



**2022 Fourth Quarter Compliance Monitoring  
&  
Operational Performance Report**

**Reporting Period October 1 – December 31, 2022**

**Cameco Fuel Manufacturing Inc.  
Fuel Facility Operating Licence  
FFOL-3641.00/2022**

200 Dorset Street East  
Port Hope, Ontario  
L1A 3V4

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

## **Executive Summary**

Cameco Corporation (Cameco) is committed to the safe, clean, and reliable operations of its facilities and continually strives to improve safety performance and processes to ensure the safety of both its employees, local residents, and the environment. CFM maintains the required programs, plans and procedures as required by the applicable regulations including but not limited to the areas of health and safety, radiation protection, environment, emergency response, fire protection, waste management, and training.

As a result of the programs, plans and procedures, CFM'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. During the fourth quarter, there were no exceedances of the action levels in the radiation protection or environmental protection program.

In the fourth quarter there was a planned shutdown of the facility at the end of December. The planned shutdown provides an opportunity to complete maintenance activities, complete any scheduled facility and equipment upgrades as well as allows operators an opportunity to use vacation time.

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## 1.0 Fourth Quarter Overview

### 1.1 Facility Operation

Cameco continues to strive for operational excellence at 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 CFM Management System.

In the first quarter of 2022, CFM was granted a one-year licence by the Commission (FFL-3641.00/2023) effective March 1, 2022 until February 28, 2023. There was a new Licence Conditions Handbook (LCH) also released effective March 1, 2022 (LCH-FFL-3641.00/2023). During the fourth quarter, the CNSC held a licence hearing for the renewal of CFM's licence in 2023. The outcome from the hearing was announced in the first quarter of 2023 with the acceptance of a 20 year licence.

There were no significant changes to Structure, Systems and Components (SSC) or processes in the fourth quarter. The LCH for the facility references core CFM documents that form the licensing basis in each safety and control area. There were documents submitted to the CNSC in the fourth quarter of 2022.

In the fourth quarter there was a planned shutdown of the facility for one week at the end of December. The planned shutdown provides an opportunity to complete maintenance activities, complete any scheduled facility and equipment upgrades as well as allows operators an opportunity to use vacation time.

There was one reportable event that required notification of the duty officer as detailed in the *Nuclear Safety and Control Act* during the quarter. At 2:42 AM on December 24th, 2022, CFM's Port Hope facility was subject to a loss of electrical power due to the winter snowstorm/windstorm occurring at the time. Since this loss of electrical power occurred during a planned shutdown period there was one process technician on site, along with security. The fire alarm annunciated at approximately 4:07 AM which triggered a response from the Municipality of Port Hope Fire & Emergency Services (PHFES). Since limited staff were on site, no personnel evacuation was required. Site personnel at the time of the alarm investigated to determine that there was no fire event. Upon arrival to the site, the PHFES also confirmed that there was no fire event and returned the site back to CFM control.

During the fourth quarter there were no exceedances of the radiation protection or environmental protection action levels.

## 1.2 Physical Design / Facility Modification

Modifications to facility buildings, processes, equipment, procedures, programs, or organizational structure with the potential to impact safety are evaluated through the internal change and design control process from planning through to completion. This process is used to help identify impacts and potential impacts to the licensing basis, the environment as well as to the health and safety of employees and local residents.

In the fourth quarter of 2022, there were no modifications undertaken that required written approval from the Commission or a person authorized by the Commission.

There were also no significant changes to the physical design of equipment, processes, or the facility in the quarter.

## 2.0 Radiation Protection

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

CFM has established action levels pertaining to radiation protection, which are listed in CFM’s LCH. A result above an action level is investigated and remedial actions taken if necessary. During the fourth quarter there was no exceedance in the Radiation Protection program.

### Whole Body Dose

Table 1 shows the fourth quarter whole body dose for three work groups: employees in the operations group, employees in administration/support roles, and outside contractors/visitors. The highest exposures are from the operations work group, consisting of production, inspection, and maintenance personnel. There were no action level exceedances for whole body dose in the radiation protection program during the quarter. In the fourth quarter, the majority of NEWs received a whole body dose below 1 mSv (98%).

