Cameco

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May 18, 2018

Ms. Sarah Eaton
Senior Project Officer
Nuclear Processing Facilities Division
Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, ON K1P 5S9

Dear Ms. Eaton,

Quarterly Compliance Report – Port Hope Conversion Facility

Please find enclosed the Port Hope Conversion Facility's first quarter 2018 Quarterly Compliance Monitoring & Operational Performance Report. The report has been written to comply with the requirements in the CNSC document, "Annual Compliance Monitoring and Operational Performance Reporting Requirements for Class 1A and B Nuclear Facilities", dated March 2011.

If you have any questions or concerns regarding this matter, please contact me.

Sincerely,

Suzanne Frankcom-Wright
Coordinator, Regulatory Compliance

Cc: Mr. Mike Jones

c: Ms. Kavita Murthy, Canadian Nuclear Safety Commission
Mr. David Bradley, Ministry of the Environment and Climate Change
Mr. David Fisher, Ministry of the Environment and Climate Change
Mr. D. Kim, Environment Canada
Ms. A. Rappl, Municipality of Port Hope (arappl@porthope.ca)
Ms. T. Wilson, Municipality of Port Hope (twilson@porthope.ca)
Port Hope Library

2018 First Quarter Compliance Monitoring
&
Operational Performance Report

Reporting Period January 1 – March 31, 2018

Port Hope Conversion Facility
Operating Licence
FFOL-3631.00/2027

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: May 18, 2018

I Executive Summary

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

Cameco operates a Class IB nuclear facility in Port Hope, Ontario and employs approximately 330 workers. In the first quarter of 2018, the facility operated under operating licence FFOL-3631.00/2027, which is valid until February 28, 2027.

Cameco is committed to the safe, clean and reliable operation of all of its facilities and continually strives to improve its 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 programs, plans and procedures, PHCF's operations have maintained radiation exposures to workers and the public well below the regulatory dose limits. Environmental emissions are also being controlled to levels that are a fraction of the regulatory limits.

There was one reportable event that occurred in the first quarter.

On January 11, 2018 due to fluctuating weather conditions, a transfer pipe was damaged and released a small amount of groundwater to the storm water system which drains to the harbour adjacent to the PHCF. The duration of the leak was less than one hour.

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1.0 INTRODUCTION

1.1 General Introduction

Cameco Corporation (Cameco) is a major supplier of uranium processing services required to produce fuel for the generation of clean electricity around the world.

Cameco's Fuel Services Division (FSD) is comprised of the Blind River Refinery (BRR), the Port Hope Conversion Facility (PHCF), Cameco Fuel Manufacturing Inc. (CFM) and a divisional head office located in Port Hope, Ontario.

Cameco operates a Class IB nuclear conversion facility in Port Hope, Ontario and employs approximately 330 workers. The facility operated under a Canadian Nuclear Safety Commission (CNSC) five-year operating licence (the Licence), FFOL-3631.00/2027, which is valid until February 28, 2027.

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

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

The acronyms in the following table may appear in this report.

Table 1

Acronyms Used Within This Report	
Acronym	**Description**
AAQC	Ambient Air Quality Criteria
AHF	Anhydrous Hydrogen Fluoride
ALARA	As Low As Reasonably Achievable
BRR	Blind River Refinery

Bq/cm^2	Becquerel per Square Centimeter
Cameco	Cameco Corporation
CaO	Calcium Oxide
CBT	Computer Based Training
CCC	Criticality Control Committee
CCM	Contaminated Combustible Material
CCME	Canadian Council of Ministers of the Environment
CFM	Cameco Fuel Manufacturing
Charter	The Safety Charter
CIRS	Cameco Incident Reporting System
CNC	Contaminated Non-Combustible Material
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
COC	Contaminants of Concern
CSSC	Conversion Safety Steering Committee
CUP	Clean Up Program Operations Group
DU	Depleted Uranium
EC	Environment and Climate Change Canada
ECA	Environmental Compliance Approval
EHS	Environmental Health and Safety
EMP	Environmental Monitoring Plan
ERP	Emergency Response Plan
ERT	Emergency Response Team

FHA	Fire Hazard Assessment
FBW	Filter Backwash
FFI	Facility Fire Inspections
FMEA	Failure Mode and Effects Analysis
FPP	Fire Protection Program
FSD	Fuel Services Division
gU/h	Grams of Uranium per Hour
HAZOP	Hazard and Operability Analysis
HF	Hydrogen Fluoride
HIRAC	Hazard Identification, Risk Assessment and Control
HRSDC	Human Resources and Skills Development Canada
IAEA	International Atomic Energy Agency
ICAM	Intelligent Alpha/Beta Continuous Air Monitor
IMS	Incident Management System
ISO	International Standards Organization
ITM	Inspection, Testing and Maintenance
JHA	Job Hazard Analysis
LCH	Licence Conditions Handbook
Licence	Licence FFOL-3631.00/2027
LIMS	Laboratory Information Management System
LOPC	Loss of Primary Containment
LTWMF	Long Term Waste Management Facility
MEWS	Ministry of the Environment Wastewater System

MISA	Municipal/Industrial Strategy for Abatement
MOECC	Ontario Ministry of the Environment and Climate Change
MPH	Municipality of Port Hope
mSv	Millisievert
NDR	National Dose Registry
NEW	Nuclear Energy Worker
NFPA	National Fire Protection Association
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NSCA	Nuclear Safety Control Act
NUO_2	North UO_2 Plant
OH&S	Occupational Health and Safety
ORL	Operating Release Level
OSL	Optically Stimulated Luminescence
PDP	Preliminary Decommissioning Plan
PHCF	Port Hope Conversion Facility
PHFES	Port Hope Fire and Emergency Services
PTTW	Permit to Take Water
Q1	First Quarter
Q2	Second Quarter
Q3	Third Quarter
Q4	Fourth Quarter

QA	Quality Assurance
QMI-SAI	Quality Management Institute – Standards Australia International
RE	Reliability Engineering
SAT	Systematic Approach to Training
SCBA	Self-Contained Breathing Apparatus
SCI	South Cooling Water Intake
SEU	Slightly Enriched Uranium
SHEQ	Safety Health Environment and Quality
SPOC	Single Point of Contact
SSC	Systems Structures and Components
SuperCUP	Clean Up Program to remove historic equipment and structures
SWCS	Storm Water Control Study
TC	Transport Canada
TRIR	Total Recordable Injury Rate
UF_6	Uranium Hexafluoride
µgU/L	Micrograms of Uranium per Litre
ULN	Upper Limit of Normal
UO_2	Uranium Dioxide
UO_2N	UF_6 plant/Building 2 Cooling Water Return
UO_2S	UO_2 Plant Cooling Water Return
UO_3	Uranium Trioxide
µSv/h	Microsievert per Hour

µSv	Microsievert
WSIB	Workplace Safety and Insurance Board

* Not all acronyms listed above appear in every quarterly.

1.2 Facility Operation

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

In addition to Cameco requirements regarding management systems, the facility's quality program has been designed to meet section 3(d) of the *Class I Nuclear Facilities Regulations*. This program provides the controls to ensure all processes are conducted in a safe manner and that processes applying to licensed activities are conducted in accordance with applicable CNSC quality requirements and other regulatory requirements. The application of the quality requirements is scaled according to the safety significance (complexity and hazard potential) of a particular activity.

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

There were no significant changes to the physical design of equipment, processes and the facility in the first quarter 2018.

On January 11, 2018 due to fluctuating weather conditions, a transfer pipe was damaged and released a small amount of groundwater to the storm water system which drains to the harbour adjacent to the PHCF. The duration of the leak was less than one hour.

The UF_6 plant was restarted in December 2017 and ran continuously throughout the quarter.

The UO_2 plant was successfully restarted in January 2018 after the vacation shutdown and ran continuously throughout the quarter.

1.3 Production or Utilization

The maximum daily production rate for the UF_6 plant did not exceed the licensed limit of 45 tonnes uranium as UF_6 per day during the first quarter.

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

1.4 Facility Modification

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

The following PHCF documents referenced in the Licence Conditions Handbook (LCH) were updated and submitted for CNSC staff review in the first quarter:

- Management Systems Program Manual; and
- CQP-942 UF_6 Plant Operations Training Procedure.

2.0 SAFETY AND CONTROL AREAS

2.1 Management

2.1.1 Management System

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

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

The 2018 internal audits have been scheduled for the year.

One external customer audit was completed during the first quarter of 2018. The results of the audit have been entered into Cameco's Incident Reporting System and will be tracked to completion.

In order to come into compliance with CSA N286-12 Management System requirements for nuclear facilities, Cameco updated its Management Systems Program Manual.

The CNSC conducted two inspections at the PHCF during the first quarter.

The PHCF received the following inspection reports from the CNSC in the first quarter:

- CNSC Compliance Inspection Cameco-PHCF-2017-04 Report; and,
- CNSC Compliance Inspection Cameco-PHCF-2017-05 Report.

Cameco strives for continual improvement and is committed to ensuring the safety of employees, the public and the environment. The corrective actions related to inspection reports are assigned as appropriate.

2.1.2 Human Performance Management

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

UF_6 training included operator and supervisor training as well as the maintenance of area qualification and requalification schedules for operator qualification. A new UF_6 technical writer received UF_6 overview training.

A new UO_2 technical writer received UO_2 overview training. Maintenance of area qualifications continues for qualified operators.

During the first quarter, the PHCF maintained a sufficient number of production personnel and emergency response team members to ensure that operating production areas and the site were adequately staffed to run safely.

2.1.3 Operating Performance

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

In the first quarter of 2018, the PHCF continued to operate in a manner that supports safe, clean and reliable production and in compliance with applicable acts and regulations.

The UF_6 plant was restarted in December 2017 and ran continuously throughout the quarter.

The UO_2 plant was successfully restarted in January 2018 after the vacation shutdown and ran continuously throughout the quarter.

The PHCF operated in accordance with site programs and procedures and did not exceed any CNSC regulatory limits during the quarter.

2.2 Facility and Equipment

2.2.1 Safety Analysis

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

The PHCF has a safety report that documents the detailed safety analysis carried out for the facility. The safety report summarizes the systematic review of site operations to identify and assess hazards and potential risks to the public and environment. Cameco uses a hazards and operability (HAZOP) approach to assess new processes or equipment. This focuses on equipment, instrumentation, human actions and other factors that impact on the process. HAZOPs are conducted prior to making any plant modifications that may affect the safety case for the facility, with the site safety report updated at least every five years to include the findings from any HAZOP's completed since the last revision to the report. The safety report was most recently updated in the fourth quarter of 2015 and was accepted by CNSC staff on April 22, 2016.

There were no modifications made in the quarter that affected the safety case for the PHCF. The safety-significant systems at the facility have been identified and a preventive maintenance program is in place to ensure that the equipment associated with these systems is properly maintained.

2.2.2 Physical Design

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

As part of Cameco's budgeting process for capital expenditures, plant improvements related to physical design are identified and prioritized. A Stage Gate process is used at PHCF to review capital projects at up to four points in the design process. This process includes sign-off by site management (or designate), to ensure that these requirements are addressed in every capital project.

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

There were no significant changes to the physical design of equipment, processes and the facility in the first quarter 2018.

2.2.3 Fitness for Service

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

In the first quarter of 2018, work was conducted in all four areas of Operational Reliability. Highlights included:

- Work Management (WM): Continued working on aspects of work management opportunities through the development of a maintenance communication plan, sharing maintenance best practices across Cameco through workshops, and initiating a Plan-Do-Check-Act process for maintenance key performance indicators.
- Materials Management (MM): Kitting improvement project has been the focus to ensure successful implementation.
- Reliability Engineering (RE): Predictive maintenance activities continue in four key categories: thermal, ultrasonic testing, lubrication and vibration.
- Operations Improvement (OI): Began implementation of a 5S program for maintenance shops and continued focus on programs to engage trades personnel in continuous improvement.

The effectiveness of the program, as it pertains to reliability of equipment and systems, continues to be measured through a number of leading and lagging metrics. Program effectiveness is defined by upward trends of these indicators to reach world class standards for chemical manufacturing facilities.

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

The asset management program accounts for aging 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.

