2022 Fourth Quarter Compliance Monitoring
&
Operational Performance Report

Reporting Period October 1 – December 31, 2022

Port Hope Conversion Facility
Operating Licence
FFOL-3631.00/2027

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I Executive Summary

Cameco Corporation (Cameco) is committed to the safe, clean, and reliable operation of all its facilities and continually strives to improve its performance and processes to ensure the safety of both its employees and local residents. The Port Hope Conversion Facility (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.

Cameco utilizes administrative levels and action levels to provide early detection of issues and ensure levels remain well below regulatory limits. A variety of control measures and practices are employed as part of site programs to ensure the protection of the public, site employees and the environment. A robust ALARA program is in place to ensure continual improvement and to ensure exposures and emissions remain well below action levels.

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1.0 Fourth Quarter Overview

1.1 Facility Operation

Cameco continues to strive for operational excellence at all 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.

Significant changes to Structure, Systems and Components (SSC) or processes in the fourth quarter included:

- Commissioning of a new hydrogen tank at the south end of the site. The previous hydrogen tank has now been removed from site.

On November 18, 2022, approximately 480L of potable water from the UO_2 plant sprinkler system discharged to the ground from the sprinkler room and into a storm sewer catch basin.

On December 23, 2022, approximately 40,000L of potable water from a water main break was released into a storm sewer basin.

On December 24, 2022, approximately 200 gallons of potable water was released to the ground from the UF_6 plant sprinkler system. Some of the water was able to enter a nearby storm sewer catch basin.

The UF_6 plant operated without interruption in the fourth quarter including through the holiday period and into 2023.

The UO_2 plant operated through to December 22nd and then was shut down for the holiday period. The plant restarted January 4, 2023.

1.2 Physical Design / 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.

As part of the Vision in Motion (VIM) project, the site's liquid Hydrogen tank was replaced by a new installation located at the south end of the facility. Commissioning of the new tank was completed in October 2022 and the old tank has been removed. The PHCF Safety Analysis Report was updated to reflect this change and has been approved by CNSC staff.

A project to replace the current cooling water systems for both the UF_6 and UO_2 plants with closed loop cooling water systems began in 2022. The UO_2 plant ceased discharging once-through cooling water to the harbour in late-July 2022. Commissioning for the UO_2 plant closed loop cooling system was completed in Q4 2022. Commissioning for the UF_6 plant is scheduled for 2023. The Safety Analysis Report was updated to reflect these changes and has been approved by CNSC staff.

At the PHCF, changes to the physical design of equipment, processes, and the facility with the potential to impact safety are evaluated using the internal design change process described in *Process and Design Change Control, CQP-113*. Changes are reviewed through Cameco's management of change workflow, which ensures all potential impacts to the environment as well as to the health and safety of personnel are evaluated prior to implementation.

2.0 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. Cameco manages the radiation protection program using ALARA principles in order to ensure doses are maintained well below regulatory limits.

There were no radiation dose action level exceedances in the fourth quarter of 2022.

Whole Body Dose

Table 1 shows the whole-body dose summary results from the fourth quarter of 2022 for six work groups: UF_6 Plant; UO_2 Plant, Maintenance; Technical Support (including Nuclear Energy Worker (NEW) contractors), Corporate Technical Services (formerly named Major Projects); and Administration.

Table 1

Fourth Quarter 2022 Whole Body Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	93	0.29	0.00	1.97
UO_2 Plant	24	0.09	0.00	0.33
Maintenance	61	0.11	0.00	0.67
Technical Support [1]	473	0.03	0.00	0.78
Corporate Technical Services	34	0.00	0.00	0.03
Administration	85	0.00	0.00	0.16
Total (Max)	**736**	**0.07**	**0.00**	**1.97**
[1]Includes contractors (NEWs) Quarterly Action Level 2.0 mSv (NEWs)				

Table 2 shows the average, minimum and maximum quarterly individual external whole-body exposures for the fourth quarter of 2021 through to the fourth quarter of 2022. The average whole-body dose is consistent with previous quarters when production was operational. The maximum whole-body dose received by a UF6 employee was related to work in the flame reactor and effluent areas.

Table 2

Whole Body Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q4 2021	652	0.08	0.00	2.32
Q1 2022	615	0.06	0.00	1.68
Q2 2022	700	0.03	0.00	1.10
Q3 2022	825	0.05	0.00	1.40
Q4 2022	736	0.07	0.00	1.97
Quarterly Action Level 2.0 mSv (NEWs)				

Skin Dose

Table 3 shows the quarterly skin dose summary results for six work groups: UF_6 Plant; UO_2 Plant; Maintenance; Technical Support (including NEW contractors), Corporate Technical Services (formerly named Major Projects); and Administration. The highest exposures are from the UF_6 related to work in the flame reactor and effluent areas.