**Table 1**

<b>Fourth Quarter 2022 Whole Body Dose Results</b>				
<b>Work Group</b>	<b>Number of Individuals</b>	<b>Average (mSv)</b>	<b>Minimum (mSv)</b>	<b>Maximum (mSv)</b>
Operations	100	0.21	0.00	1.20
Administration / Support	82	0.01	0.00	0.21
Contractors/Visitors	18	0.00	0.00	0.02
Monthly action level is 1.6 mSv (for NEWs such as production employees). Quarterly action level is 1.0 mSv (for NEWs such as support staff and contractors).				

Table 2 shows the quarterly average, minimum and maximum individual external whole body exposure for all NEWs from the fourth quarter of 2021 to the fourth quarter of 2022 (five monitoring periods). The average whole body dose in the fourth quarter for all NEWs was 0.11 mSv. The average whole body dose is slightly lower than previous quarters; with the exception of the third quarter, which typically has more contractors on site during shutdown. The maximum dose is lower than most of the previous quarters. It is most accurate to compare the fourth quarter results in 2022 to the previous fourth quarter results in 2021 when normalized with production rates. When these two quarters are compared, the average and maximum dose was lower in 2022. The individual with

the highest exposure in the fourth quarter was an operator who works in the Pelleting Area.

**Table 2**

<b>Whole Body Dose Results by Quarter</b>				
<b>Monitoring Period</b>	<b>Number of Employees</b>	<b>Average Dose (mSv)</b>	<b>Minimum Dose (mSv)</b>	<b>Maximum Dose (mSv)</b>
Q4 2021	194	0.13	0.00	1.23
Q1 2022	198	0.13	0.00	1.71
Q2 2022	192	0.12	0.00	1.16
Q3 2022	199	0.10	0.00	1.33
Q4 2022	200	0.11	0.00	1.20

Skin Dose

Table 3 shows the fourth quarter skin dose results for three work groups, employees in operations (monitored monthly), employees in administration and/or support roles and outside contractors/visitors (both monitored on a quarterly basis). The highest exposures are from the operations work group, consisting of production and maintenance personnel. The maximum skin dose for all NEWs was 12.95 mSv in the fourth quarter and the average skin dose for all NEWs was 0.82 mSv. The action levels for skin dose were not exceeded in the quarter. The majority of NEWs received a skin dose in the fourth quarter below 10 mSv (99.5%).

**Table 3**

<b>Fourth Quarter 2022 Skin Dose Results</b>				
<b>Work Group</b>	<b>Number of Individuals</b>	<b>Average (mSv)</b>	<b>Minimum (mSv)</b>	<b>Maximum (mSv)</b>
Operations	100	1.62	0.00	12.95
Administration / Support	82	0.01	0.00	0.53
Contractors/Visitors	18	0.00	0.00	0.02
Monthly action level is 20.0 mSv (for NEWs such as production employees). Quarterly action level is 5.0 mSv (for NEWs such as support staff and contractors).				

Table 4 shows the employee quarterly average and maximum individual skin exposure from the fourth quarter of 2021 to the fourth quarter of 2022. It is most accurate to compare the fourth quarter results in 2022 to the previous fourth quarter results in 2021 due to production rates. When these two quarters are compared the average dose is lower in the fourth quarter of 2022 and the maximum was higher in 2022. The individual who

received the maximum skin dose was a Pelleting area employee but was not the same individual with the maximum whole-body dose.

**Table 4**

<b>Skin Dose Results by Quarter</b>				
<b>Monitoring Period</b>	<b>Number of Employees</b>	<b>Average Dose (mSv)</b>	<b>Minimum Dose (mSv)</b>	<b>Maximum Dose (mSv)</b>
Q4 2021	194	0.96	0.00	10.18
Q1 2022	198	1.03	0.00	14.06
Q2 2022	192	1.00	0.00	11.91
Q3 2022	199	0.60	0.00	8.65
Q4 2022	200	0.82	0.00	12.95

Eye Dose

Table 5 shows the fourth quarter eye dose results for three work groups, employees in operations (monitored monthly), employees in administration and/or support roles and outside contractors/visitors (both monitored on a quarterly basis). The highest exposures are from the operations work group, consisting of production and maintenance personnel. The maximum eye dose for all NEWs was 5.92 mSv in the fourth quarter and the average eye dose for all NEWs was 0.42 mSv. The interim action levels for eye dose were not exceeded in the quarter. The majority of NEWs received an eye dose below 2 mSv (93%).