2.3 Core Control Processes

2.3.1 Radiation Protection

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

PHCF has an extensive Radiation Safety Program in place to meet the requirements of the *Nuclear and Safety Control Act* and the *Radiation Protection Regulations* and ensure exposures are kept to levels as low as reasonably achievable (ALARA). The program includes the following aspects:

- External dosimetry – personal monitoring;
- Internal dosimetry – urine analysis and lung counting programs;
- Radioactive contamination control;
- Radioactive waste handling;
- Radioisotope control;
- ALARA program;
- Radiation protection training;
- Respiratory protection program; and
- Radiation exposure control and monitoring.

The CNSC regulatory limits for effective dose for nuclear energy workers (NEWs) are 50 millisievert (mSv) per year and no more than 100 mSv over a specified five year period.

For various radiological parameters, Cameco has established action levels, accepted by the CNSC, which may be indicative of a potential loss of control for that specific parameter. These action levels serve as an early warning of a condition that warrants further investigation. In addition, as a continual improvement tool, Cameco has established lower-tier internal administrative levels and ALARA targets, which are set below the action levels and provide very early warning of a potential concern. A result above an internal administrative level is also investigated and remedial actions taken, if necessary.

Audits and inspections are performed in accordance with the Management Systems Program Manual. Refer to the Management Systems section of this report for further details.

The radiation protection and ALARA programs have been demonstrated to be effective.

The PHCF did not implement any significant changes in the first quarter.

Cameco uses in-house licensed dosimetry services for assigning internal doses to individuals utilizing urine analysis and lung counting programs. In 2014, Cameco received the renewed dosimetry services licence (11010-16-24.0) which is due to expire on November 30, 2024.

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

The radiation protection program at the PHCF is well established, with detailed procedures outlining the processes under each element of the program. Review of the quarterly dose data indicates that the program is effective in the prevention of unreasonable risk to the health and safety of workers. Cameco follows a "top five" approach whereby the work practices of the five employees with the highest year-to-date doses are reviewed.

The following tables and graphs summarize employee external exposure results. Note that in figures with ranges on the horizontal axis, a range of one to two, for example, means all results are greater than one and less than or equal to two.

Whole Body Dose

Table 2 shows the whole body dose summary results from the first quarter of 2018 for six work groups: UF_6 Plant; UO_2 Plant, Maintenance; Technical Support (including NEW contractors), Major Projects; and Administration. The highest exposures were from the Maintenance group.

There was one result above the monthly action level of 2 mSv for a Maintenance employee. An official investigation was completed. While it appeared likely that the exposure was not a valid result, it could not be ruled out. The result was assigned to the employee in order to be as conservative as possible.

Table 2

First Quarter 2018 Whole Body Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	83	0.26	0.00	2.06
UO_2 Plant	23	0.13	0.00	0.38
Maintenance	68	0.13	0.00	2.59
Technical Support [1]	283	0.04	0.00	1.30
Major Projects	19	0.00	0.00	0.00
Administration	84	0.00	0.00	0.04
Total (Max)	**560**	**0.08**	**0.00**	**2.59**
[1]Includes contractors (NEWs)				

Distributions of the quarterly external whole body exposures are shown in Figure 1. 98.6% of whole body exposures were below 1 mSv.

Figure 1

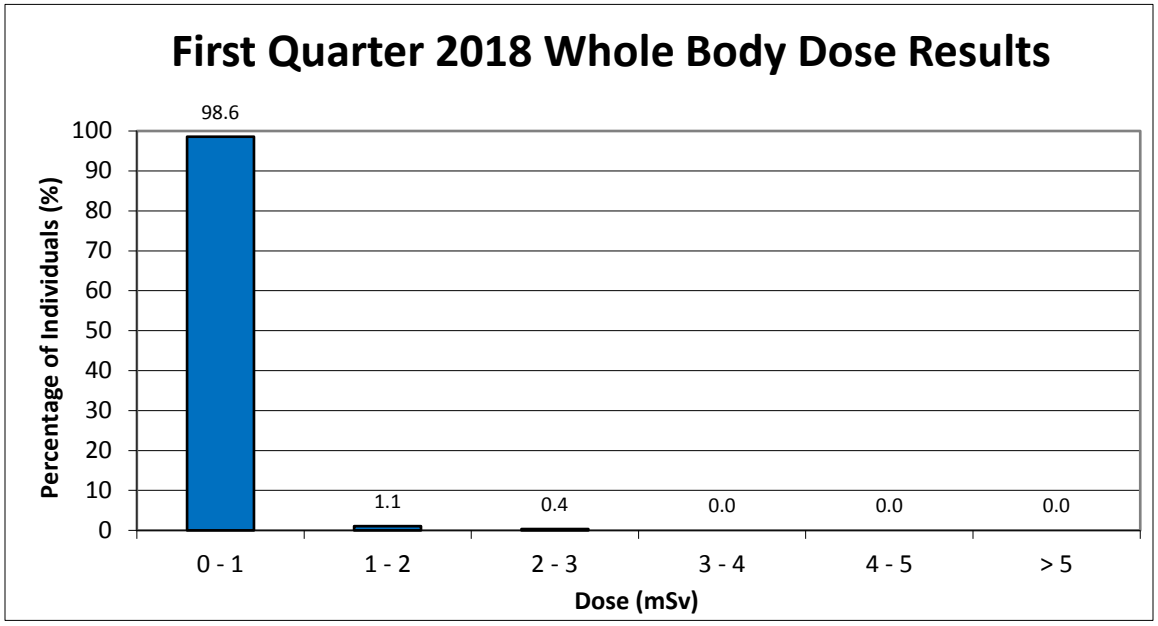


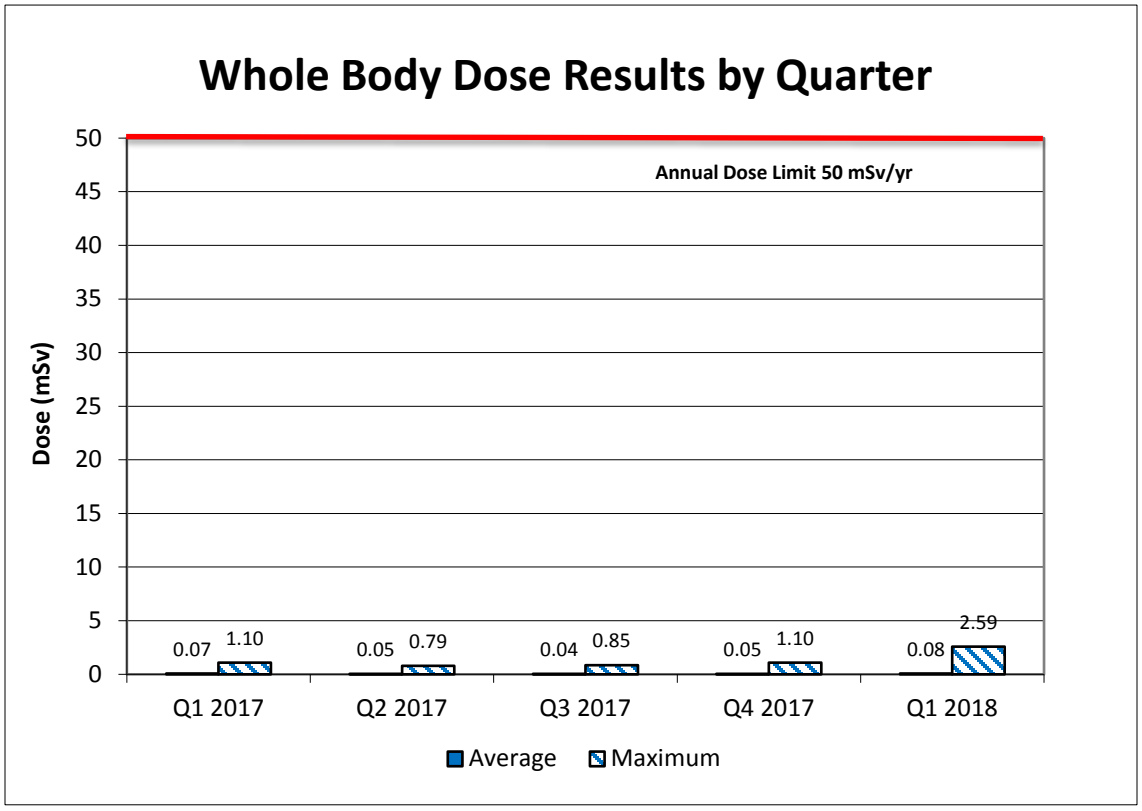
Table 3 and Figure 2 show the employee average, minimum and maximum quarterly individual external whole body exposures for the first quarter of 2017 through to the first quarter of 2018. The average whole body dose is consistent with previous quarters when production is operational. The maximum whole body dose received by a Maintenance employee was investigated and assigned as discussed above.

Table 3

Whole Body Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q1 2017	529	0.07	0.00	1.10
Q2 2017	524	0.05	0.00	0.79
Q3 2017	574	0.04	0.00	0.85
Q4 2017	547	0.05	0.00	1.10
Q1 2018	560	0.08	0.00	2.59

Note: Number of individuals changed for previous quarters due to adjustments made to NEW status.

Figure 2



Skin Dose

Table 4 shows the quarterly skin dose summary results for six work groups: UF_6 Plant; UO_2 Plant; Maintenance; Technical Support (including NEW contractors), Major

Projects; and Administration. The highest exposures are from the UF_6 group related to work in the flame reactor area.

Table 4

First Quarter 2018 Skin Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	83	1.03	0.00	6.54
UO_2 Plant	23	0.69	0.00	1.60
Maintenance	68	0.61	0.00	3.35
Technical[1]	283	0.10	0.00	1.96
Major Projects	19	0.00	0.00	0.01
Administration	84	0.01	0.00	0.24
Total (Max)	**560**	**0.31**	**0.00**	**6.54**
[1]Includes contractors (NEWs)				

Distributions of the quarterly external skin exposures are shown in Figure 3. All of the external skin exposures were below 10 mSv.

Figure 3

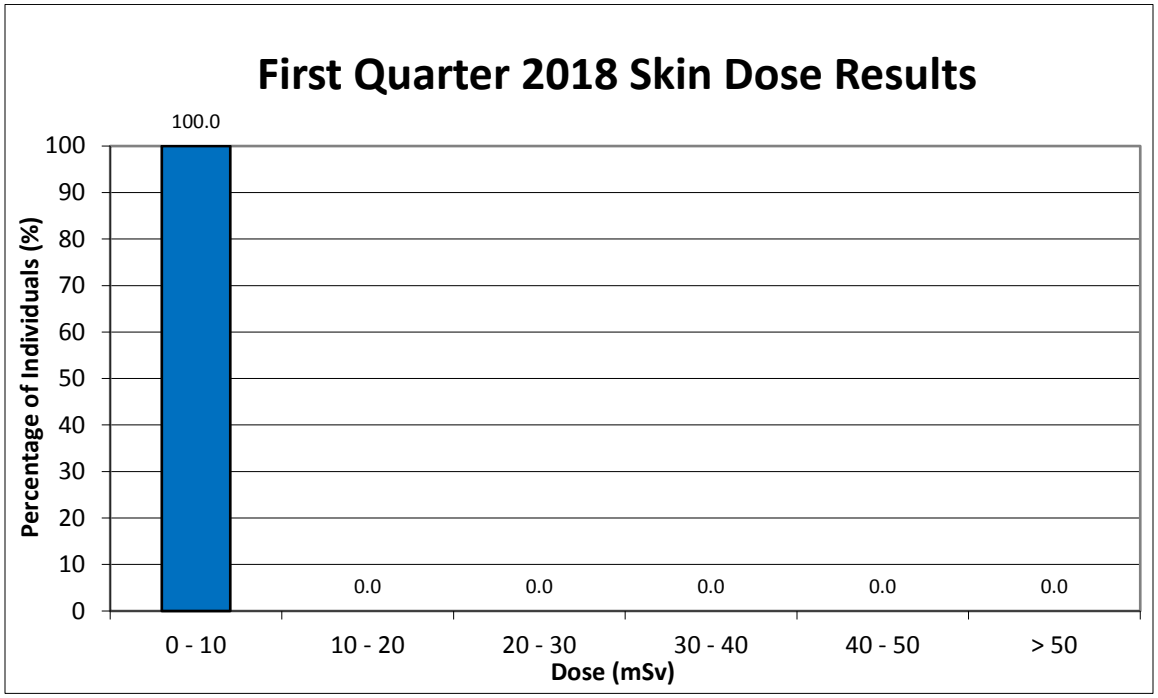


Table 5 and Figure 4 show the employee average and maximum quarterly individual skin exposure for the first quarter of 2017 through to the first quarter of 2018. The average

