffic to daytime hours to the greatest extent possible</li> </ul>	N/A – only applicable during project.
Surface Water Quality - Runoff during storm events - also protects aquatic habitat	Demolition and excavation activities	<ul style="list-style-type: none"> <li>a. construction of diversion dykes to channel runoff around the excavation areas</li> <li>b. covering of stockpiles and excavated soil with secured tarps or plastic sheeting during significant storm events</li> <li>c. placing sand bags, water-filled bags or equivalent to prevent surface water escape</li> </ul>	1. Stormwater and surface water monitoring programs to be re-evaluated post-VIM.

Potential Environmental Effects (Hazards)	Project Activities	Mitigation and Monitoring During VIM	Follow-up Verification or Changes to EMoP
		<ul style="list-style-type: none"> <li>d. allowing surface water inside disturbed work areas to drain to open excavations to be collected for treatment, as required</li> <li>e. protecting catch basin inlets using filter fences, geotextiles or an excavated sediment trap</li> <li>f. implementing of velocity controls and temporary water holding areas</li> <li>g. flood diversion capability through emergency response plan</li> </ul>	
Sediment Quality - Runoff during storm events - also protects aquatic habitat	Demolition, excavation and construction activities	During severe precipitation events, the following may be implemented to restrict work: <ul style="list-style-type: none"> <li>a. evaluating the safety of haulage to the LTWMF</li> <li>b. evaluating the excavation along the harbour wall and securing equipment and materials, if necessary</li> <li>c. covering stockpiles to minimize runoff</li> <li>d. covering all bins and roll-off containers</li> <li>e. filling excavations in advance, if possible, when flood warnings are given</li> <li>f. flood diversion capability through emergency response plan</li> </ul>	N/A – only applicable during project.
Groundwater	On-going operation	<ul style="list-style-type: none"> <li>a. contaminated soil remediation;</li> <li>b. installation of five new groundwater treatment wells</li> <li>c. groundwater monitoring program</li> <li>d. water treatment through waste recovery</li> <li>e. potential treatment and release of treated groundwater</li> </ul>	<ol style="list-style-type: none"> <li>1. Groundwater treatment system risk-based performance objectives to be developed and implemented.</li> <li>2. Groundwater monitoring program to be reviewed and revised where appropriate to assess (annually) objectives from 1.</li> </ol>
Severe Precipitation and Climate Change	Excavation activities	<ul style="list-style-type: none"> <li>a. improvements to storm water management, (i.e. grit separators)</li> </ul>	<ol style="list-style-type: none"> <li>1. Storm water control study to be completed post-VIM to establish a new baseline.</li> </ol>

Potential Environmental Effects (Hazards)	Project Activities	Mitigation and Monitoring During VIM	Follow-up Verification or Changes to EMoP
		b. adaptive mangement (review stormwater management capacity if severe storm intensity have increased in severity due to climate change) c. flood diversion capability through emergency response plan	2. Stormwater monitoring program to be reviewed and revised where appropriate based on 1.
Malfunctions and Accidents	Contaminant spill resulting in harbour contamination	a. existing plans and proceedures for safe operations b. spill containment practices c. emergency response plan d. event-specific sample collection and analysis	N/A – only applicable during project.
	Release of anhydrous HF (AHF), UF <sub>6</sub> or other hazardous material during removal of piping and equipment	a. existing plans and procedures for safe handling of hazardous materials b. project specific plans including: <ol style="list-style-type: none"> <li>i. dismantlement, decontamination and demolition plan</li> <li>ii. safety clearances for hot work</li> <li>iii. adequate training and use of personal protective equipment (PPE)</li> <li>iv. sequencing of demolition and equipment removal activities</li> <li>v. portable fume collection</li> </ol> c. spill containment practices d. emergency response plan e. event-specific sample collection and analysis	N/A – only applicable during project.
	Transportation accident involving release of uranium into the Ganaraska River	a. existing plans and procedures for the safe handling of these materials b. spill containment c. emergency response plan d. event-specific sample collection and analysis	N/A – only applicable during project.