**Table 5**

<b>Fourth Quarter 2022 Eye Dose Results</b>				
<b>Work Group</b>	<b>Number of Individuals</b>	<b>Average (mSv)</b>	<b>Minimum (mSv)</b>	<b>Maximum (mSv)</b>
Operations	100	0.83	0.00	5.92
Administration / Support	82	0.01	0.00	0.35
Contractors/Visitors	18	0.00	0.00	0.02
*Monthly interim action level is 6.0 mSv				
*Quarterly interim action level is 12.0 mSv.				

\*Interim action levels approved by CNSC July 11, 2022

Table 6 shows the employee quarterly average and maximum individual eye exposure for 2022. The average dose in the fourth quarter of 2022 was lower than the dose in the first and second quarter however was higher than the dose in the third quarter. This is expected due to the three week shutdown in the third quarter. The maximum eye dose in the fourth quarter was higher than previous quarters with the exception of the first



quarter. The individual who received the maximum eye dose was a Pelleting area employee who was the same individual with the maximum skin dose.

**Table 6**

<b>Eye Dose Results by Quarter</b>				
<b>Monitoring Period</b>	<b>Number of Employees</b>	<b>Average Dose (mSv)</b>	<b>Minimum Dose (mSv)</b>	<b>Maximum Dose (mSv)</b>
Q1 2022	198	0.53	0.00	6.40
Q2 2022	192	0.50	0.00	5.42
Q3 2022	199	0.32	0.00	4.31
Q4 2022	200	0.42	0.00	5.92

\*Note – Tracking eye dose results was implemented as a requirement in the first quarter; therefore, additional quarters will be added to this table in future reports until 5 monitoring periods is acquired.

Extremity Dose

The action level for extremity dose at CFM is 55 mSv per quarter. The quarterly action level applies to production NEWs who regularly handle product as part of their daily task. In 2021, CFM completed an assessment for extremity dose to align with the Radiation Protection Regulations (RPR) issued in 2020. Specifically, section 8 of the RPR adds the requirement to use a licensed dosimetry service for equivalent doses to the skin, hands, and feet if the annual dose would be over 50 mSv. It was determined that the extremity dose for NEWs at CFM do not exceed 50 mSv/yr and therefore are not required to wear dosimeters from a licensed dosimetry service provider. Extremity dose can be estimated using historic data.

If there is a change in processing techniques or work configurations that would impact extremity dose, then an assessment is required to determine if the 50 mSv/yr criteria would be exceeded. Changes to equipment or processes are captured through CFM's Management of Change (MoC) process. In the fourth quarter of 2022, there were no changes implemented that would have required an assessment of the impact to extremity dose; therefore, the fourth quarter extremity dose is equivalent to previous quarters.

Table 7 shows the average, minimum, and maximum extremity dose for NEWs over the period from the fourth quarter of 2021 to the fourth quarter of 2022. As noted above the dose for the fourth quarter of 2022 would be similar to previous quarters with the second quarter of 2021 most representative as NEWs wore their rings for the entire quarter. If the second quarter dose from 2021 was used as the basis for the fourth quarter of 2022 the average dose is estimated at 1.90 mSv and the maximum dose is estimated to be 10.50 mSv.

**Table 7**

<b>Extremity Dose Results by Quarter</b>				
<b>Monitoring Period</b>	<b>Number of Employees</b>	<b>Average Dose (mSv)</b>	<b>Minimum Dose (mSv)</b>	<b>Maximum Dose (mSv)</b>
Q4 2021	78	1.76	0.00	9.03
Q1 2022	-	1.90*	0.00	10.50*
Q2 2022	-	1.90*	0.00	10.50*
Q3 2022	-	1.25 <sup>+</sup>	0.00	7.87 <sup>+</sup>
Q4 2022	-	1.90*	0.00	10.50*

\*estimation based on Q2 2021 data

+ estimation based on Q3 2021 data

### Urine Analysis

The action level for a single routine urine sample is 10 µg/L of uranium concentration. During the quarter there was no exceedance of the urine analysis action level. Routine urine samples results analyzed during the fourth quarter are provided in Table 8 below.

**Table 8**

<b>Fourth Quarter Routine Urine Analysis Results</b>				
<b>Work Group</b>	<b>Number of Samples</b>	<b>Average (µg/L)</b>	<b>Minimum* (µg/L)</b>	<b>Maximum (µg/L)</b>
Operations	363	0.24	<0.20	2.20
Routine urine sample action level is 10 µg/L				

\*detection limit of equipment is 0.2 µg/L therefore reported as <0.20 µg/L

### Internal Dose

Routine urine analysis samples are collected on a biweekly basis for trending purposes; if an acute uptake is noted it is verified using lung counting and dose assigned if required.