Table 3

Fourth Quarter 2022 Skin Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	93	0.74	0.00	4.73
UO_2 Plant	24	0.29	0.00	1.29
Maintenance	61	0.55	0.00	3.18
Technical Support[1]	473	0.06	0.00	0.79
Corporate Technical Services	34	0.01	0.00	0.18
Administration	85	0.01	0.00	0.28
Total (Max)	**736**	**0.19**	**0.00**	**4.73**
[1]Includes contractors (NEWs) Quarterly Action Level 15.0 mSv (NEWs)				

Table 4 shows the average and maximum quarterly individual skin exposure for the fourth quarter of 2021 through to the fourth quarter of 2022. The average skin dose is consistent with previous quarters when production was operational.

Table 4

Skin Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q4 2021	652	0.29	0.00	10.44
Q1 2022	615	0.25	0.00	5.88
Q2 2022	700	0.15	0.00	5.89
Q3 2022	825	0.18	0.00	4.85
Q4 2022	736	0.19	0.00	4.73
Quarterly Action Level 15.0 mSv (NEWs)				

Eye Dose

Table 5 shows the quarterly eye dose summary results for six work groups: UF_6 Plant; UO_2 Plant; Maintenance; Technical Support (including NEW contractors), Corporate Technical Services (formerly named Major Projects); and Administration. The highest exposure is from the UF_6 group related to work in the flame reactor and effluent areas.

Table 5

Fourth Quarter 2022 Eye Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	93	0.52	0.00	2.42
UO_2 Plant	24	0.20	0.00	0.82
Maintenance	61	0.33	0.00	1.68
Technical Support[1]	473	0.05	0.00	0.79
Corporate Technical Services	26	0.01	0.00	0.09
Administration	85	0.00	0.00	0.24
Total (Max)	**736**	**0.13**	**0.00**	**2.42**
[1]Includes contractors (NEWs)				

Table 6 shows the average, minimum and maximum quarterly individual external eye exposures for the fourth quarter of 2022.

Table 6

Eye Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q1 2022	615	0.15	0.00	2.58
Q2 2022	700	0.09	0.00	3.16
Q3 2022	825	0.11	0.00	3.09
Q4 2022	736	0.13	0.00	2.42

Urine Analysis

The urine analysis action levels are presented in Table 7 below.

Table 7

Urine Analysis Action Levels		
Parameter		**Action Level**
Urinalysis (NEW)	Weekly - UO_2/UF_6 Operators, Maintenance, Technical Support	65 µg U/L
	Monthly - Administrative Support	25 µg U/L
	Long-term Contractors	65 µg U/L
	Short-term Contractors	80 µg U/L
	Chemical toxicity – post shift sample	500 µg U/L
	Fluoride toxicity – all samples	7 mg F/L
Urinalysis (Non-NEW)	Daily - Routine Sample	40 µg U/L
	Monthly - Routine Sample	25 µg U/L
	Chemical Toxicity - Post Shift Sample	500 µg U/L
	Fluoride Toxicity – All Samples	4 mg F/L

There was no fluoride in urine result above the action level of 7 mg F/L in the fourth quarter of 2022.

Table 8 shows the distribution of urine results for the fourth quarter of 2022. A total of 13,018 urine samples were collected and analyzed for uranium during the fourth quarter of 2022. The majority of routine urine analysis results (98.7%) 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 two official investigations for uranium in urine during the fourth quarter of 2022.

Table 8

Fourth Quarter 2022 Routine Urine Analysis Results	
Distribution of Results	**Q4 2022**
Number of Samples < 5 µg U/L	12,848
Number of Samples > 5 to < 25 µg U/L	165
Number of Samples > 25 to < 50 µg U/L	5
Number of Samples > 50 µg U/L	0
Number of Samples Analyzed (Uranium)	13,018

Table 9 presents the internal urine analysis doses for the last five quarters. The average and maximum internal urine analysis doses in the quarter were 0.01 mSv and 0.16 mSv, respectively, which was consistent with previous quarters.

Table 9

Internal Dose (Urine) by Quarter				
Quarter	**Number of Individuals**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**	**Average Dose (mSv)**
Q4 2021	539	0.00	0.15	0.01
Q1 2022	493	0.00	0.26	0.01
Q2 2022	586	0.00	0.16	0.01
Q3 2022	676	0.00	0.20	0.01
Q4 2022	633	0.00	0.16	0.01

Fluoride in Urine

A total of 9,040 urine samples were analyzed for fluoride during the fourth quarter, with summary results provided in Table 10.

There was one sample above the internal administrative investigation level of 4 mg F/L during the fourth quarter. The samples were investigated and entered into CIRS.