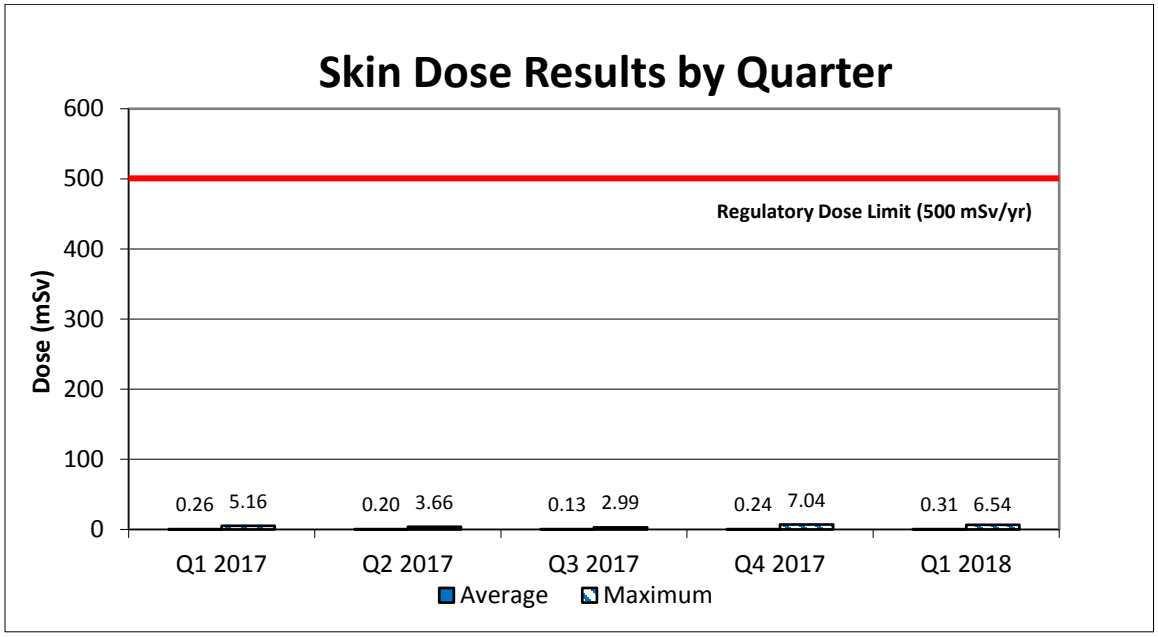
skin dose is consistent with previous quarters in which production and maintenance activities were occurring. The maximum skin dose received by a UF_6 operator was related to flame reactor work activities.

Table 5

Skin Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q1 2017	529	0.26	0.00	5.16
Q2 2017	524	0.20	0.00	3.66
Q3 2017	574	0.13	0.00	2.99
Q4 2017	547	0.24	0.00	7.04
Q1 2018	560	0.31	0.00	6.54

Note: Number of individuals changed for previous quarters due to adjustments made to NEW status.

Figure 4



Urine Analysis

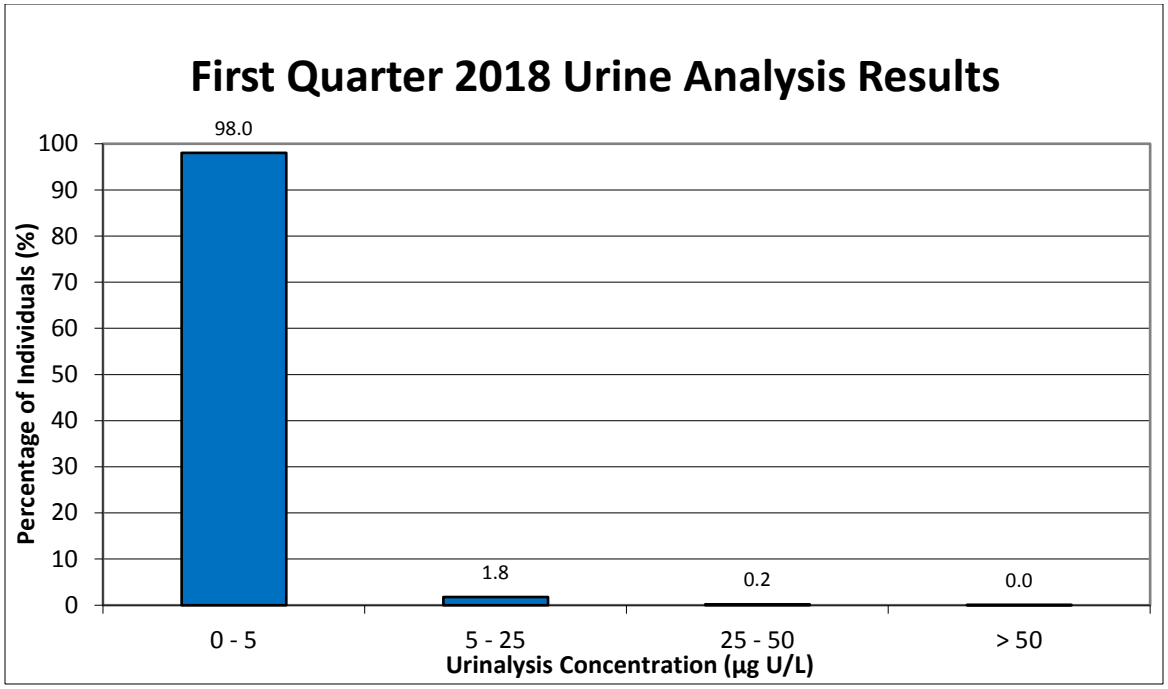
Table 6 and Figure 5 show the distribution of urine results for the first quarter. A total of 7,123 urine samples were collected and analyzed for uranium during the first quarter of 2018. The majority of routine urine analysis results (98.0%) were less than 5 µg U/L in the quarter.

All results above 13 µg U/L were screened by radiation protection staff. There were no official investigations for urine analysis during the first quarter of 2018.

Table 6

First Quarter 2018 Routine Urine Analysis Results	
Distribution of Results	**Q1 2018**
Number of Samples < 5 µg U/L	6,980
Number of Samples > 5 to < 25 µg U/L	126
Number of Samples > 25 to < 50 µg U/L	14
Number of Samples > 50 µg U/L	3
Number of Samples Analyzed (Uranium)	7,123

Figure 5



The distribution of the quarterly internal urine dose for employees is shown in Figure 6. All individual assigned doses were below 0.2 mSv.

Figure 6

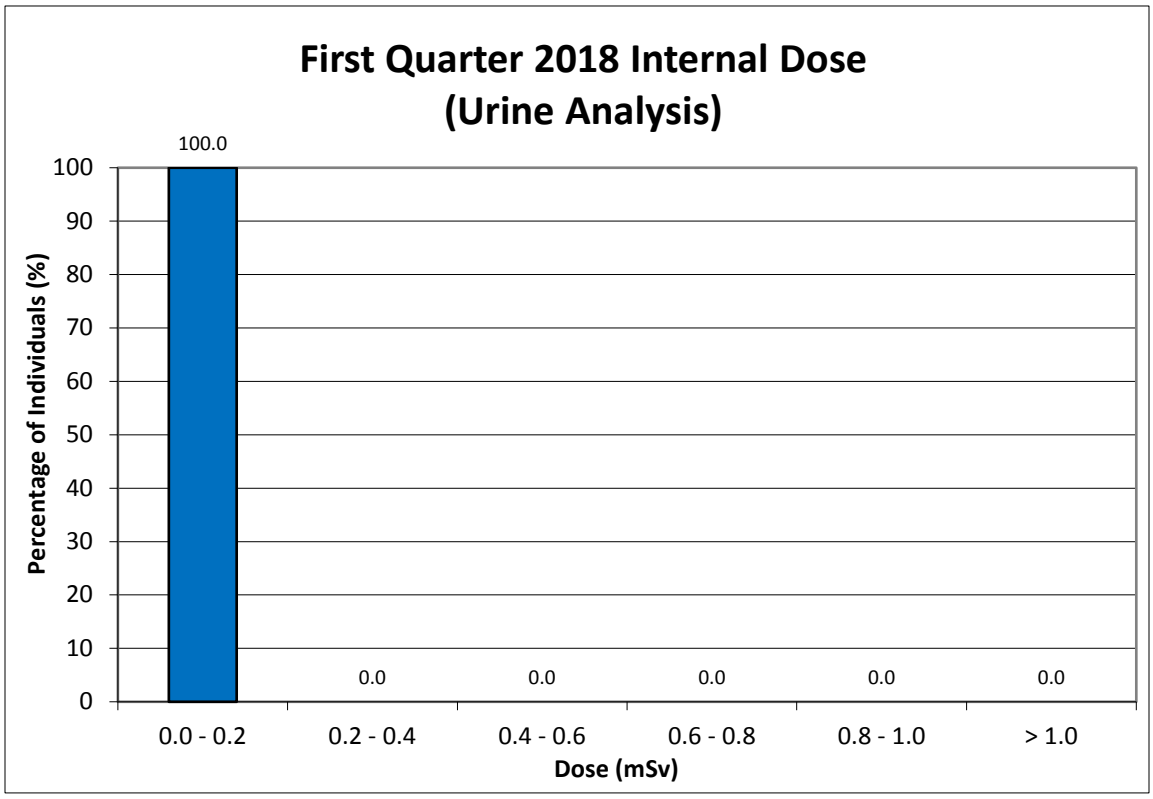
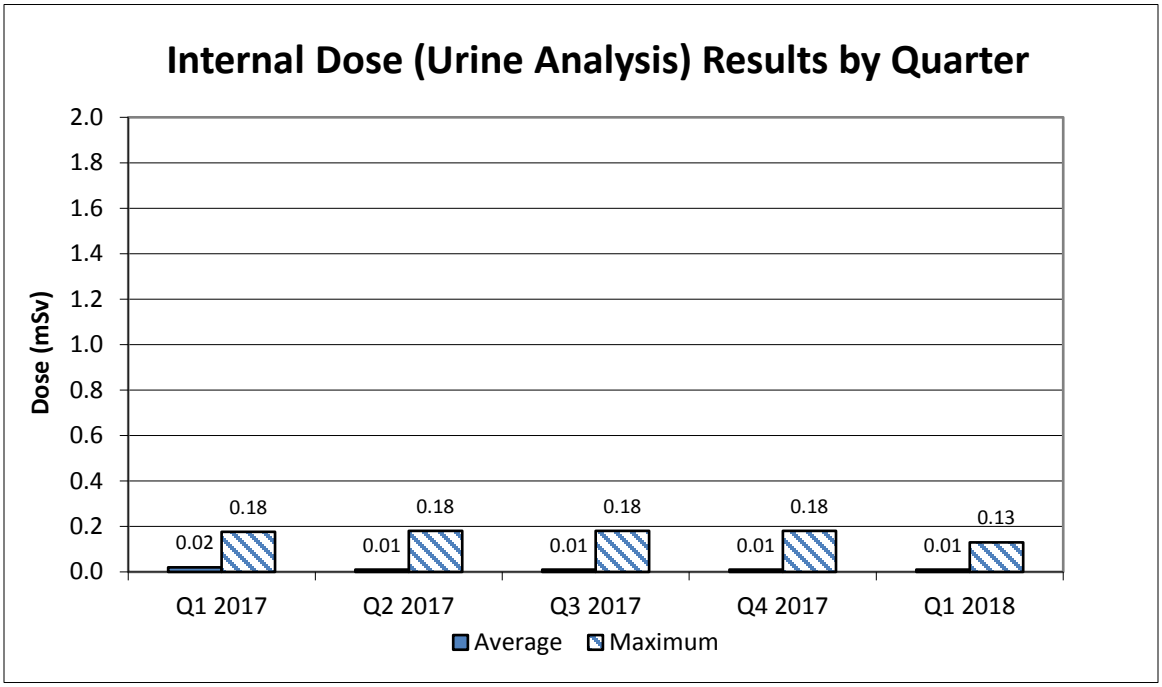


Table 7 and Figure 7 present the internal urine analysis doses for the last five quarters. A total of 465 employees and contractors (NEW) were monitored by the urine analysis program during the first quarter. The average and maximum internal urine analysis doses in the quarter were 0.01 mSv and 0.13 mSv, respectively, which were comparable to previous quarters.