In the fourth quarter, there were no routine urine sample results that were above the internal administrative level of 4.0 µgU/L.

During the fourth quarter there was routine lung counts conducted. In total 53 employees attended a lung count in the fourth quarter. The next campaign is scheduled for May/June of 2023.

### Contamination Control

CFM has other programs to ensure radiation exposure levels remain low. An extensive contamination control program at CFM is zone control. The facility is divided into four

zones for contamination control purposes. Zone 1 areas are designated as clean areas with no contamination permitted. Food and drink can be consumed in these areas and include the lunchroom and office areas. Zone 2 areas contain no open sources of radioactivity but have the potential for contamination. These areas include the assembly area, change rooms and the machine shop. Zone 3 areas are the access points to Zone 4. Zone 4 areas contain open sources of radioactivity and include the Pelleting Area. Consumption of food and drink are restricted in Zones 2, 3, and 4.

The administrative limits are provided in Table 9 as well as the routine contamination monitoring results for the fourth quarter. Of the 711 samples taken none exceeded the internal administrative control limits (ACL).

**Table 9**

<b>Fourth Quarter Alpha Contamination Monitoring Results</b>			
<b>Area</b>	<b># of Samples Taken</b>	<b>Administrative Limits (Bq/cm<sup>2</sup>)</b>	<b># of Samples Above Limits</b>
Zone 1	140	0.4	0
Zone 2	192	4.0	0
Zone 3	42	4.0	0
Zone 4	337	40	0

In-Plant Air

Routine air sampling is conducted at workstations throughout the plant continuously during operations to monitor airborne uranium dioxide in the work environment. The results for the fourth quarter of 2022 taken in each area, including the CAM heads in the PP2 area, dry Waste Treatment area and the furnace hall are shown in Table 10 below. There were no results above the 80-hour ACL or the 2000 hour ACL in the fourth quarter.

**Table 10**

<b>Fourth Quarter 2022 Uranium In-plant Air Sampling Results</b>					
<b>Plant Area</b>	<b># of Samples</b>	<b>Average (<math>\mu\text{g U}/\text{m}^3</math>)</b>	<b>Maximum (<math>\mu\text{g U}/\text{m}^3</math>)</b>	<b># Samples &gt; ACL<sup>2000 hr</sup></b>	<b># Samples &gt; ACL<sup>80 hr</sup></b>
Ceramics Lab	56	1	4	0	0
Compaction Room	112	2	5	0	0
Load Room	224	1	7	0	0
Pangborn Room	112	3	14	0	0
Pelleting Area	336	2	8	0	0
UO <sub>2</sub> Grinders	224	3	17	0	0
Waste Treatment	56	4	24	0	0
PP2 Area	736	2	24	0	0
Dry Waste Treatment	460	1	19	0	0
Furnace Hall	548	1	6	0	0
<b>TOTAL</b>	<b>2865</b>	<b>2</b>	<b>24</b>	<b>0</b>	<b>0</b>
2000-hour Administrative Control Limit = 52 $\mu\text{g}/\text{m}^3$					
80-hour Administrative Control Limit = 595 $\mu\text{g}/\text{m}^3$					

### Gamma Surveys

An ongoing ALARA initiative involves posting OSLD's around the facility to determine areas of elevated gamma radiation. The result for each location in the fourth quarter is summarized in Table 10. The results illustrate that the Fuel Storage Area had the highest gamma fields (6.1  $\mu\text{Sv}/\text{hr}$ ), which is expected due to the amount of product stored in the area. The area is posted instructing workers to limit the time spent in this area. The next highest reading (5.0  $\mu\text{Sv}/\text{hr}$ ) was in the PP2 Receiving area. This is also expected due to the amount of raw material stored in this area. Employees limit their time in this area as well. The dose rate results for the fuel storage area are lower than the previous quarter (7.2  $\mu\text{Sv}/\text{hr}$ ) and was slightly higher than the previous quarter in the PP2 area (4.6  $\mu\text{Sv}/\text{hr}$ ). The dose rate in both of these areas fluctuate according to production requirements.