Table 10

Fourth Quarter 2022 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	9,040	0.1	4.0
Routine post-shift fluoride samples >= 7 mg F/L	0	-	-
Routine post-shift fluoride samples >= 4 mg F/L	1	-	-
Non-routine fluoride samples	333	0.1	3.3
Samples analyzed for U, insufficient volume (< 30mL) for F analysis	44	-	-

Lung Counting

The lung count trailer was at the BRR and the PHCF sites in the fourth quarter. At PHCF, the contractors and CFM groups were lung counted.

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. There is also a monitor located at the 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. Incidents of zone contamination are presented in Table 11.

Table 11

Fourth Quarter 2022 Alpha Contamination Monitoring Results			
Area	**Number of Samples Taken**	**Zone Contamination Criteria (Bq/cm²)**	**Number of Samples Above Criteria**
Zone 1	811	0.4	0
Zone 2	12,226	0.4	19
Zone 3 (Yard)*	4	0.4	3

*Note – Samples are not routinely required in the yard area. Samples are taken as required if contamination is suspected.

The contamination in Zone 2 areas was primarily detected in the office areas and lunchrooms 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.

In-Plant Air

Routine air sampling is performed by collecting airborne particulate on air sampling filters and quantifying the airborne concentration of uranium. The fourth quarter results are presented in Table 12.

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.

Table 12

Fourth Quarter 2022 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	4,871	8	501	41
UO_2 Plant	1,474	3	50	0
Waste Recovery	741	2	10	0
CUP	437	1	8	0

The maximum in-plant air sample of 501 µg U/m^3 was recorded on November 23, 2022, in the UF_6 plant. This result was due to activities in the flame reactor and ashcan area. The area was posted as respirator required.

The average in-plant air concentrations are consistent with previous quarters.

3.0 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. Conventional safety statistics are presented in Table 13.

Table 13

2022 Safety Statistics					
Quarter / Parameter	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**	**YTD**
First Aid Injuries	9	17	9	11	46
Medical Diagnostic Procedures	3*	1	2	1	7
Medical Treatment Injuries	1	1**	1	1	4
Other Recordable Injuries	0	0	0	0	0
Lost Time Injuries	0	0	0	0	0
Lost Time Injury Frequency	0	0	0	0	0
Lost Time Injury Severity	0	0	0	0	0

*Three additional medical diagnostic events added to Q1 following an audiometric review. These were dated back to the date of the test.

**Revised due to June 29, 2022 medical treatment injury which was reported in January 2023.

There were no lost time incidents that occurred in the fourth quarter.

Health and Safety Activities

- **Communications**: OHS and CSSC continued to issue safety bulletins to promote a focus on continuing safety awareness.
- **Education and Training**: Internal training remained in place as room occupancy levels returned to normal in June.
- **Safety Awareness Activities**: A vendor show was held in the fourth quarter. Employees were able to meet with a variety of vendors related to PPE, tools/equipment, and health related services.

- **CSSC and Safety Subcommittees:** The CSSC committee continues to meet for regulatory meetings. Safety subcommittees continue to remain on hold, pending a refresher activity with Milliken.
- **Safety & Industrial Hygiene**: Powered air purifying respirators (PAPR) have been procured to replace the current fleet for site welders and Clean Up (CUP) crew. Training for the new units is in progress.
- **COVID Interruption**: COVID vaccination requirements remain in effect to access PHCF.
- **Total Recordable Injury Rate (TRIR)** – Q4 Ending = 1.32 (11 First Aids, 1 medical diagnostic, 1 medical treatment). Site has more than 3.7 million hours without a Lost Time Injury. Contractor TRIR YTD is 1.56.
- The site reached 4 years without a Lost Time Injury in September. Celebrations for this milestone occurred in Q4 2022.

4.0 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.

Public Dose

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

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

The monthly dose from Site 1 and Site 2 are based on monitoring results for each dose component as shown in Table 14.

Table 14

Quarterly Dose (mSv/quarter)					
ORL Component	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**	**YTD 2022**
Air	<0.001	<0.001	<0.001	<0.001	0.001
Water	<0.001	<0.001	<0.001	<0.001	0.001
Gamma – Site 1	0.023	0.021	0.020	0.022	0.087
Gamma – Site 2	0.030	0.029	0.026	0.033	0.116
Quarterly Dose – Site 1	0.024	0.021	0.021	0.022	0.088
Quarterly Dose – Site 2	0.030	0.029	0.026	0.033	0.118

Gamma Monitoring

Dose to the public is calculated for both site 1 and 2 using specific gamma fenceline monitoring locations. The results at station 2 are used for site 1 public dose calculations and the results at station 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 15.

There were no monthly gamma radiation action levels exceeded during the fourth quarter.