Table 7

Internal Dose (Urine) by Quarter				
Quarter	**Number of Individuals**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**	**Average Dose (mSv)**
Q1 2017	461	0.00	0.18	0.02
Q2 2017	456	0.00	0.18	0.01
Q3 2017	489	0.00	0.18	0.01
Q4 2017	476	0.00	0.18	0.01
Q1 2018	465	0.00	0.13	0.01

Figure 7



Fluoride in Urine

A total of 2,919 urine samples were analyzed for fluoride during the first quarter, with summary results provided in Table 8. There were 2 samples above the internal administrative investigation level of 4 mg F/L during the first quarter, which were determined to be non-occupational.

Table 8

First Quarter 2018 Fluoride in Urine Analysis Results			
Type of Fluoride Samples	**Number of Samples**	**Minimum Concentration (mg F/L)**	**Maximum Concentration (mg F/L)**
All fluoride samples	2,918	0.1	5.0
Routine post-shift fluoride samples >= 7 mg F/L	0	-	-
Routine pre-shift fluoride samples >= 4 mg F/L	1	-	-
Non-routine fluoride samples	332	0.1	3.5
Samples analyzed for U, insufficient volume (< 30mL) for F analysis	11	-	-

Lung Counting

As part of the licensed internal dosimetry program, Cameco employs the use of a lung counter to monitor and assess internal exposure to uranium of its employees at the PHCF. This equipment is capable of measuring low levels of exposure to the point where an employee's further exposure can be prevented well before it exceeds a regulatory action level or dose limit. The lung counting program runs in parallel with the urinalysis program.

A total of 153 PHCF lung count measurements were completed in the first quarter. There were no PHCF investigations triggered by the lung counting program during the quarter and no regulatory action level was exceeded for PHCF lung count measurements.

Contamination Control

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

Table 9

First Quarter 2018 Alpha Contamination Monitoring Results			
Area	**Number of Samples Taken**	**Zone Contamination Criteria (Bq/cm²)**	**Number of Samples Above Criteria**
Zone 1	856	0.4	0
Zone 2	7,877	0.4	27

The contamination in Zone 2 areas was primarily detected in the office areas and lunch rooms of production buildings. Contamination measurements are taken upon request in Zone 3 areas when contamination is suspected and only documented when above the applicable levels.

Vehicle contamination check verification forms are used to record contamination checks on vehicles leaving the site. The tires, seats, floors and pedals are checked for contamination on all vehicles. If contamination above the unrestricted release criteria is detected in these areas, vehicles are directed to the site truck wash booth to be decontaminated prior to leaving the site. In addition, Class 7 transport vehicles are monitored to comply with transport regulations.

In-Plant Air

Routine air sampling is performed by collecting airborne particulate on air sampling filters and quantifying the airborne concentration of uranium.

The site administrative level and derived air concentration (DAC), based on slow moving (low solubility) material, is 100 µg U/m^3 but protective measures, such as investigation and respiratory protection, are normally required as a precaution at lower DAC levels. Continuous air monitoring equipment (iCAMs) in the UF_6 and UO_2 plants are also used to provide early warning and to prompt response to elevated airborne uranium concentrations. Local alarms and direct communication with the control rooms provide early warning to plant personnel.

Elevated airborne uranium concentrations have occurred following process upsets or maintenance activities. The release of uranium as an aerosol during an upset condition prompts additional air sampling and non-routine personnel monitoring such as urine analysis and lung counting where applicable. There was one such incident during the first quarter. On February 7, 2018, when ventilation to the UF_6 plant tower was temporarily lost due to a fuse failure, the area was posted as requiring a respirator to enter and operators were asked to submit post-shift urine samples. One post-shift result was slightly elevated as a result of the incident, but below applicable reporting levels.

Table 10

First Quarter 2018 In-Plant Air Uranium Concentration by Operations Group				
Operations Group	**Number of Samples Taken**	**Average (µg U/m^3)**	**Maximum (µg U/m^3)**	**Number of Samples Taken Above Administrative Level**
UF_6 Plant	4,973	11	656	129
UO_2 Plant	1,575	2	62	0
Waste Recovery	743	2	125	1
CUP	441	1	3	0

The maximum in-plant air sample of 656 µg U/m^3 was recorded on March 23, 2018. This area (inside of dumping station) is always posted as a respirator area.

The average in-plant air concentrations for the UO_2 plant, waste recovery and CUP were in line with the previous quarters in which the production plants were operational. The average in-plant air concentration for the UF_6 plant was slightly higher as a result of the February 7, 2018 incident, as described above.

Gamma Surveys

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

2.3.2 Conventional Health and Safety

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

The health and safety management program fosters and promotes a strong sustainable safety culture. Cameco has five key principles in the area of safety that form the framework for how safety is managed. These are:

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

The health and safety of workers at the PHCF is assured through site-specific safety and health management programs. These programs set out the requirements for management of health and safety aspects of the operation consistent with Cameco's corporate safety, health, environment and quality (SHEQ) policy, which is modeled on the OHSAS 18001 standard. Key components of the program include:

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

Several Occupational Health and Safety initiatives progressed in the first quarter including the following:

- Communications: New Safety announcements will be added bi-weekly to TV monitors and to the morning call minutes;
- Hazard Assessments: Two HIRAC's have been completed and a safety meeting video was created on how, why and when a HIRAC is completed;
- Ergonomics: The sub-committee has developed a plan for prioritizing ergonomic assessments to be completed and developed a plan for follow-up for ones already completed;
- Education and Training: New incident investigation training has been developed and will be delivered before the end of the year to all site employees who require the training;

- Safety Awareness Activities: The CSSC sponsored a battery give away during the time change;
- Sub-committees: The CSSC developed short term targets for the sub-committees to complete;
- CSSC team efficiencies: The CSSC voted and have now implemented alternative members to replace the rotational employee. Therefore an employee off each shift in UF_6 will be a CSSC committee member and will attend if available during their day shift when a meeting is occurring. Similarly, two alternative members from the UO_2 will be attending the meetings during their shifts as available; and,
- Total Recordable Injury Rate (TRIR) YTD is 2.20.

Table 11

2018 Safety Statistics					
Quarter / Parameter	**Q1 2018**	**Q2 2018**	**Q3 2018**	**Q4 2018**	**YTD**
First Aid Injuries	15				15
Medical Diagnostic Procedures	1				1
Medical Treatment Injuries	2				2
Lost Time Injuries	0				0
Lost Time Injury Frequency	0.00				0.00
Lost Time Injury Severity	0.00				0.00

2.3.3 Environmental Protection

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

There are federal, provincial and municipal regulatory authorities that have legislative jurisdiction over environmental protection at the facility. PHCF's Environmental Monitoring Plan (EMP) is comprised of monitoring the following components:

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

The key characteristics of the operation and activities that can have a significant environmental impact are monitored and measured and are described in the EMP and associated procedures. These documents identify all of the emissions to the air, water and land, the programs that are in place to monitor them, what is measured, the legal requirements and the reporting requirements.

Audits and inspections were performed in accordance with the Management Systems Program Manual.

Though the environmental program has been demonstrated to be effective, the PHCF has also implemented changes during the quarter as part of its continual improvement program, including:

Program Update:

- The PHCF has received comments from CNSC staff regarding environmental program documents that were revised to meet CSA standards N288.4 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills and N288.5 Effluent monitoring programs at Class I nuclear facilities and uranium mines and mills. PHCF intends to revise the site environmental protection program based on comments received and resubmit the program for CNSC concurrence in the second quarter 2018.

Cameco has established action levels, which have been accepted by the CNSC, for key environmental parameters. These action levels serve as an early warning of a condition that warrants further investigation. An exceedance of an action level does not pose a risk to people or the environment. A result above an action level is investigated and remedial actions taken, if necessary.

Public Dose

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

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

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

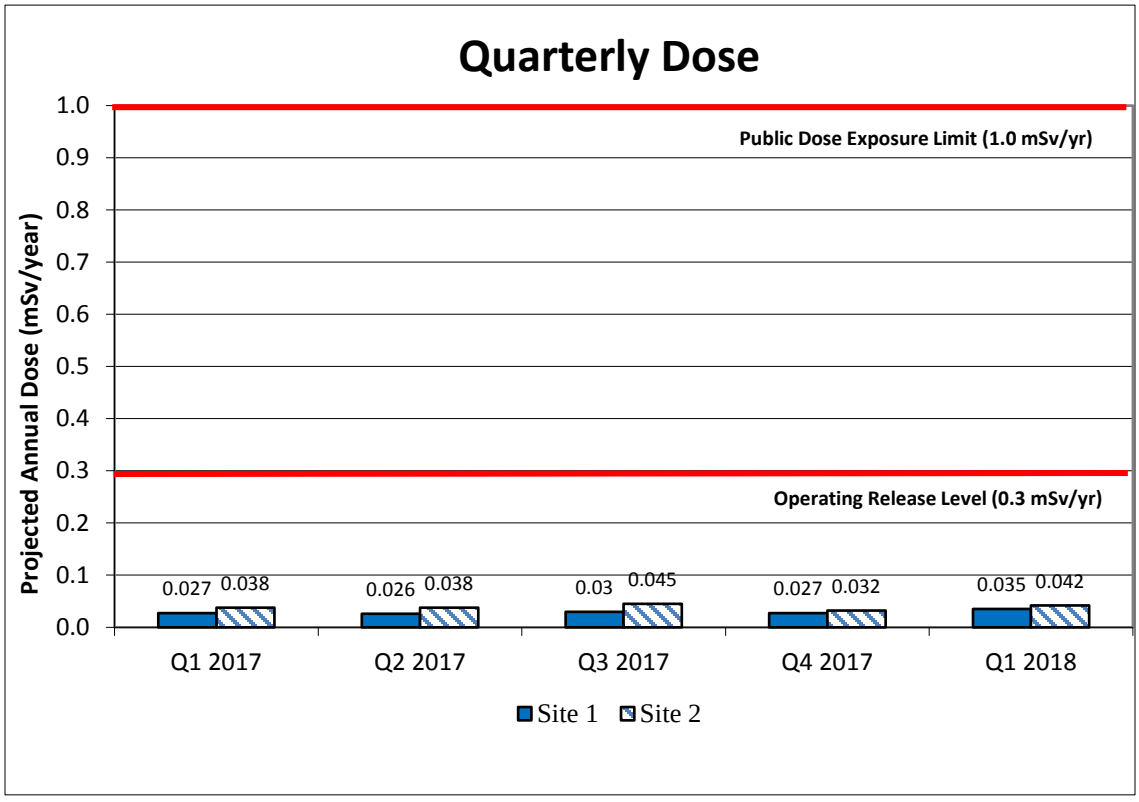
$$\text{Public Dose} = \text{Dose}_{\text{Air}} + \text{Dose}_{\text{Water}} + \text{Dose}_{\text{Gamma}} < 0.3 \text{ mSv/y}$$

The monthly dose from Site 1 and Site 2 are based on monitoring results for each dose component as shown in Table 12. This table illustrates the individual contributions from air, water and gamma as well as the total public dose from each site.

Table 12

Quarterly Dose (mSv/quarter)					
ORL Component	**Q1 2018**	**Q2 2018**	**Q3 2018**	**Q4 2018**	**YTD 2018**
Air	<0.001				<0.001
Water	<0.001				<0.001
Gamma – Site 1	0.034				0.034
Gamma – Site 2	0.042				0.042
Quarterly Dose – Site 1	0.035				0.035
Quarterly Dose – Site 2	0.042				0.042

Figure 8



Gamma Monitoring

In order to ensure that doses to local residents/critical receptors are ALARA and do not exceed the annual public dose limit of 1 mSv as defined in the Radiation Protection Regulations, environmental OSL dosimeters are strategically placed (at chest height) around the exterior perimeter of the licensed facility. The OSL dosimeters are deployed

on a monthly basis. Gamma dose is measured in mSv which is converted into a dose rate in µSv/h. Eighteen locations at Site 1 (including main site and Centre Pier) and six locations at Site 2 have been selected around the fenced perimeter to cover all potential receptors in the public.

As per the 2016 ORL, dose to the public is calculated for both sites 1 and 2 using specific gamma fenceline monitoring locations. The results at stations 2 and 13 are used for Site 1 public dose calculations and the results at stations 2 and 21 are used for Site 2 public dose calculations. The results at these locations for this quarter are summarized and compared with regulatory action levels in Table 13.

No monthly gamma radiation action levels were exceeded during the first quarter at any fenceline monitoring locations.