**Table 11**

<b>Fourth Quarter 2022 Gamma Survey Results</b>						
<b>Location #</b>	<b>Area</b>	<b>Result (μSv/hr)</b>		<b>Location #</b>	<b>Area</b>	<b>Result (μSv/hr)</b>
13	Kitting	0.3		37	PP2 Powder Rec. N.	1.1
14	S Stacking	1.1		38	Powder Receipt	0.5
15	Stacking	0.2		39	U <sub>3</sub> O <sub>8</sub> Add-back	1.4
16	Pelleting Entry	0.6		40	S End Cap	0.1
17	Pelleting Lab	0.1		41	End Cap	0.2
18	S Grinding	1.0		42	N End Cap	0.1
19	Grinding	0.9		43	E Offices	0.0
20	N Grinding	0.9		44	S End Plate	0.0
21	S Wall	0.0		45	End Plate	0.0
22	S Furnace	0.4		46	N End Plate	0.0
23	Furnace	0.9		47	W Offices	0.0
24	N Furnace	0.1		48	S Inspection	0.1
25	SE Wall	0.6		49	Inspection	0.1
26	E Wall Furnace	0.4		50	N Inspection	1.1
27	NE Wall	0.4		51	W Inspection	0.0
28	N Corridor	0.4		52	Strapping Bay	0.2
29	Ceramics Lab	0.2		53	Packing	0.2
30	R7#1 East Wall	1.6		54	Fuel Storage Area	6.1
31	PP2 West Wall	0.2		55	Graphite East	0.1
32	S Pressing	1.1		56	BMS Loading	0.7
33	N Pressing	0.9		57	PP2 Receiving	5.0
34	Pangborn	0.9		58	PP2 Press R53-1	1.3
35	S. Waste Treat	1.6		59	PP2 East Wall	0.6
36	N. Waste Treat	0.5				

### 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. Table 12 shows the safety statistics for the Port Hope facility.

**Table 12**

2022 Safety Statistics					
Year / Parameter	Q1	Q2	Q3	Q4	YTD
First Aid Injuries	0	2	3	0	5
Medical Diagnostic Injuries	3	4	1	1	8
Medical Treatment Injuries	1	0	1	1	2
Lost Time Injuries	0	0	0	0	0
Lost Time Injury Frequency	0.0	0.0	0.0	0.0	0.0
Lost Time Injury Severity	0.0	0.0	0.0	0.0	0.0

Injury statistics updates from previous compliance reports: No updates for the fourth quarter.

There were no lost time incidents that occurred in the fourth quarter. The Total Recordable Injury Rate (TRIR) for Oct 1st to Dec 31st, 2022 was 3.41 with a year to date TRIR of 3.34.

#### Health and Safety Activities

- Communications:** The fourth quarter safety meetings were held each month with a different topic including Fire Safety, Mental Health, and Winter Safety. Each month an update is included for the previous month on 4 topics: Safe, healthy, and rewarding workplace, clean environment, supportive communities, and outstanding financial performance. Safety statistics as well as the status on quality and production targets are also included in the update on these topics.
- Education and Training:** During the fourth quarter of 2022, CFM training continued to develop work instructions for the PP2 area. SAT design for the Millwright position began and a draft completed. The three-year review for Basic Cause Investigation: 5 Why's began and the analysis was updated. 2022 was another strong year for training compliance, with CFM ending the year with a 97.5% compliance score ahead of the 95% target. Cameco Fuel Manufacturing also ended the year with a 99.6% completion of No Go courses. Cameco Fuel Manufacturing employees completed 6,112 hours of training during the year and completed 200 scheduled in-person courses, which is a 32% increase from 2021.

- **Safety Awareness Activities:** In the fourth quarter the JHSC provided all employees with high-visibility/reflective vests and a flashlight for any activities that might be done after work when it is dark outside.
- **JH&SC:** The JHSC continued in person meetings with the option of attending virtually if people are not comfortable in group settings. A meeting is set for Q1 of 2023 to develop 2023 JHSC objectives.
- **Safety & Industrial Hygiene:** CFM's new ergonomic procedure and contractor management program updates were completed. Noise dosimetry was conducted in the 4th quarter for employees who work in hearing protection mandatory areas based on sound level assessments. Welding fume sampling and silica in air sampling were also completed by a qualified third-party contractor.
- **Ergonomics:** Ergonomic risk assessments and physical demands analysis were conducted by a qualified third party on several tasks in Q4. Reports and recommendations are expected in early Q1 of 2023. Additional ergonomic risk assessments are also scheduled for Q1 of 2023.
- **Emergency Preparedness:** During the fourth quarter, CFM conducted its full scale emergency exercise which was performed in conjunction with the Port Hope fire department. A final report was developed, and findings entered into CIRS for tracking.