Table 15

Fourth Quarter 2022 Public Dose Gamma Monitoring Results					
Station Number	**October**	**November**	**December**	**Action Level (µSv/h)**	**Licence Limit (µSv/h)**
2	0.180	0.180	0.140	0.400	0.570
10	0.000	0.000	0.010	0.400	0.610
21	0.040	0.040	0.020	0.250	0.260

Air Emissions

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 16.

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.

No licensed action levels were exceeded for uranium emissions from the UF_6 plant main stack in the quarter. The UF_6 main stack average uranium emission rate was consistent with previous quarters.

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 was consistent with 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. The UF_6 main stack average fluoride emission rate was slightly lower than in previous quarters.

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 was consistent with previous quarters.

Table 16

Daily Main Stack Emissions by Quarter									
Plant	**Parameter**	**Licence Limit**	**Action Level**	**Value**	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
UF_6	Uranium g U/h	280	40	Quarterly Daily Average	2.1	2.3	3.8	2.0	1.9
				Quarterly Daily Maximum	6.7	6.7	44.7	6.7	3.7
	Hydrogen Fluoride g HF/h	650	230	Quarterly Daily Average	35	22	25	21	12
				Quarterly Daily Maximum	191	98	124	236	201
UO_2	Uranium g U/h	240	10	Quarterly Daily Average	0.5	0.5	0.6	0.4	0.5
				Quarterly Daily Maximum	1.1	0.9	1.2	1.2	1.4
	Ammonia kg NH_3/h	58	10	Quarterly Daily Average	2.2	2.9	2.6	1.4	2.0
				Quarterly Daily Maximum	4.2	7.7	4.9	3.8	4.3

Liquid Discharges

The PHCF operates a once-through non-contact cooling water system in support of UF_6 plant operations and harbour water supply quality influences cooling water return quality under normal operating conditions. Ambient water quality can fluctuate based on near-shore Lake Ontario currents, seasonal weather patterns, harbour remedial work and outer harbour sedimentation among other items.

Cooling water return quality data for the UF_6 plant cooling water return (monitoring location UO2N) is summarized in Table 17. The UO_2 plant ceased discharging once-through cooling water to the harbour in late-July 2022 in association with a transition to a closed loop cooling system. As the UO2S monitoring location was inactive for the duration of the fourth quarter, monitoring data is not summarized herein.

General decreases in first quarter average and maximum uranium concentrations were recorded relative to the fourth quarter of 2021. A general decrease in uranium trending

was noted from December 2021 through to February 2022 in relation to the interruption of Canadian Nuclear Laboratories (CNL) remedial work within the inner Port Hope harbour over the winter period. Following resumption of inner harbour dredge activities in March 2022, a corresponding increase in uranium trending was observed. Elevated mean and maximum conditions are observed at monitoring location UO2N for the balance of the 2022 calendar year as a function of on-going inner harbour remedial work. The fourth quarter maximum monthly mean and daily conditions were recorded in October. Similar trending patterns have been recorded at the PHCF harbour water intake.

An elevated first quarter 2022 maximum fluoride result was recorded for location UO2N relative to typical baseline concentrations and harbour water intake trending in association with harbour water supply challenges and a brief harbour water intake outage experienced in February. Ammonia results otherwise generally increased in the fourth quarter 2022. Ammonia is not a parameter of concern with respect to UF_6 plant heat exchanger operations and the cooling water intake also experienced a general increase in ammonia results over the same period. Trending is attributed to the accumulation and decomposition of surface water organic matter within the PHCF cooling water works.

Table 17

UO2N Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Uranium	µg U/L	Average	230	48	80	160	140
		Maximum	520	140	280	420	320
Fluoride	mg F/L	Average	0.070	0.13	0.11	0.10	0.12
		Maximum	0.17	0.76	0.21	0.15	0.33
Ammonia & Ammonium	mg N/L	Average	0.014	0.014	0.014	0.014	0.27
		Maximum	0.014	0.014	0.014	0.028	0.84
Nitrate	mg N/L	Average	1.2	1.2	0.68	0.34	0.89
		Maximum	1.9	1.7	1.7	0.51	1.6
pH	-	Minimum	8.12	8.02	8.12	8.08	8.10
		Maximum	8.36	8.36	8.38	8.76	8.57

A daily sanitary sewer discharge uranium action level of 100 µg U/L (0.10 mg U/L) and a monthly mean release limit of 275 µg U/L (0.275 mg U/L) are currently in place. Tables 18 and 19 summarize uranium concentrations and pH values recorded for the fourth quarter of 2022.

The daily sanitary sewer action level was not exceeded in the fourth quarter.

As a follow-up to fourth quarter 2021 and first quarter 2022 sanitary sewer infrastructure inspections, Cameco has evaluated targeted sanitary sewer infrastructure rehabilitation, replacement and/or abandonment tasks, taking into consideration work completed to date and planned site and VIM project sanitary sewer system improvements. Several activities are currently planned for the 2023 calendar year, both within and upstream of the licensed facility.