Table 13

First Quarter 2018 Public Dose Gamma Monitoring Results					
Station Number	**January**	**February**	**March**	**Action Level (µSv/h)**	**Licence Limit (µSv/h)**
2	0.260	0.210	0.200	0.400	0.570
13	0.040	0.04	0.010	0.100	0.400
21	0.040	0.050	0.040	0.250	0.260

Air Emissions

A stack monitoring program is used to determine the airborne uranium emission rates on a daily basis from the main stacks of the UF_6 and UO_2 plants.

Source emission action levels and maximum limits are indicated in the appropriate tables and figures throughout this report.

The quarterly average and maximum stack emissions from the UF_6 plant main stack and the UO_2 plant main stack are presented in Table 14 and Figures 9 through to Figure 12.

No licensed action levels were exceeded for uranium emissions from the UF_6 plant main stack in the quarter. The maximum value of 8.7g U/h on March 25, 2018 was investigated under CIRS # PHCF-2018-000487 and determined that the final cold trap had been switched and lower than normal KOH flow on the tailgas scrubbing system had occurred.

No licensed action levels were exceeded for uranium emissions from the UO_2 plant main stack in the quarter. The UO_2 main stack average uranium emission rate is comparable to previous quarters.

Fluoride emissions from the UF_6 main stack are sampled and analyzed on a continuous basis using an on-line analyzer and the data is collected on the plant computer system.

No licensed action levels were exceeded for fluoride emissions from the UF_6 plant main stack in the quarter. The maximum value of 224 g HF/h on March 30, 2018 was caused by a fluorine compressor burn out and investigated under CIRS # PHCF-2018-000502. CIRS# PHCF-2018-000475 determined that a clean-up reactor loss of seal resulted in 112 g HF/h on March 23, 2018.

The UO_2 main stack is also continuously sampled for ammonia. No licensed action levels were exceeded for ammonia emissions from the UO_2 plant main stack in the quarter. The UO_2 main stack average ammonia emission rate is comparable to previous quarters.

The depleted circuit was non-operational in the first quarter 2018.

All other stacks are sampled on an occasional or as requested basis.

Table 14

Daily Main Stack Emissions by Quarter									
Plant	**Parameter**	**Licence Limit**	**Action Level**	**Value**	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
UF_6	Uranium g U/h	280	40	Avg	1.5	1.4	< 0.1	1.7	2.4
				Max	4.3	5.3	0.7	15.3	8.7
	Hydrogen Fluoride g HF/h	650	230	Avg	19	29	7	28	47
				Max	168	89	23	209	224
UO_2	Uranium g U/h	240	7	Avg	0.6	0.4	0.3	0.5	0.6
				Max	2.7	0.9	0.8	1.1	1.4
	Ammonia kg NH_3/h	58	13	Avg	1.3	1.6	1.2	1.4	1.5
				Max	4.0	3.7	3.7	2.8	3.4

Figure 9

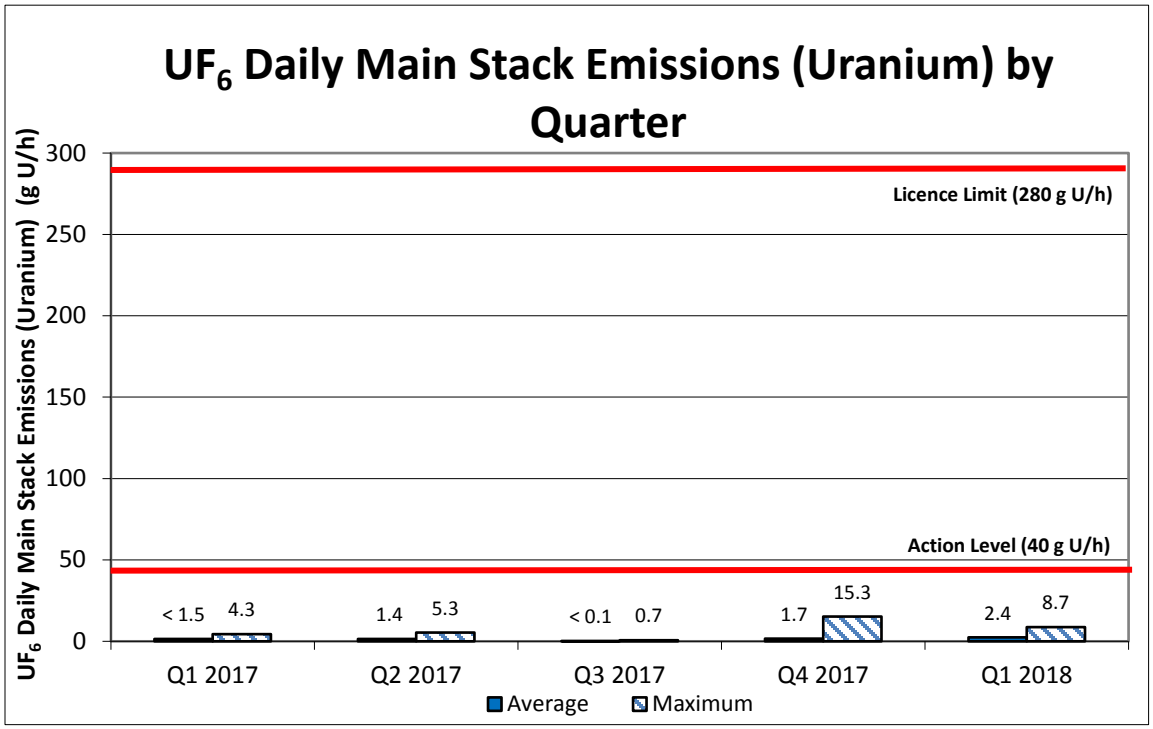


Figure 10

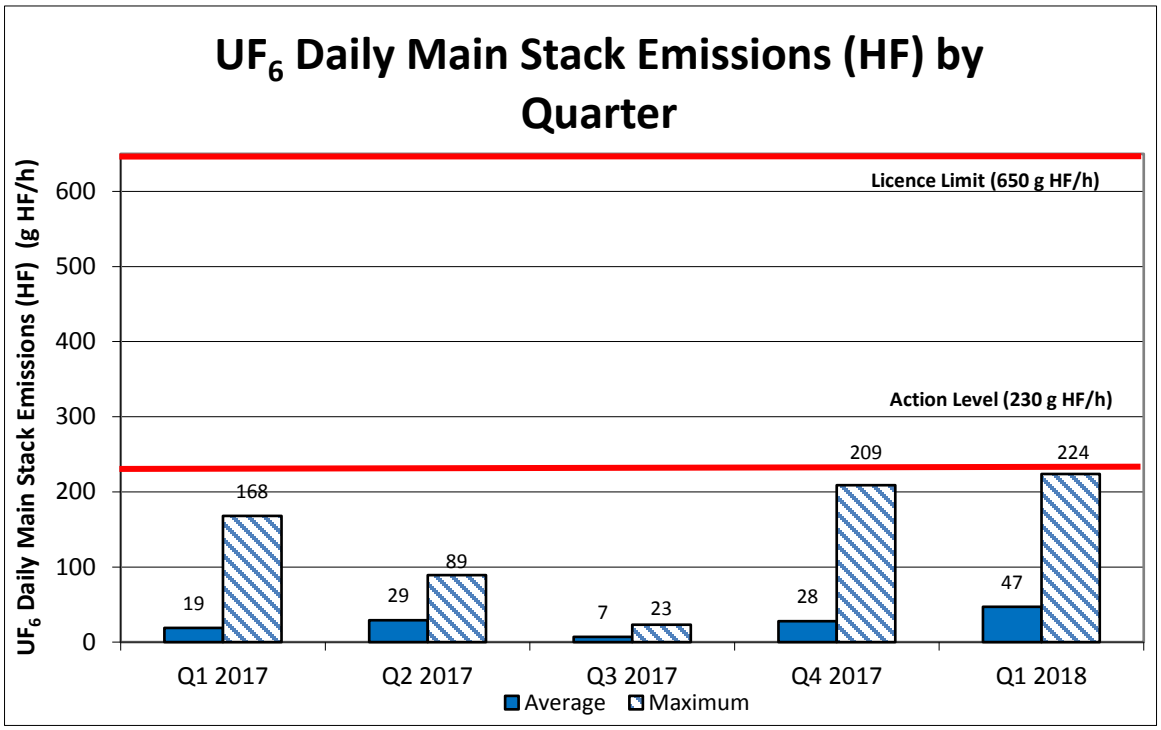


Figure 11

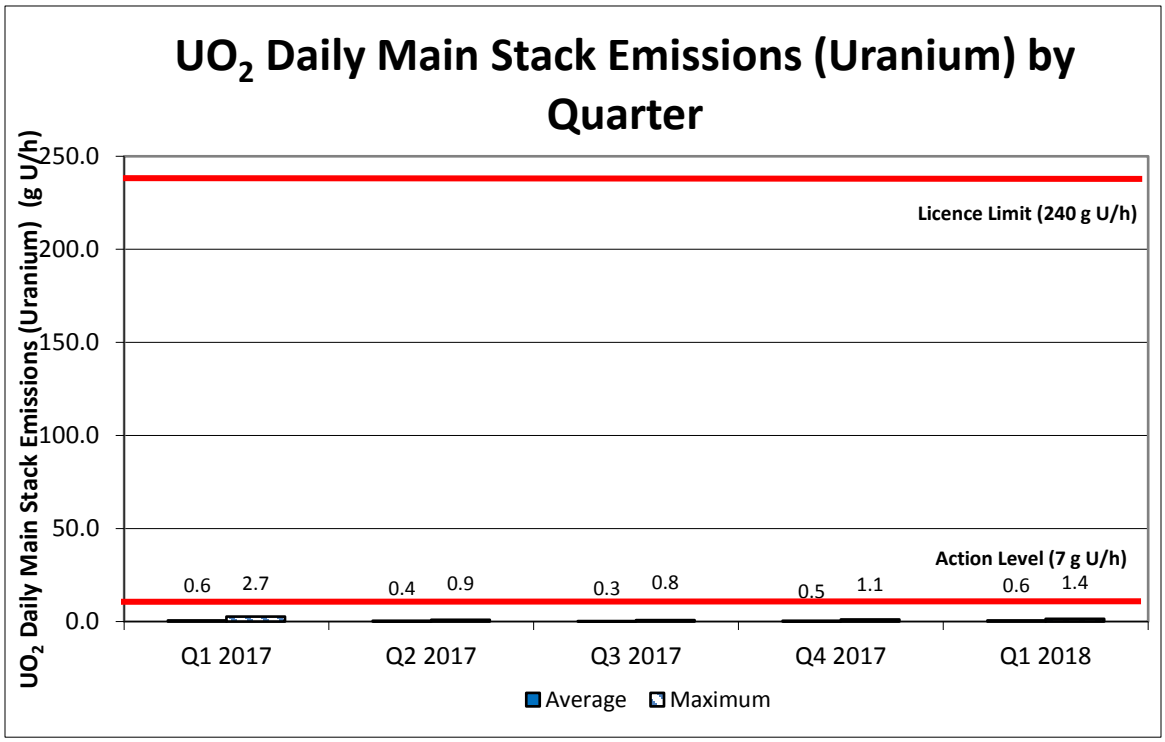
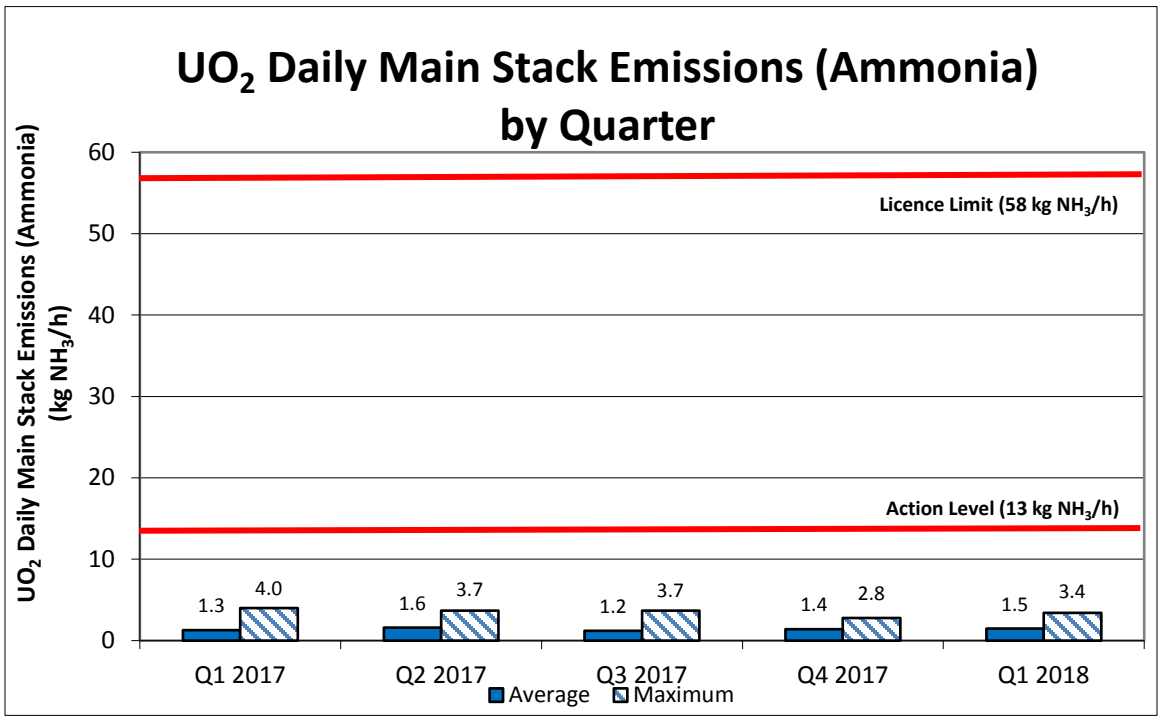


Figure 12



Liquid Discharges

This section summarizes the PHCF liquid discharges and associated monitoring programs.