Following VIM, the following facility assessments will need to be updated to reflect the changes to the facility:

1. Safety Report
2. Environmental Risk Assessment
3. Preliminary Decommissioning Plan
4. Emission Summary Dispersion Model Report
5. Derived Release Limit and Operating Release Levels

The results of this work will then need to be incorporated into the Environmental Management Program and the EMoP modified as necessary. It is anticipated that the following aspects of the EMoP may require changes post-VIM:

1. Ambient air monitoring
2. Soil monitoring
3. Groundwater monitoring
4. Surface water monitoring
5. Stormwater monitoring
6. Fenceline gamma monitoring

## 7.0 CONCLUSION

Upon completion of the project scope, the following will be accomplished:

- Waste materials at the PHCF within the defined remediation scope will have been transferred to the LTWMF (or other waste outlets as appropriate).
- New or modified infrastructure will have been commissioned as needed to support the project objectives for building modifications and new infrastructure.
- The environmental objectives of the project will have been achieved.
- Improvements to the PHCF, which are consistent with the community planning objectives for development of the lands around the Port Hope harbour will have been completed, including the transfer of the Centre Pier property back to the MPH.

The VIM project will be executed within the CUP program framework which permits Cameco to remove obsolete buildings, equipment and materials for the purpose of reducing environmental obligations, creating useable space and improve the appearance of the facility. As described in sections 2.4 and 2.5 Cameco has demonstrated the robustness of this program in recent years through the safe completion of CUP projects with activities similar to the VIM project.

As part of licence renewal activities occurring in 2016, Cameco requests that the operating licence for the PHCF specifically provide the authorization through a site-specific licence condition for PHCF to engage in clean-up, decontamination, demolition and remediation activities (including VIM) that are currently part of the licensing basis through the Facility Licensing Manual, Waste Management Plan and Clean-Up Program.

## 8.0 REFERENCES

Canadian Nuclear Safety Commission. 2012. *Proposed Comprehensive Study Report for Cameco Corporation's Proposed Redevelopment of the Port Hope Conversion Facility (Vision 2010)*; CEAR 06-03-22672. May.

Cameco Corporation. 2010. *Cameco Vision 2010 Environmental Impact Statement – December 2010*

### **ERA Documents**

SENES Consultants Limited. 2009a. *Port Hope Conversion Facility Site-Wide Risk Assessment: Human Health and Ecological Risk Assessment*. Prepared for Cameco Corporation.

SENES Consultants Limited. 2009b. *UPDATE - Port Hope Conversion Facility Site-Wide Risk Assessment: Human Health and Ecological Risk Assessment*, Prepared for Cameco Corporation.

SENES Consultants Limited. 2010. *Follow Up – Port Hope Conversion Facility Site-Wide Risk Assessment: Human Health and Ecological Risk Assessment*. Prepared for Cameco Corporation.

Arcadis Canada Inc. 2015. *Environmental Risk Assessment for the Cameco Port Hope Conversion Facility*. Prepared for Cameco Corporation.

**Appendix 1 – List of Acronyms Used in the Supplemental VIM Submission**

Cameco	Cameco Corporation
CEAA	<i>Canadian Environmental Assessment Act</i>
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CSA	CSA Group - internationally-accredited standards development and testing & certification organization
CSR	Comprehensive Study Report
CUP	Clean-Up Program
EA	Environmental Assessment
EC	Environment Canada
ECA	Environmental Compliance Approval
EIS	Environmental Impact Statement
EMoP	Environmental Monitoring Plan
ERA	Environmental Risk Assessment
FFOL	Fuel Facility Operating Licence
HF	Hydrogen fluoride
HHRA	Human Health Risk Assessment
JHA	Job Hazard Analysis
LCH	Licence Conditions Handbook
LTWMF	Long-term waste management facility
MOECC	Ontario Ministry of the Environment and Climate Change
NEW	Nuclear Energy Worker
NSCA	<i>Nuclear Safety and Control Act</i>
PCB	Polychlorinated biphenyl
PHAI	Port Hope Area Initiative
PHCF	Port Hope Conversion Facility
PIP	Public Information Program
QMPM	Quality Management Program Manual
RPPM	Radiation Protection Program Manual
SCA	Safety and Control Area
Centre Pier	Property at 1 Hayward Street used for storage
PHCF Main Site	Property at 1 Eldorado Place used for operations and storage