Specific to the licensed facility, Cameco is currently evaluating the replacement and realignment of sewer infrastructure servicing existing facility lift stations and portions of Building 20. Moreover, target areas have been selected for rehabilitation or abandonment planning. Some rehabilitation work considerations also extend to Marsh Street municipal infrastructure upstream of the PHCF.

Table 18

Sanitary Sewer Discharge Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Uranium	mg U/L	Average	0.050	0.044	0.050	0.022	0.040
		Maximum	0.25	0.14	0.28	0.18	0.094
pH	-	Minimum	6.94	7.18	7.32	7.12	7.56
		Maximum	8.31	8.31	8.20	8.21	8.22

Table 19

Q4 2022 Monthly Sanitary Sewer Discharges			
Period	**Sanitary Sewer Action Level/Release Limit**	**Monthly Average Uranium Concentration (µg U/L)**	**Daily Maximum Uranium Concentration (µg U/L)**
October	Action Level of 100 µg U/L – daily composite samples Release Limit of 275 µg U/L – monthly average of daily composite samples	31	80
November		42	94
December		47	89

Ambient Air Monitoring

Table 20 shows the quarterly all-station average and maximum uranium dustfall results from the fourth quarter of 2021 through to the fourth quarter of 2022.

No uranium dustfall results exceeded the internal administrative screening level in the fourth quarter. The average uranium in dustfall results in the fourth quarter of 2022 were consistent with the uranium in dustfall averages during the previous quarters.

Table 20

Uranium in Dustfall Results by Quarter (mg U/m^2/30 days)					
Value	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Average	0.1	<0.1	0.1	0.2	0.2
Maximum	0.6	0.1	0.4	1.7	1.3
Internal Administrative Screening Level = 10 mg U/m^2/30 days					

Table 21 summarizes the average and maximum uranium hi-vol results from the fourth quarter of 2021 through to the fourth quarter of 2022.

Average and maximum results for the quarter are below regulatory criteria. The average results for the Marsh Street, Waterworks, Hayward Street and Shuter Street stations are comparable to levels observed in the previous quarters.

Table 21

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**
Q4 2021	Average	0.001	0.001	0.002	0.002
	Maximum	0.020	0.011	0.017	0.011
Q1 2022	Average	0.001	0.001	0.003	0.002
	Maximum	0.017	0.014	0.018	0.014
Q2 2022	Average	0.002	0.002	0.004	0.003
	Maximum	0.012	0.036	0.031	0.012
Q3 2022	Average	0.001	0.001	0.004	0.001
	Maximum	0.003	0.008	0.025	0.005
Q4 2022	Average	0.001	0.001	0.003	0.002
	Maximum	0.006	0.004	0.010	0.015
Average <0.06 µg U in TSP/m^3 (annual) AAQC Maximum <0.3 µg U in TSP/m^3 (24 hr) AAQC					

Table 22 shows the quarterly all-station average and maximum fluoride dustfall results from the fourth quarter of 2021 through to the fourth quarter of 2022.

The average fluoride in dustfall results in the fourth quarter of 2022 was consistent with previous quarters.

Table 22

Fluoride in Dustfall Results by Quarter (mg F/m^2/30 days)					
Value	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Average	1.1	0.9	1.5	0.4	0.8
Maximum	11	10	9.9	4.1	4.2
Internal Administrative Screening Level = 20 mg F/m^2/30 days					

Table 23 shows the average and maximum lime candle results from the fourth quarter of 2021 through to the fourth quarter of 2022. The average results are comparable to levels observed in the previous quarters.

Table 23

Monthly Lime Candle Results by Quarter (μg F/100 cm^2/30 days)					
Value	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Average	3	4	4	4	2
Maximum	7	11	12	7	4
The desirable ambient air quality criteria for lime candles are to protect forage crops consumed by livestock. During the summer growing season, the criteria is 40µg F/100cm^2/30 days, changing to 80µg F/100cm^2/30 days in winter					

Ambient Water Quality Monitoring

A summary of harbour water intake (SCI) water quality data is presented in Table 24. Consistent with the production facility returns trending, general decreases in first quarter 2022 average and maximum uranium concentrations were recorded relative to the fourth quarter 2021. A general decrease in uranium trending was noted from December 2021 through to February 2022 in relation to the interruption of CNL remedial work within the inner Port Hope harbour over the winter period. Following resumption of inner harbour dredge activities in March 2022, a corresponding increase in uranium trending was observed. Elevated mean and maximum conditions are observed for the balance of the 2022 calendar year as a function of on-going inner harbour remedial work. The fourth quarter maximum monthly mean and daily conditions were recorded in October.