#### 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

With the update to the Derived Release Limit (DRL) report, the calculated public dose was revised to include potential dose from all pathways at the CFM facility. Beginning in the first quarter of 2021, public dose was calculated by summing the total amount of uranium dioxide released to air in process stacks, building ventilation as well as liquid emissions, and was added to the gamma dose to the critical receptor (now represented by location #12). This is demonstrated in the following formula:

$$\text{Public Dose} = \text{Dose Air (stacks)} + \text{Dose Air (building ventilation)} + \text{Dose Water} + \text{Dose Gamma}$$

The estimated public dose, along with each component, for the fourth quarter of 2021 to the fourth quarter of 2022, using revised DRLs, the revised formula (including liquid and breaking apart air sources), and the new location for the critical receptor, is provided in Table 13.

The total dose to the member of the public from air, liquid emissions and gamma levels for the quarter is calculated to be 0.098 mSv. This is elevated when compared with previous quarters with the exception of the second quarter.

**Table 13**

<b>Public Dose by Quarter (mSv/quarter)</b>					
<b>DRL Component</b>	<b>Q4 2021</b>	<b>Q1 2022</b>	<b>Q2 2022</b>	<b>Q3 2022</b>	<b>Q4 2022</b>
Air (stacks)	0.000	0.000	0.000	0.000	0.000
Air (building ventilation)	0.020	0.025	0.028	0.021	0.028
Liquid	0.001	0.001	0.001	0.001	0.001
Gamma (Location 12)	0.067	0.059	0.071	0.067	0.069
Total dose to Critical Receptor (location #12)	0.088	0.085	0.100	0.089	0.098



### Gamma Monitoring

The perimeter gamma derived release limit for the critical receptor at location #12 is 1.35  $\mu\text{Sv/hr}$  and the action level is 1.0  $\mu\text{Sv/hr}$ . The other DRL's listed for gamma monitoring are for location #1 and location #2 at 4.96  $\mu\text{Sv/hr}$  and 0.46  $\mu\text{Sv/hr}$  respectively with the action level of 0.2  $\mu\text{Sv/hr}$  for both locations. There were no exceedances of the DRL's or the action levels during the fourth quarter.

Table 14 provides the quarterly gamma levels in  $\mu\text{Sv/hr}$  for all fence line monitoring locations (i.e., 1-12) for the quarter.

**Table 14**

<b>Fourth Quarter 2022 Gamma Monitoring Results (<math>\mu\text{Sv/hr}</math>)</b>		
<b>Location</b>	<b>Action Level</b>	<b>Quarterly Dose Rate</b>
1	0.2	0.02
2	0.2	0.03
3	1.0	0.00
4	1.0	0.00
5	1.0	0.00
6	1.0	0.00
7	1.0	0.00
8	1.0	0.00
9	1.0	0.03
10	1.0	0.00
11	1.0	0.25
12	1.0	0.37

The monitoring results for location 12 (closest location to the critical receptor) from the fourth quarter in 2021 to the fourth quarter of 2022 are provided in Table 15. Results have been corrected to take into account background gamma levels by subtracting 0.08  $\mu\text{Sv/hr}$ . The dose rate for the fourth quarter of 2022 is higher than previous quarters with the exception of the second quarter of 2022.

**Table 15**

<b>Gamma Monitoring Results at Critical Receptor (location #12) by Quarter</b>			
<b>Period</b>	<b>Regulatory Limit (DRL)</b>	<b>Action Level</b>	<b>DRL Contribution</b>
Q4 2021	1.35	1.0	0.36
Q1 2022	1.35	1.0	0.32
Q2 2022	1.35	1.0	0.38
Q3 2022	1.35	1.0	0.36
Q4 2022	1.35	1.0	0.37

### Stack Emissions

The total amount of uranium dioxide released to the environment during the quarter in gaseous effluent from stacks was 0.001 kg. The action level for stack emissions is 2.0 µg/m<sup>3</sup> uranium concentration for a daily stack reading. There were no exceedances of the action levels with respect to air emissions during the quarter.