There are currently three types of liquid point source discharges from the PHCF operations that are routinely monitored: cooling water returns; the combined sanitary sewage discharge; and the combined cooling water intake filter backwash (FBW) stream. Facility storm water discharge data is not summarized herein.

The FBW stream consists of water used to back flush the travelling screens and downstream equipment associated with the facility cooling water intake mechanical pre-treatment operations.

Most of the PHCF cooling water requirements are met by the facility cooling water intake, located at the entrance to the Port Hope harbour, and the remaining cooling water requirements are met by municipal potable water. A once-through non-contact cooling water system is used.

The PHCF cooling water works operations are regulated by the Ontario MOECC under a Permit to Take Water (PTTW), an Environmental Compliance Approval (ECA) and Ontario Regulation 560/94. ECA 4998-9CKL7F requires specific sampling of the cooling water works discharge points UO_2N and UO_2S, among other items. Moreover, the ECA stipulates added monitoring requirements beyond baseline Municipal/Industrial Strategy for Abatement (MISA) cooling water sampling and flow monitoring requirements in some cases.

Cooling water discharge quality data is summarized in Table 15 and Table 16. The UF_6 Plant/Building 2 (UO_2N) and UO_2 Plant (UO_2S) cooling water returns have general displayed reasonably consistent parameter results over the previous five quarters. Exceptions to note include the ammonia and nitrate cooling water return results. Production plant cooling water return quality is influenced by cooling water supply quality and related fluctuations, as was the case for the first quarter. It is also important to note that ammonia and nitrate are not contaminants of concern with respect to facility once-through cooling water system heat exchanger operations.

Flow data is summarized and discussed in the Annual Compliance Monitoring and Operational Performance Report.

An overview of ECA monitoring results with comparison to effluent objectives and limits, among other items, is compiled in a separate annual performance report to fulfill additional ECA reporting requirements. Annual performance reports are submitted to the MOECC within 90 days of the end of each calendar year.

The municipal sewage treatment plant processes the sanitary sewer discharges from the PHCF. The principal sources contributing to the combined PHCF sanitary sewer discharge are standard domestic stream contributions from throughout the facility, liquid discharges from the Powerhouse (such as boiler blowdown) and contributions from showering facilities. All sanitary sewer sources merge into a common sanitary sewer line within the PHCF prior to discharging to the municipal sanitary sewer system. It should be noted that a portion of the sanitary sewer discharge from PHCF originates upstream of the facility, primarily from the municipal water treatment facility.

The combined PHCF sanitary sewer discharge is sampled on a daily basis for uranium and pH. Table 17 summarizes and Figure 13 illustrates summary uranium concentrations and pH values observed during the first quarter. No uranium action level or licence limit exceedances were observed in the first quarter of 2018. The range of observed pH results also satisfied municipal sewer use by-law criteria.

Table 15

UO_2N Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Uranium	µg U/L	Average	3.8	3.2	3.1	2.9	3.7
		Maximum	6.0	8.6	7.4	4.8	6.2
Fluoride	mg F/L	Average	0.17	0.21	0.18	0.21	0.23
		Maximum	0.21	0.33	0.22	0.31	0.30
Ammonia & Ammonium	mg N/L	Average	0.15	0.075	0.094	0.25	0.31
		Maximum	0.27	0.13	0.30	0.44	0.67
Nitrate	mg N/L	Average	1.4	0.93	0.66	0.98	1.3
		Maximum	2.2	1.6	1.0	1.3	1.5
pH	-	Minimum	7.46	7.59	7.48	7.31	7.20
		Maximum	8.30	8.39	8.43	8.20	8.32

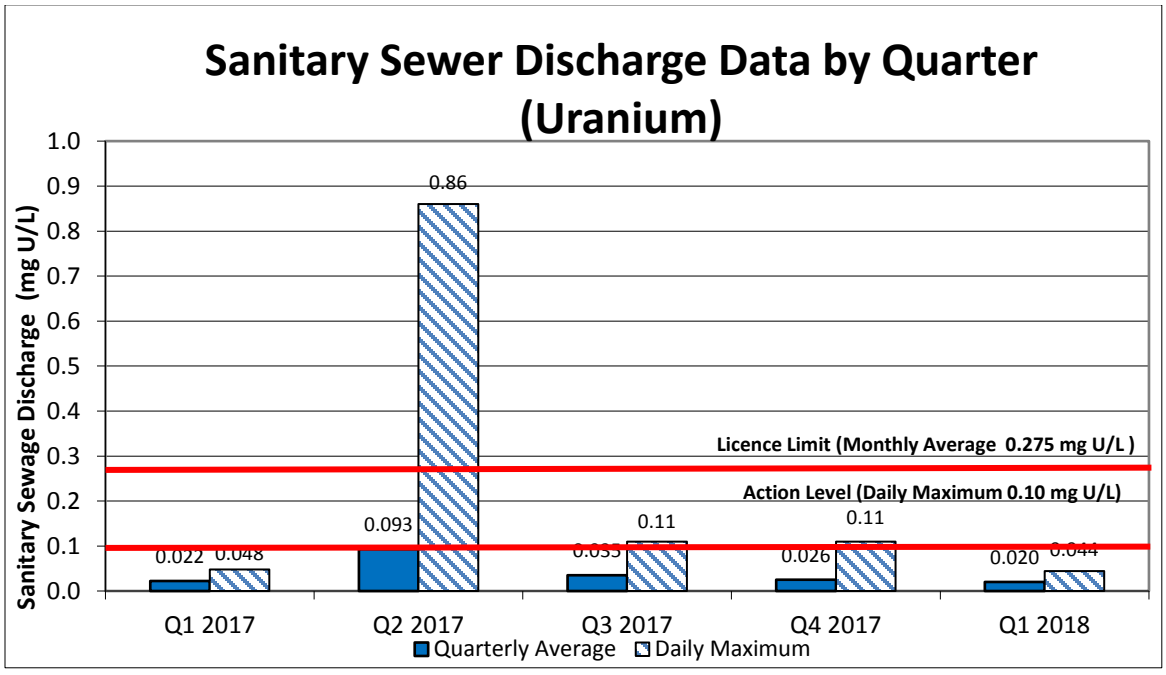
Table 16

UO_2S Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Uranium	µg U/L	Average	3.9	3.3	3.1	3.0	3.9
		Maximum	5.5	8.5	7.4	6.0	6.6
Ammonia & Ammonium	mg N/L	Average	0.14	0.082	0.12	0.23	0.29
		Maximum	0.24	0.12	0.36	0.42	0.50
Nitrate	mg N/L	Average	1.5	0.98	0.67	1.0	1.4
		Maximum	2.2	1.6	1.1	1.3	1.6
pH	-	Minimum	7.46	7.63	7.53	7.37	7.31
		Maximum	8.36	8.43	8.47	8.20	8.36

Table 17

Sanitary Sewer Discharge Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Uranium	mg U/L	Average	0.022	0.093	0.035	0.026	0.020
		Maximum	0.048	0.86	0.11	0.11	0.044
pH	-	Minimum	7.03	7.23	7.17	6.84	7.16
		Maximum	8.49	8.92	8.33	7.92	8.91

Figure 13



Ambient Air Monitoring

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

Cameco monitors ambient uranium concentrations in the field using dustfall jars, high volume air samplers (hi-vols) and soil samples. The results from dustfall jars and hi-vol programs are provided below. Soil sampling is currently conducted on an annual basis and the results are discussed in the Annual Compliance Monitoring and Operational Performance Report.

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

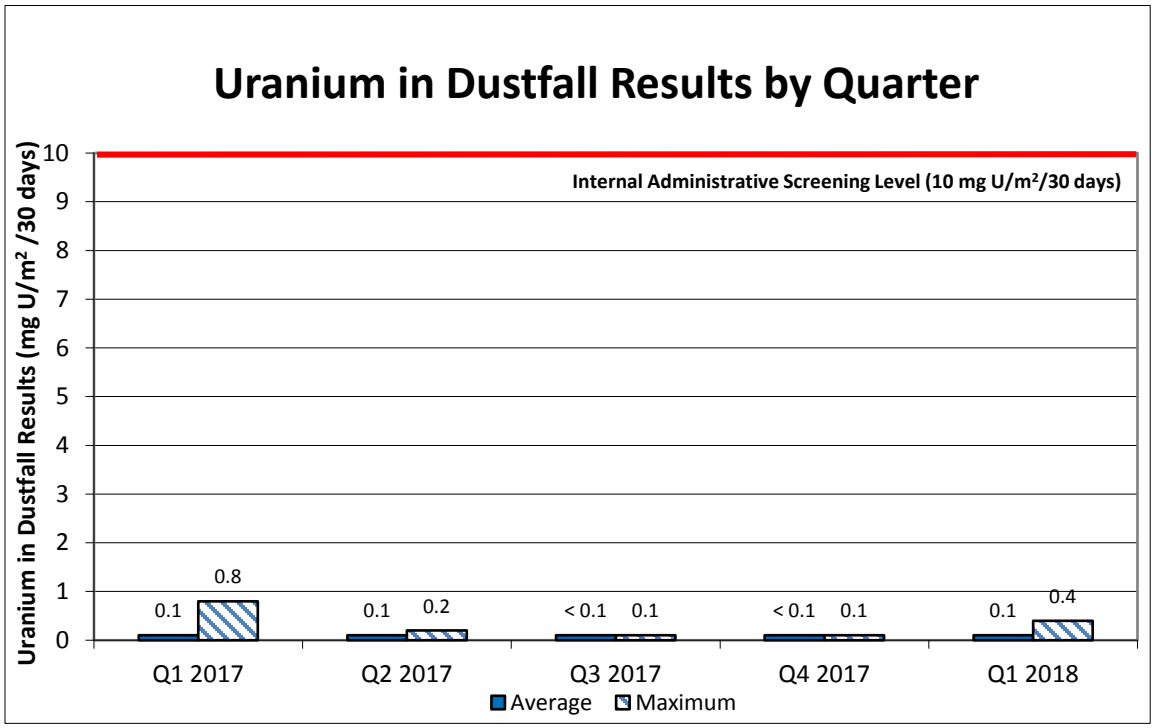
No uranium dustfall results exceeded the internal administrative screening level in the first quarter. The average uranium in dustfall results in the first quarter of 2018 were consistent with the uranium in dustfall averages during the previous four quarters.

Table 18 and Figure 14 show the quarterly all-station average and maximum uranium dustfall results from the first quarter of 2017 through to the first quarter of 2018.

Table 18

Uranium in Dustfall Results by Quarter (mg U/m^2/30 days)					
Value	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Average	0.1	0.1	< 0.1	< 0.1	0.1
Maximum	0.8	0.2	0.1	0.1	0.4
Internal Administrative Screening Level = 10 mg U/m^2/30 days					

Figure 14



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

Approximately 40 cubic feet per minute of air is passed through the hi-vol sampler and collected on a filter in a 24 hour period.