Ammonia results otherwise generally increased in the fourth quarter 2022. Trending is attributed to the accumulation and decomposition of surface water organic matter within the PHCF cooling water works.

Table 24

SCI Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2021**	**Q1 2022**	**Q2 2022**	**Q3 2022**	**Q4 2022**
Uranium	µg U/L	Average	240	52	85	180	160
		Maximum	540	160	280	500	360
Fluoride	mg F/L	Average	0.070	0.11	0.11	0.099	0.11
		Maximum	0.17	0.17	0.22	0.19	0.16
Ammonia & Ammonium	mg N/L	Average	0.014	0.014	0.014	0.019	0.13
		Maximum	0.014	0.014	0.014	0.46	0.76
Nitrate	mg N/L	Average	1.3	1.2	0.72	0.42	1.2
		Maximum	1.9	1.8	1.4	0.65	1.9
pH	-	Minimum	8.14	8.02	8.09	8.04	7.94
		Maximum	8.42	8.36	8.46	8.74	8.60

Cooling Water Intake – Visual Inspections

Table 25 below presents all non-conformities observed during daily visual inspections of the cooling water intake system.

Table 25

Date	**Quantity of Fish Observed**	**Observations**
October 13	1	1 small fish approximately two to three inches in length was observed on this day. It is believed that the fish was washed into the pit as a result of heavy wave action.
November	0	No fish were observed during daily checks.
December	0	No fish were observed during daily checks.

5.0 Public Information Program

During the fourth quarter of 2022, PHCF continued to meet the requirements of CNSC RD/GD 3.2.1, Public Information and Disclosure programs.

Public Engagement

Cameco supported and attended the Port Hope Chamber Business Awards on October 6 and the Rebound Child and Youth Services Kilometres for Kids event on October 16.

Cameco sponsored the Northumberland Hispanic Cultural Club's Hispanic Heritage Month in October.

The results of the 2022 Public Opinion Polling were posted to the website and shared via Cameco's social media channels. The survey showed 93% of local residents supported the continuation of Cameco operations in Port Hope.

Cameco sponsored the Community Care Northumberland Volunteer Fair on October 18 at the Lions Community Centre in Cobourg.

A news release announcing the application process for the Cameco Fund for Mental Health was issued to local media on October 20. The release was posted to the website and promoted on social media.

Cameco sponsored a wreath at the Remembrance Day ceremonies in Port Hope and Cobourg on November 11. On November 19, Cameco was a sponsor of the Northumberland Hispanic Cultural Club Diversity Festival at the Victoria Concert Hall in Cobourg.

Cameco was a sponsor of the Capitol Theatre's Festival of Trees in November/December as well as the Spry Family Christmas Tree event on December 3 which raises funds for the Northumberland Hills Hospital Foundation.

The Port Hope Santa Claus Parade took place on November 26 and Cameco entered its holiday float and employees participated in walking in the parade.

Cameco issued a news release on December 16 to announce the recipients of the 2022 Cameco Fund for Mental Health

Cameco provided free advertising to local charitable organizations with its sponsorship of MyFMs Community Partner Program. Through the quarter, Community Care Northumberland, Northumberland United Way, and Northumberland Hills Hospital benefitted from this sponsorship by receiving advertising.

Public Disclosure

PHCF made four public disclosures during the fourth quarter: Environment & Safety - Conversion: Port Hope - Fuel Services - Businesses - Cameco

Posting Date	October 3, 2022
Incident Date	September 28, 2022
Incident	Environmental Action Level Exceedance
Details	The daily sanitary sewer discharge recorded a value of 180 µg/L on September 28, 2022, which exceeded the uranium sanitary sewer action level of 100 µg/L. Facility discharge otherwise remains well below the sanitary sewer uranium limit of 275 µg/L (monthly average). There was no health or safety risk posed to the public, workers or the environment.
Corrective Action	Groundwater infiltration associated with inactive utilities is suspected as the likely cause. Cameco notified the Canadian Nuclear Safety Commission and the Municipality of Port Hope.
Cameco Environmental Effect Rating	1

Posting Date	October 6, 2022
Incident Date	September 29, 2022
Incident	Update to September 28 Environmental Action Level Exceedance
Details	The daily sanitary sewer discharge recorded a value of 160 µg/L on September 29, 2022, which exceeded the uranium sanitary sewer action level of 100 µg/L. Facility discharge otherwise remains well below the sanitary sewer uranium limit of 275 µg/L (monthly average). There was no health or safety risk posed to the public, workers or the environment.
Corrective Action	Groundwater infiltration associated with inactive utilities is suspected as the likely cause. Cameco notified the Canadian Nuclear Safety Commission and the Municipality of Port Hope.
Cameco Environmental Effect Rating	1