Table 16 provide the average and maximum uranium concentration for all stacks in µg/m<sup>3</sup> from the fourth quarter of 2021 to the fourth quarter of 2022. The average and maximum concentrations measured in stack emissions in the fourth quarter were lower than previous quarters with the exception of the third quarter.

**Table 16**

<b>Daily Stack Emissions by Quarter (µg/m<sup>3</sup>)</b>							
<b>Source</b>	<b>Action Level</b>	<b>Avg. / Max.</b>	<b>Q4 2021</b>	<b>Q1 2022</b>	<b>Q2 2022</b>	<b>Q3 2022</b>	<b>Q4 2022</b>
PP2 West	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.1	0.1	0.1	0.1	0.1
PP2 East	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.1	0.2	0.1	0.1	0.1
Waste Treatment Area Absolute	2.0	Avg.	0.2	0.2	0.3	0.2	0.1
		Max.	0.5	0.7	0.7	0.3	0.4
BMS Extraction	2.0	Avg.	0.0	0.0	0.0	0.1	0.1
		Max.	0.0	0.0	0.2	0.3	0.2
Hoffman Vacuum	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.1	0.1	0.1	0.0	0.0
Pangborn North Dust Collector	2.0	Avg.	0.0	0.0	0.0	0.1	0.1
		Max.	0.3	0.1	0.2	0.2	0.2
Pangborn South Dust Collector	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.1	0.1	0.1	0.1	0.1
DeVilbiss Mist Collector	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.0	0.0	0.1	0.1	0.1
Furnace Burn-off	2.0	Avg.	0.0	0.0	0.0	0.0	0.0
		Max.	0.0	0.0	0.1	0.1	0.1
<b>Overall</b>	<b>2.0</b>	<b>Avg.</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>
		<b>Max.</b>	<b>0.5</b>	<b>0.7</b>	<b>0.7</b>	<b>0.3</b>	<b>0.4</b>

### Building Ventilation Emissions

The action level for building ventilation is 1.0 g/hr and is monitored daily for the Pelleting Area and 0.4 g/hr for the PP2 area. There were no exceedances of either action level in the fourth quarter. The estimated release of uranium dioxide in exhaust ventilation from both areas during the quarter was 0.22 kg (0.17 kg from the Pelleting Area and 0.05 kg from the PP2 area).

Table 17 provides the average and maximum uranium concentration emitted through the building ventilation system in g/hr from the fourth quarter of 2021 to the fourth quarter of 2022.

The table demonstrates that the PP2 area has much lower emissions through building ventilation than the Pelleting Area and the results are consistent between the quarters. In the fourth quarter of 2022 the building ventilation average and maximum emission rates for the Pelleting Area were comparable to previous quarters.

**Table 17**

<b>Building Ventilation Rates by Quarter (g/hr)</b>							
<b>Parameter</b>	<b>Action Level</b>	<b>Measure</b>	<b>Q4 2021</b>	<b>Q1 2022</b>	<b>Q2 2022</b>	<b>Q3 2022</b>	<b>Q4 2022</b>
Uranium Emissions from Pelleting Area	1.0	Average	0.14	0.15	0.17	0.15	0.19
		Maximum	0.24	0.31	0.38	0.25	0.33
		Minimum	0.06	0.08	0.05	0.06	0.09
Uranium Emissions from PP2 Area	0.4	Average	0.01	0.01	0.01	0.02	0.02
		Maximum	0.03	0.07	0.04	0.11	0.08
		Minimum	0.00	0.00	0.00	0.00	0.00

### Liquid Emissions

The action level for liquid effluent released to the sewer is 0.1 mg/L. In the fourth quarter there was no exceedance of the action level.

Table 18 provides the average and maximum uranium concentration for a single composite sample from the fourth quarter of 2021 to the fourth quarter of 2022. Also provided in the table is the minimum and maximum pH measured in the samples.

**Table 18**

Sanitary Sewer Emissions by Quarter							
Parameter	Action Level (mg/L)	Measure	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Uranium (mg/L)	0.1	Average	0.01	0.02	0.02	0.01	0.02
		Maximum	0.03	0.10*	0.02	0.02	0.06
pH (pH units)	6.5	Minimum	6.8	6.8	6.6	6.8	6.9
	9.0	Maximum	8.9	7.6	7.4	7.6	7.6
Volume of water	-	(m <sup>3</sup> )	5473	3306	3928	3770	2718
Estimated Discharge	-	(kg)	0.08	0.05	0.06	0.05	0.05

\*Result was 0.095 mg/L; therefore, was not above the action level.