The regulatory criteria for uranium content in ambient air varies by period and particulate size. Cameco uses TSP (total suspended particulates) hivols at the PHCF. The regulatory standards for U in TSP are 0.3 µg U TSP/m^3 (24 hr) and 0.06 µg U in TSP/m^3 (annual). These TSP criteria are compared against the maximum and average PHCF hivol results, respectively.

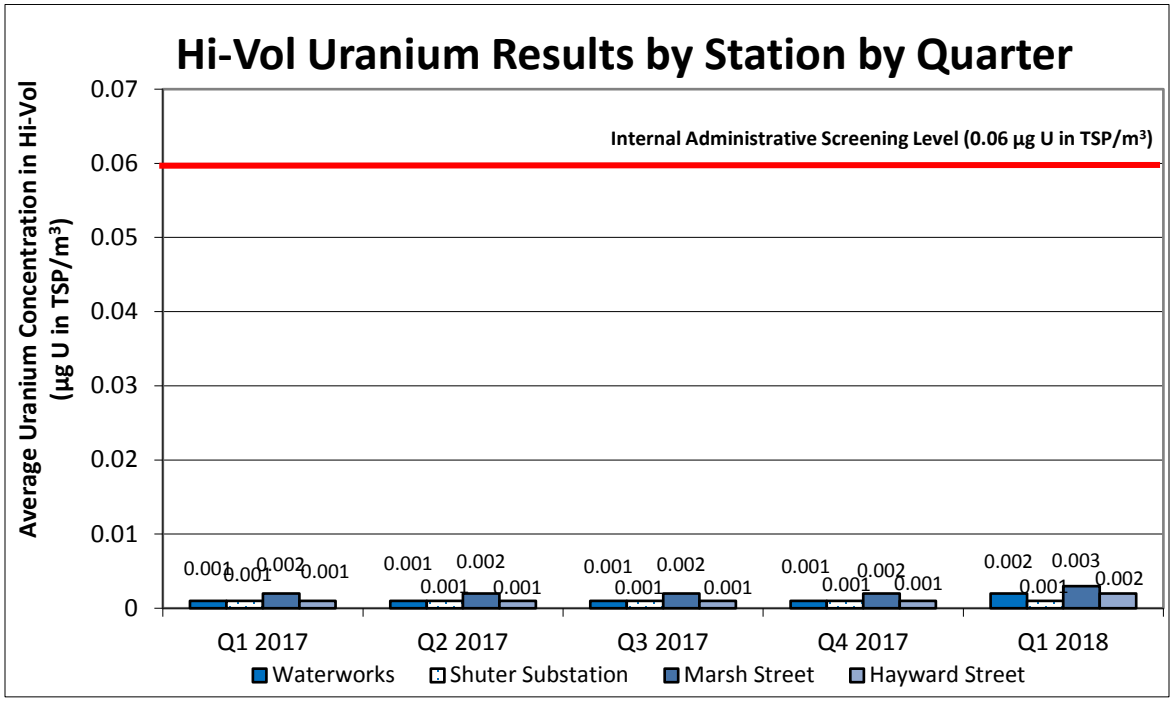
Table 19 summarizes the average and maximum uranium hi-vol results from the first quarter of 2017 through to the first quarter of 2018.

Figure 15 show the average uranium hi-vol results from the first quarter of 2017 through to the first quarter of 2018. Average and maximum results for the quarter are below regulatory criteria and comparable to levels observed in the previous four quarters.

Table 19

Uranium-in-Air Concentration at Hi-Vol Stations by Quarter (µg U in TSP/m^3)					
Quarter	**Result**	**Waterworks**	**Shuter Substation**	**Marsh Street**	**Hayward Street**
Q1 2017	Average	0.001	0.001	0.002	0.001
	Maximum	0.010	0.004	0.008	0.006
Q2 2017	Average	0.001	0.001	0.002	0.001
	Maximum	0.005	0.004	0.009	0.005
Q3 2017	Average	0.001	0.001	0.002	0.001
	Maximum	0.015	0.004	0.008	0.007
Q4 2017	Average	0.001	0.001	0.002	0.001
	Maximum	0.005	0.007	0.008	0.005
Q1 2018	Average	0.002	0.001	0.003	0.002
	Maximum	0.027	0.007	0.012	0.011
Average <0.06 µg U in TSP/m^3 (annual) Maximum <0.3 µg U in TSP/m^3 (24 hr)					

Figure 15



The concentration of fluoride in the ambient environment is monitored in the field using dustfall, lime candle and vegetation sampling. The results from the dustfall and lime

candle programs are provided below. The results for the vegetation sampling program are provided in the Annual Compliance Monitoring and Operational Performance Report.

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

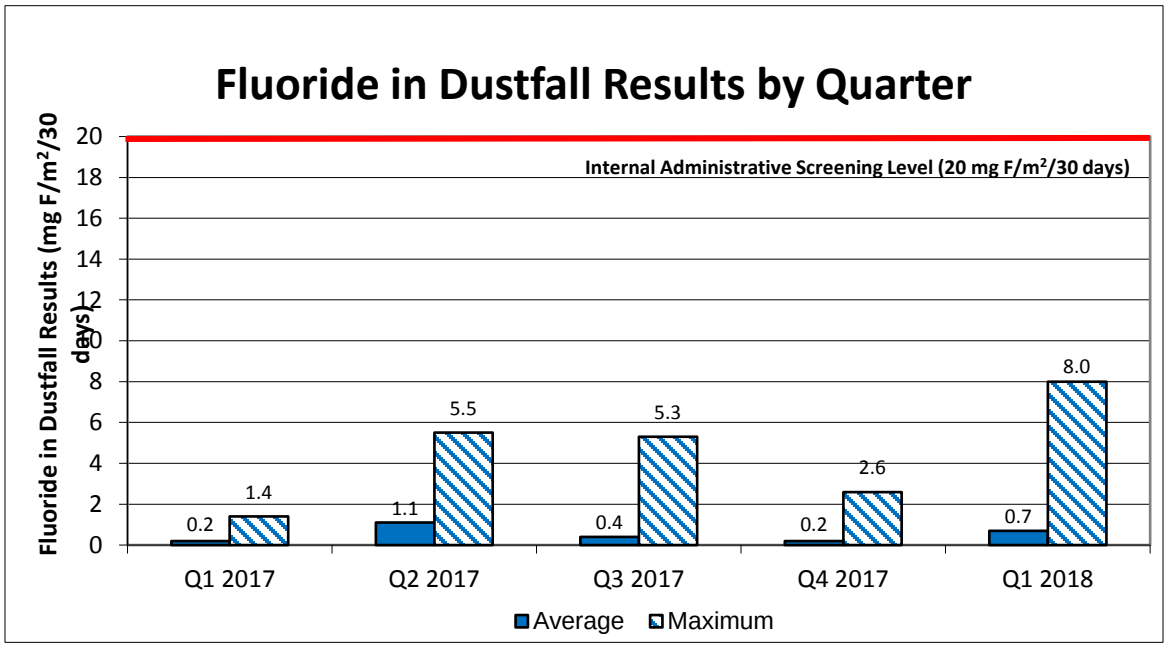
The average fluoride in dustfall results in the first quarter of 2018 is consistent with the fluoride in dustfall results observed in the previous four quarters.

Table 20 and Figure 16 show the quarterly all-station average and maximum fluoride dustfall results from the first quarter of 2017 through to the first quarter of 2018. The maximum fluoride dustfall result of 8.0 mg F/m^2/30 days was a result of the March 23, 2018 and March 30, 2018 events as described in the air emissions sections above.

Table 20

Fluoride in Dustfall Results by Quarter (mg F/m^2/30 days)					
Value	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Average	0.2	1.1	0.4	0.2	0.7
Maximum	1.4	5.5	5.3	2.6	8.0
Internal Administrative Screening Level = 20 mg F/m^2/30 days					

Figure 16



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

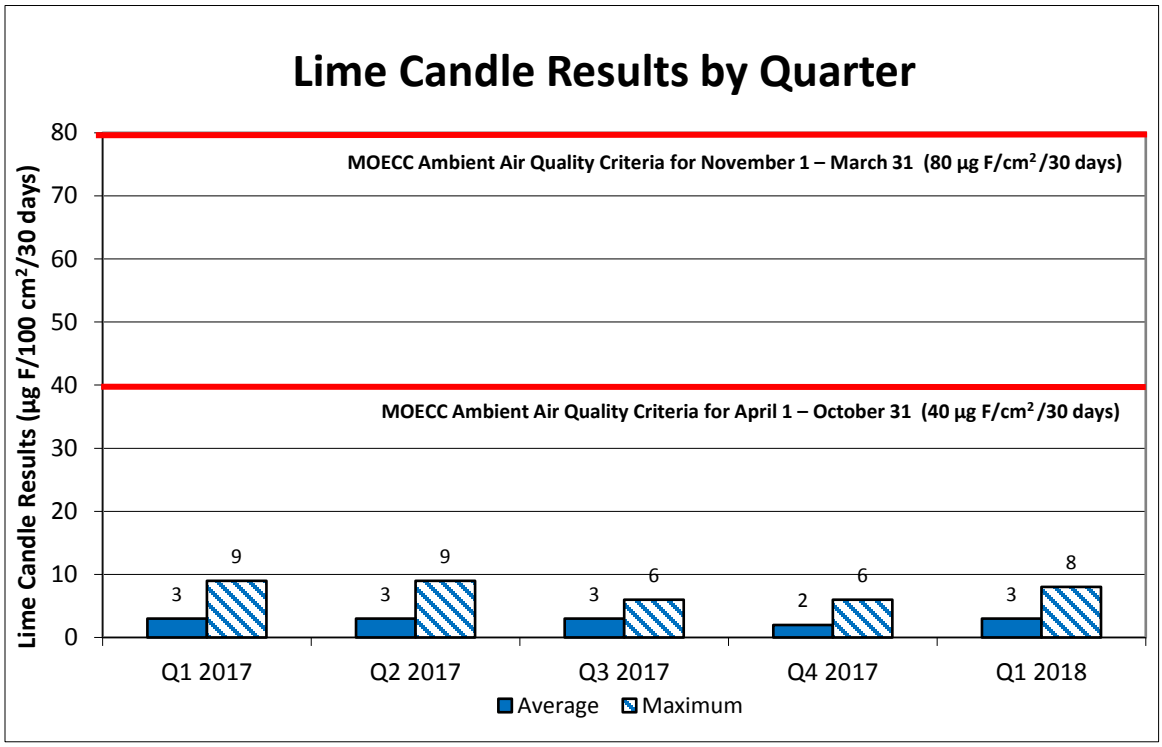
The lime candles are prepared, deployed and collected on a specified frequency and are submitted to the analytical group for fluoride analysis. The period of time is normally 30 days; however, weekly periods are also used. These shorter-term results are used to assess impact in a timelier manner. Monthly and weekly lime candles are operated throughout the year. The MOECC Ambient Air Quality Criteria (AAQC) for fluoridation are 40 µg F/100 cm^2/30 days for April 1 to October 31 and 80 µg F/100 cm^2/30 days for November 1 to March 31. These criteria are based on the protection of foraging animals.

Table 21 and Figure 17 show the average and maximum lime candle results from the first quarter of 2017 through to the first quarter of 2018. Average results are comparable to levels observed in the previous four quarters.

Table 21

Monthly Lime Candle Results by Quarter (µg F/100 cm^2/30 days)					
Value	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Average	3	3	3	2	3
Maximum	9	9	6	6	8

Figure 17



Terrestrial Monitoring

The terrestrial monitoring program, including soil and vegetation sampling, is performed at frequencies specified in the individual procedures. The data collected is useful for evaluating the potential effects of the facility operations on the surrounding environment and may be used to supplement results from the air emission monitoring program. Results from the terrestrial monitoring program are summarized and discussed in the Annual Compliance Monitoring and Operational Performance Report.

Ambient Water Quality Monitoring

The ambient water quality monitoring program is established to monitor and assess potential impacts of PHCF operations on the local watercourse.

Liquid discharges to the Port Hope harbour are from the three source discharge types outlined previously, storm water discharges and groundwater flow through the site.

The surface water monitoring program consists of sampling 13 monitoring locations on a quarterly basis. At each location, samples are obtained just below the water surface and just above the harbour sediment layer. The first quarter 2018 surface water sampling took place on March 28, 2018. Note that sampling locations in the vicinity of the west turning

basin harbour wall have been adjusted in response to the installation of a silt curtain by the Municipality of Port Hope.