Posting Date	November 21, 2022
Incident Date	November 18, 2022
Incident	Reportable Spill
Details	Approximately 480 litres of potable water (municipal water) from the UO_2 plant sprinkler system discharged to the ground from the sprinkler room and into a storm sewer basin connected to the harbour. The PHCF potable water system is supplied by the Municipality of Port Hope. There was no health or safety risk posed to the public or environment.
Corrective Action	The ERT was activated, and the sprinkler system was isolated to stop the release once it was determined that there was no fire. Cameco pumped the storm sewer basin out and the water was cleaned up. The likely cause appears to be excess heat in the room, which caused the sprinkler head to activate. The Canadian Nuclear Safety Commission and the Spills Action Centre have been notified.
Cameco Environmental Effect Rating	1

Posting Date	December 23, 2022
Incident Date	December 23, 2022
Incident	Reportable Spill
Details	A water main break at the Port Hope Conversion Facility resulted in approximately 40,000 litres of municipal water being released into a storm sewer basin connected to the harbour. There was no health or safety risk posed to the public, workers or the environment.
Corrective Action	The flow has been minimized and de-chlorination pucks were placed in the area within 15 minutes of the discovery of the water main break. Cameco notified the Spills Action Centre and the Canadian Nuclear Safety Commission.
Cameco Environmental Effect Rating	1

Social Media

Cameco Ontario's Facebook community grew by 20 new followers (1,259 total) and had a total of 1,053 page likes at the end of the quarter. Cameco Ontario's 24 posts covered information such as:

- Results of the 2022 public opinion survey
- Various career opportunities at Cameco
- Events sponsored by Cameco, such as the Community Care Northumberland Volunteer Fair, and the Festival of Lights and Trees at the Capitol Theatre
- Promoted the Step Up for Mental Health application process for Blind River and Northumberland County
- Promoted community partners, including Community Care Northumberland, and Northumberland Hills Hospital
- Recognized Remembrance Day on November 11
- Cameco's participation in the Port Hope Santa Claus parade on November 26
- Informed Port Hope residents about Cameco's involvement in an emergency response exercise led by the Municipality of Port Hope on December 1
- Shared a Cameco holiday greeting on December 13
- Announced the grant recipients from the Cameco Fund for Mental Health on December 16

- Shared the employee giving campaign total for all of Cameco, including all sites in Ontario

By the end of the quarter the Instagram account had grown by 27 new followers for a total of 718 followers. Photos and information featured were similar to the Cameco Facebook page.

Indigenous Engagement

Cameco met with Scugog Island First Nation on October 25 and December 6, 2022. Both meetings were part of Cameco and Scugog Island's regularly scheduled update meetings. The October meeting focused on an update on various community activities and results from the public opinion polling. Cameco and Scugog Island agreed that Cameco can start focusing content on the Port Hope Conversion Facility and Vision in Motion activities as licensing activities at CFM wind down at the end of the year. At the December meeting, conversations focused on a general discussion of the CFM licence hearing.

Cameco met with representatives of the Métis Nation of Ontario Region 6 on November 3. Cameco provided an overview of operations, performance and general community activities. Cameco answered general questions about waste and security of supply.

Cameco met with Curve Lake First Nation on November 28. The meeting covered a general discussion of the CFM licence renewal hearing. Curve Lake provided an update on its work with proponents in the territory.

Public disclosures are reviewed and discussed at all meetings with Curve Lake and Scugog Island.

On October 20, Cameco emailed Curve Lake and Scugog Island a copy of the news release announcing the application process for the Cameco Fund for Mental Health.

Website

Cameco Fund for Mental Health: Information about the Cameco Fund for Mental Health was posted to the website: The Cameco Fund for Mental Health - Making a Difference - Community - Cameco Fuel Services

A news release announcing the grant recipients was posted: Cameco Fund for Mental Health 2022 Awards Grants to Nine Northumberland County Organizations - News Archive - Media - Cameco Fuel Services

Public Disclosures: Four public disclosures were posted to the website Environment & Safety - Conversion: Port Hope - Fuel Services - Businesses - Cameco

Public Opinion Polling: The summary of the 2022 Public Opinion Polling results was posted to the website: Port Hope Community Survey Results 2022 - Making a Difference - Community - Cameco Fuel Services

Media Analysis

Cameco received media coverage regarding its charity golf tournament:

- **COMMUNITY SPOTLIGHT: CCN Volunteer Fair brings over 30 Local agencies together with prospective volunteers** – Oct 26, 2022 – Go Northumberland
    - COMMUNITY SPOTLIGHT: CCN Volunteer Fair brings over 30 Local agencies together with prospective volunteers | 93.3 myFM (gonorthumberland.ca)

- **Port Hope's Cameco golf tournament fundraiser means more money for mental health initiatives** – Nov 6, 2022 – Northumberland News
    - Port Hope's Cameco golf tournament fundraiser means more money for mental health initiatives (northumberlandnews.com)