Ambient Air Monitoring

High volume air samples are collected in the four corners of the CFM property. Table 19 shows the quarterly average and maximum results for all four locations from the fourth quarter of 2021 to the fourth quarter of 2022.

**Table 19**

Overall Uranium-in-Air Concentration at Hi-Vol Stations by Quarter (µg/m <sup>3</sup> )					
Parameter	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Average	0.0001	0.0002	0.0005	0.0003	0.0002
Maximum	0.0004	0.0008	0.0021	0.0006	0.0005

Table 20 provides the quarterly average and maximum uranium-in-air concentrations for all locations from the fourth quarter of 2021 to the fourth quarter of 2022. The average and maximum result for the fourth quarter of 2022 is comparable to or lower than previous quarters with the exception of the fourth quarter in 2021.

**Table 20**

<b>Uranium-in-Air Concentration at Hi-Vol Stations by Quarter (µg/m<sup>3</sup>)</b>					
<b>Quarter</b>	<b>Result</b>	<b>East</b>	<b>North</b>	<b>Northwest</b>	<b>Southwest</b>
Q4 2021	Average	0.0001	0.0001	0.0001	0.0002
	Maximum	0.0002	0.0002	0.0003	0.0004
Q1 2022	Average	0.0002	0.0002	0.0002	0.0002
	Maximum	0.0005	0.0006	0.0008	0.0007
Q2 2022	Average	0.0003	0.0006	0.0005	0.0005
	Maximum	0.0009	0.0023	0.0021	0.0011
Q3 2022	Average	0.0002	0.0003	0.0002	0.0003
	Maximum	0.0003	0.0005	0.0005	0.0006
Q4 2022	Average	0.0002	0.0002	0.0002	0.0002
	Maximum	0.0003	0.0005	0.0003	0.0004

Legacy Waste Management

Limited waste management activities occurred in the fourth quarter due to resource constraints. CFM did work with its disposal site in the United States to send some material in the fourth quarter. CFM is still reviewing drummed material that did not meet the disposal site’s criteria; this will require the systematically opening each drum to visually identify the contents, sort, and segregate like materials. From this activity, recoverable uranium material is consolidated to be verified and the uranium recovered with other scrap material. Marginally contaminated material is repackaged, rescanned, and prepped for disposal in the United States

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## 5.0 Public Information Program

During the fourth quarter of 2022, CFM 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](#)

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

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

<b>Posting Date</b>	November 21, 2022
<b>Incident Date</b>	November 18, 2022
<b>Incident</b>	Reportable Spill
<b>Details</b>	<p>Approximately 480 litres of potable water (municipal water) from the UO<sub>2</sub> 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.</p> <p>There was no health or safety risk posed to the public or environment.</p>
<b>Corrective Action</b>	<p>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.</p> <p>The likely cause appears to be excess heat in the room, which caused the sprinkler head to activate.</p> <p>The Canadian Nuclear Safety Commission and the Spills Action Centre have been notified.</p>
<b>Cameco Environmental Effect Rating</b>	1

<b>Posting Date</b>	December 23, 2022
<b>Incident Date</b>	December 23, 2022
<b>Incident</b>	Reportable Spill
<b>Details</b>	<p>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.</p> <p>There was no health or safety risk posed to the public, workers or the environment.</p>
<b>Corrective Action</b>	<p>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.</p> <p>Cameco notified the Spills Action Centre and the Canadian Nuclear Safety Commission.</p>
<b>Cameco Environmental Effect Rating</b>	1



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## 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

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- [Port Hope's Cameco golf tournament fundraiser means more money for mental health initiatives \(northumberlandnews.com\)](https://www.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 \(todaynorthumberland.ca\)](https://www.todaynorthumberland.ca)
  - **Cameco contributing \$50K to support Northumberland mental health initiatives** –Northumberland News – Dec. 24, 2022
    - [Cameco contributing \\$50K to support Northumberland mental health initiatives \(northumberlandnews.com\)](https://www.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\)](https://www.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**

There were no processing activities of enriched material conducted on site in the fourth quarter of 2022 and CFM met all site-specific reporting requirements.

## 7.0 CONCLUDING REMARKS

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

During the fourth quarter of 2022, CFM did not exceed any CNSC regulatory limits. CFM maintained environmental emissions and public radiation exposures to levels that are a fraction of the regulatory limits.

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