Dorset Street East	Property at 158 Dorset Street East used for storage
UO <sub>3</sub>	uranium trioxide
UO <sub>2</sub>	uranium dioxide
UF <sub>6</sub>	uranium hexafluoride
VIM	Vision in Motion Project
VIM EMP	Vision in Motion Environmental Monitoring Plan
WAC	Waste Acceptance Criteria
WMP-01	Waste Management Plan
WMP-02	Clean-Up Program

Attachment 3: Documents Supporting the Licence Application

The PHCF has identified the following documents to be relevant to supporting this application for the renewal of its Fuel Facility Operating Licence (FFOL-3631.0/2017). Changes to this list since the November 20, 2015 application are identified by an asterisk (\*). The current versions of written notification documents are tracked by both Cameco and CNSC staff.

Document Title	Document Type
Safety, Health, Environment and Quality Policy	Corporate
Quality Management Program	Corporate
Environmental Management Program	Corporate
Environmental Management Program	Corporate
Safety and Health Management Program	Corporate
Radiation Protection Program	Corporate
Emergency Preparedness and Response Program	Corporate
2017 Licence Renewal Application for the Port Hope Conversion Facility*	Site
2017 Licence Renewal Application for the Port Hope Conversion Facility – Supplemental VIM Submission*	Site
Facility Licensing Manual (FLM)	Site
Quality Management Program Manual (QMPPM)	Site
Quality Control Program for Pressure Piping and Vessels	Site
CQP-113 Process and Design Change Control	Site
TP-01 Port Hope Training Plan	Site
CQP-942 UF <sub>6</sub> Plant Operations Training Procedure*	Site
CQP-943 UF <sub>6</sub> Supervisor Training Procedure*	Site
PHF.UF <sub>6</sub> .SO70.3 Standard for Minimum Crew Complement in UF <sub>6</sub> Operations*	Site
SO40 Minimum Staffing Requirements UO <sub>2</sub> Production Plant*	Site
SOG019 Emergency Response Team Minimum Staffing*	Site
Radiation Protection Program Manual	Site
Nuclear Criticality Safety Program Manual	Site
Environmental Management Program Manual	Site
Environmental Monitoring Plan	Site
Occupational Health and Safety Manual	Site
OHSPLAN 001 Contractor Safety Management Plan	Site
Emergency Response Plan	Site

Document Title	Document Type
CQP 1200 Fire Protection Program	Site
CQP 1201 Fire Safety Plan	Site
PHCF Security Plan	Site
Waste Management Plan	Site
Clean-Up Program	Site
Public Information Program	Site
Safety Report for the Port Hope Conversion Facility	Supporting Study
Environmental Risk Assessment	Supporting Study
Derived Release Limit	Supporting Study
Operating Release Levels	Supporting Study
Fire Hazard Analysis	Supporting Study
Preliminary Decommissioning Plan*	Supporting Study
Internal Dosimetry Technical Basis Document	Division
Pressure Systems Certificates of Authorization	TSSA
Dosimetry Licence for FSD	CNSC
Permit to Take Water (PTTW) - Cooling Water	MOECC
Permit to Take Water (PTTW) - Ground Water	MOECC
Amended Environmental Compliance Approval (ECA) – Air	MOECC
Amended Environmental Compliance Approval (ECA) – Sewage Works	MOECC