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

Groundwater is sampled under three separate schedules: monthly sampling of the operating pumping wells; quarterly sampling of overburden monitoring wells covering five key areas of the site; and annual sampling of bedrock monitoring wells. The five keys areas of the site include: the refinery wells; the east plume associated with the UF_6 plant; the south plume associated with the UF_6 plant; the former UF_6 plant area; and the UO_2 plant area.

Twelve pumping wells were in operation during the first quarter. Additional groundwater and surface water monitoring program details are provided in the Annual Groundwater and Surface Water Review Report.

As the south cooling water intake (SCI) is located near the harbour's exit point to Lake Ontario, the associated water quality data provides a reasonable indication of the mean water quality in the Port Hope harbour.

A summary of SCI water quality data is presented in Table 22. The SCI has generally displayed reasonably consistent parameter results over the previous five quarters. Exceptions include ammonia and nitrate. Minor variations in water quality parameters are influenced by seasonal variations in surface water quality. It is also important to note that ammonia and nitrate are not contaminants of concern with respect to facility once-through cooling water system heat exchanger operations.

Table 22

SCI Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q1 2017**	**Q2 2017**	**Q3 2017**	**Q4 2017**	**Q1 2018**
Uranium	µg U/L	Average	3.9	3.3	3.1	3.0	3.9
		Maximum	5.6	8.6	8.8	5.8	6.4
Fluoride	mg F/L	Average	0.17	0.21	0.18	0.20	0.23
		Maximum	0.20	0.26	0.22	0.29	0.30
Ammonia & Ammonium	mg N/L	Average	0.16	0.17	0.14	0.24	0.27
		Maximum	0.26	0.22	0.32	0.40	0.47
Nitrate	mg N/L	Average	1.5	0.98	0.66	1.0	1.4
		Maximum	2.2	1.6	1.0	1.7	1.5
pH	-	Minimum	7.53	7.68	7.31	7.32	7.19
		Maximum	8.32	8.47	8.56	8.29	8.36

Effluent and Environmental Monitoring Program Performance

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

- Water samples (i.e. cooling water, sanitary discharge) – 99.2% of planned samples were collected
- Stack samples (i.e. stacks, in-plant air) – 99.9% of planned samples were collected
- Environmental Samples (i.e. surface water, groundwater, hivol, dustfall, lime candle, fenceline gamma, soil, vegetation) – 99.5% of planned samples were collected

In the quarter, all analysis under the environmental program was completed with the quality control set out in the analytical methods. There were 17 instances where samples were flagged for issues with laboratory quality control. Of these, 3 were reviewed and/or repeated and deemed acceptable for use in accordance with the laboratory quality program; 14 required further investigation into the reason for the issue(s). There were corrective actions taken to address the findings. In total 14 (or 0.04% of) sample analyses were not included in quarterly reporting.

2.3.4 Emergency Management and Response

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

The PHCF continues to maintain its emergency preparedness and response program while looking for opportunities to further improve. This activity and associated records are subject to various audits and are incorporated into the PHCF annual management review.

There were 12 emergency response exercises carried out in the first quarter of 2018:

- On January 9, 16, 23 and 30 the Emergency Response Team (ERT) conducted UF_6 plant awareness and critical isolation training for HAZMAT and fire responses;
- On January 9, 16, 23 and 30 the ERT conducted confined space training in the UF_6 plant; and,
- On March 6, 13, 20 and 27 conducted NFPA HAZMAT Day Two emergency cylinder valve replacement and “C” capping kit.

During the first quarter there were 96 hours of training completed consisting of:

- Four 4-hour sessions of NFPA 472 Day One training;
- Four 4-hour sessions of confined space rescue training;
- Four 8-hour sessions of Emergency Medical Team (EMT) annual refresher training;
- Four 4-hour sessions of NFPA 472 Day Two training; and,
- Four 4-hour sessions of HF refresher training.

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

2.3.5 Waste and By-product Management

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

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

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

In the first quarter, 18.7 tonnes of non-contaminated wastes were sent to a local landfill. A total of 13.25 tonnes of non-contaminated materials were sent to appropriate recycling facilities for recovery.

The PHCF produces two by-products at the facility. These include ammonium nitrate, which is sold to a local fertilizer company, and fluoride product, which is sent for uranium recovery at a licensed facility. The amount of ammonium nitrate recycled in the quarter was 552 m^3. A total of 728 drums of fluoride product were generated in the quarter.

PHCF generated 25.7 tonnes of contaminated combustible materials (CCM) in the quarter, all of which was shipped to the BRR for incineration. During the same period, a total of 7.8 tonnes of contaminated non-combustible materials (CNC) were generated and 13.6 tonnes were shipped to appropriately licensed hazardous waste facilities."

PHCF recycled 32.0 tonnes of metal after decontamination to free release criteria in the first quarter.

2.3.6 Nuclear Security

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

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

2.3.7 Safeguards and Non-proliferation

This safety and control area covers the programs required for the successful implementation of the obligations arising from the Canada/IAEA Safeguards and Non-proliferation Agreement.

The PHCF participated in one Safeguard inspection/activity in the first quarter:

- A Technical Meeting was held between IAEA and CNSC staff to discuss transfers of material to the LTWMF and the possibility of signal splitting from the UF_6 load cell.

2.3.8 Packaging and Transport of Nuclear Substances

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

UO_2 is produced, packaged in drums and transported by road from the PHCF to Cameco's Fuel Manufacturing Facility in Port Hope and/or other domestic fuel manufacturing facilities. UO_2 is also packaged in drums and transported by road and marine overseas to Japan, Romania and South Korea. 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.

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

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

There were two reportable transportation events related to the PHCF in the first quarter:

- On February 2, 2018, the Port of Montreal notified Cameco that there are two empty UF_6 cylinders (UN2908), each on separate flat racks suspended about 48 feet over a vessel at the Port. The crane operator thought he was dealing with one 40-foot flat rack instead of two 20-foot flat racks. As a result, he only secured two corners of each 20 foot flat racks (the corners that would have been a 40 foot flat rack). The two flat racks were suspended with a three foot gap between the flat racks. The terminal successfully secured the two flat racks together, reducing the possibility of them dropping and safely lowered the flat racks to the ground.
- On March 23, 2018, Cameco was notified that a Class VII "B-train" trailer transporting two flat racks each carrying a full UF_6 cylinder, was damaged in the line-up to enter the terminal at the Port of Montreal. Another truck tried to squeeze by on the left of the Class VII "B-train" trailer and got wedged between the concrete wall and the rear trailer. Only the rims and tires were damaged on the rear trailer. The flat rack carrying the UF_6 cylinder and the front trailer were not damaged. The trailer went through the gate and was offloaded at the terminal.

3.0 OTHER MATTERS OF REGULATORY INTEREST

3.1.1 Public Information Program

For the first quarter of 2018, PHCF continued to meet the requirements of CNSC RD/GD 99.3, Public Information and Disclosure programs.

Public Engagement

In March of 2018, Cameco announced its 7th annual charity golf tournament with the funds raised going towards the Northumberland United Way. Along with the announcement, Cameco was also asking for sponsorships and golfers. The tournament is scheduled for May 26, 2018.

In February, Cameco was once again a sponsor of the Canadian Nuclear Association conference in Ottawa. Cameco had a booth in the main area and was able to engage other businesses and interest groups within the nuclear industry as well as students. Brochures on Cameco and general nuclear facts were available to attendees as well as giveaways such as webcam privacy covers and dashboard cellphone mounts.

Public Disclosure

On January 11, 2018 Cameco disclosed to the public via the Cameco.com website that there was a small release of groundwater to the storm water system that drains to the harbour. This was due to the fluctuating weather conditions causing damage to a transfer pipe. There were no questions from the public or media from this event posting.

Social Media and Website

Our social media ‘likes/follows’ continued to grow in the first quarter at a reasonable rate of around 4%. With over 100 posts between Facebook and Twitter, Cameco Ontario’s pages received positive engagement, with the most liked and shared post being our Cameco fact on how many houses are powered by Cameco uranium.

Cameco’s posts covered an array of topics including our community investment announcements such as Cameco’s monthly community partner, and our presence at the Canadian Nuclear Association conference.

Postings on our community website in the first quarter only consisted of the environmental incident report as mentioned above in public disclosure and the announcement of Cameco’s 7th annual charity golf tournament.

Relationship with Municipality of Port Hope

In addition to the regular communications between the municipality and Cameco in relation to the Vision in Motion project, the municipality was contacted during the first quarter to advise them of the release of groundwater to the storm water system. Our relationship remains open and strong with council and key members of the municipality.

Media Analysis

Cameco appeared in the media for its community investment and it was positive in nature. Mentioned in the media was Cameco's involvement in the Northumberland United Way's Hockey Night in Northumberland, and the Northumberland United Way's upcoming Day of Caring.

Other Initiatives

During the quarter, Cameco engaged in a number of other community outreach activities and events. The Cobourg Rotary Sportsman Dinner and Auction, and the Port Hope Fire Fighters Volunteer Appreciation Night, were attended by some Cameco employees who volunteer. Employees also participated in the Ganaraska Sharks hockey tournament, and Bowl for Kid's Sake. A member of Cameco's leadership team presented an award at the Northumberland Chamber of Commerce Business Achievement Awards, and Cameco held a skating day at a local arena to help families celebrate Family Day.

Cameco donated advertising time on the local radio station (93.3 MyFM) to the following three Cameco Community Partners:

January – Community Care Northumberland

February – Rebound Child & Youth Services

March – Northumberland Humane Society

3.1.2 Site - Specific

The nuclear criticality safety program at the PHCF follows the criticality control principles as described in Radiation Protection Program Manual. In summary, processing of any amount of enriched material at the PHCF is governed by a criticality control committee (CCC) as described in the Nuclear Criticality Safety Program Manual.

The PHCF met all other site-specific reporting requirements.

Vision in Motion (VIM) detailed design activities continued as part of a rolling wave approach to detailing future work. During the first quarter, design work continued for the new liquid hydrogen station and site-wide infrastructure, including deliverables required for the MOECC application for the storm water system. The storm water system design was formally submitted to the Ganaraska Region Conservation Authority. Detailed design activities for temporary construction facilities, centre pier accumulated waste processing, demolition of the centre pier buildings and removal of hazardous materials from the former UF_6 plant were substantially completed and procurement activities were initiated. Notifications of upcoming work were made to CNSC per the requirements of WMP-02 Clean-Up Program.

The Cameco/Canadian Nuclear Laboratories (CNL) working groups continued to coordinate future activities and detailed design work. The CNL schedule for the Long Term Waste Management Facility (LTWMF) to be ready to receive off-site wastes was delayed to approximately May 2018. Adjustments required to the schedule for removal of the temporary storage site from the Centre Pier drove a need for concurrent Cameco and CNL activities on the Centre Pier and a revision to the work island design was required. Legal agreements with CNL to support the temporary storage site removal work, waste acceptance criteria and shared work continue to be in-progress.

Cameco completed design and procurement activities work for the project hi-vol stations per the Supplemental Environmental Monitoring Plan and locations agreed to with the Municipality of Port Hope (MPH).

The Municipality of Port Hope completed and issued the tender package for the design and municipal environmental assessment design of the Choate Street extension per the Road Construction Agreement.

The first phase of activities in the former UF_6 plant involving removal of asbestos and installation of electrical upgrades continued throughout the first quarter utilizing contractors. This work will support future equipment and material removals from the building later in 2018.

3.1.3 Improvement Plans and Future Outlook

The 2018 improvement plans and future outlook for the PHCF are discussed in section 3.1.3 Improvement Plans and Future Outlook of the 2017 Annual Compliance Monitoring and Operational Performance Report, which was issued on March 29, 2018.

3.1.4 Safety Performance Objectives for Following Year

The 2018 safety performance objectives for the PHCF are discussed in section 3.1.4 Safety Performance Objectives for Following Year of the 2017 Annual Compliance Monitoring and Operational Performance Report, which was issued on March 29, 2018.

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.

In the first quarter of 2018, PHCF did not exceed any CNSC regulatory limits. As a result of the effective programs, plans and procedures in place, the PHCF was able to maintain individual radiation exposures well below all regulatory dose limits. In addition, environmental emissions continued to be controlled to levels that are a fraction of the CNSC regulatory limits, and public radiation exposures are also well below the regulatory limits.

Cameco's relationship with local residents remains strong and we are committed to maintaining the strong support and trust we have developed over the past several years.