- **Cameco Fund for Mental Health 2022 Awards Grants to Nine Northumberland County Organizations** – Today's Northumberland – Dec. 17, 2022
    - Cameco Fund for Mental Health 2022 Awards Grants to Nine Northumberland County Organizations - Today's Northumberland - Your Source For What's Happening Locally and Beyond (todaysnorthumberland.ca)

- **Cameco contributing $50K to support Northumberland mental health initiatives** –Northumberland News – Dec. 24, 2022
    - Cameco contributing $50K to support Northumberland mental health initiatives (northumberlandnews.com)

- **Cameco contributing $50K to support Northumberland mental health initiatives** – The Peterborough Examiner – Dec. 24, 2022
    - Cameco contributing $50K to support Northumberland mental health initiatives | ThePeterboroughExaminer.com)

Communication Products

The 2022 Public Opinion Polling results were posted to camecofuel.com and shared via social media channels.

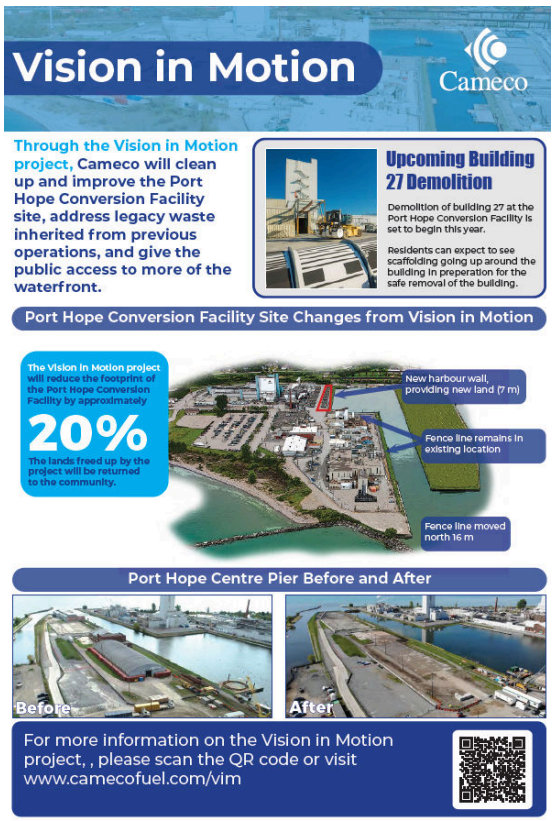
- Port Hope Community Survey Results 2022 - Making a Difference - Community - Cameco Fuel Services

A news release announcing the recipients of the Cameco Fund for Mental Health was issued to local media and posted on the website.

- Cameco Fund for Mental Health 2022 Awards Grants to Nine Northumberland County Organizations - News Archive - Media - Cameco Fuel Services

The Step Up for Mental Health section of the website was update.

The Cameco Fund for Mental Health - Making a Difference - Community - Cameco Fuel Services



6.0 Other Matters of Regulatory Interest

6.1 Vision in Motion

VIM engineering activities continued to support collaboration with the Municipality of Port Hope (MPH) on stormwater systems in the vicinity of Eldorado Place and the Cameco parking lot, building 72 (new warehouse), the large excavation to be completed west of the turning basin, and warehouse demolition (buildings 6, 7, 12, 12A).

Regular coordination continued with CNL regarding future remediation activities with shared responsibilities at the Centre Pier and near the Cameco fence line along the harbour.

On-site project activities continued from the previous quarter, including interior demolition activities at Building 27 where equipment removal was substantially completed, removal of interior block was completed down to the 4th floor, and work began to remove stairwell block walls. Installation of shoring began to support scaffolding needed to demolish the tower. Within Building 5B equipment removal work began with cleaning, hoarding, ventilation set-up, scrap removal and cold cutting equipment.

Commissioning of the new hydrogen station was completed—the system was made operational.

Packaged waste shipments to the LTWMF continued. Delivery of materials in roll-off bins is still not permitted while the LTWMF evaluates safety measures for unloading these containers.

The Supplementary Environmental Monitoring Plan for Vision in Motion and Other Clean-Up Program Projects is in place to monitor environmental impacts for the VIM activities, primarily during demolition/excavation. There were no environmental monitoring exceedances/reportable events that occurred in the fourth quarter related to VIM activities, however elevated dust trak results and high-volume air sampler total suspended particulates were recorded in October and December 2022 as a result of CNL harbour remediation activities.

7.0 Concluding Remarks

Cameco is committed to the safe, clean, and reliable operations of all 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 fourth quarter of 2022, 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.

PHCF's ALARA program continued to be effective in the fourth quarter of 2022.

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.