2020 Fourth Quarter Compliance Monitoring
&
Operational Performance Report

Reporting Period October 1 – December 31, 2020

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 of 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.

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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.

There were no significant changes to Structure, Systems and Components (SSC) or processes in the fourth quarter of 2020.

On October 12, 2020, the UF_6 plant lost cooling water supply due to algae build up on the intake screens. As a result, town water was used to safely shut down the plant and the town water was subsequently discharged to the harbour without the usual dilution.

On October 14, 2020, a contractor had a post shift fluoride in urine result of 7.2 mgF/L which was above the action level of 7.0 mgF/L. An investigation was completed, and the result was found to be non-occupational (due to tea drinking).

On November 8, 2020, there was a small leak on the UF_6 plant electrolyte make up tank coming from a regulator on an N_2 line used to purge HF. ERT was activated as a precaution and the leak was isolated. There were no injuries or exposures as a result of this event and no impact to the environment.

On December 11, 2020, a UF_6 Operator suffered a pinch injury to their right thumb. An investigation was completed, and appropriate corrective actions were tracked through the Cameco Incident Reporting System (CIRS).

The UO_2 plant was shut down on December 22, 2020 after completing production requirements for the year. The plant restarted January 4, 2021.

The UF_6 plant operated throughout the fourth quarter with no significant interruptions.

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.

There were no significant changes to the physical design of equipment, processes, and the facility in the fourth quarter of 2020.

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.

There were no radiation dose exceedances in the fourth quarter of 2020.

On October 14, 2020, a contractor had a post shift fluoride in urine result of 7.2 mgF/L which was above the action level of 7.0 mgF/L. An investigation was completed, and the result was found to be non-occupational (due to tea drinking).

Whole Body Dose

Table 1 shows the whole-body dose summary results from the fourth quarter of 2020 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.

There were no results above the monthly action level of 2 mSv during the quarter.

Table 1

Fourth Quarter 2020 Whole Body Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	90	0.16	0.00	1.58
UO_2 Plant	22	0.12	0.00	0.28
Maintenance	67	0.06	0.00	0.39
Technical Support [1]	405	0.02	0.00	0.74
Corporate Technical Services	40	0.01	0.00	0.15
Administration	73	0.00	0.00	0.03
Total (Max)	**657**	**0.05**	**0.00**	**1.58**
[1]Includes contractors (NEWs) Quarterly Action Level 2.0 mSv (NEWs)				

Table 2 shows the employee average, minimum and maximum quarterly individual external whole-body exposures for the fourth quarter of 2019 through to the fourth quarter of 2020. The average whole-body dose is consistent with previous quarters when

production was operational. The maximum whole-body dose received by a UF_6 Operator was related to work in the flame reactor area.

Table 2

Whole Body Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q4 2019	806	0.05	0.00	1.52
Q1 2020	729	0.07	0.00	1.37
Q2 2020	553	0.05	0.00	1.15
Q3 2020	642	0.04	0.00	0.87
Q4 2020	657	0.05	0.00	1.58
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 group related to work in the flame reactor areas.

Table 3

Fourth Quarter 2020 Skin Dose Results				
Work Group	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
UF_6 Plant	90	0.61	0.00	7.13
UO_2 Plant	22	0.43	0.00	1.15
Maintenance	67	0.31	0.00	2.76
Technical Support[1]	405	0.03	0.00	0.84
Corporate Technical Services	40	0.02	0.00	0.75
Administration	73	0.00	0.00	0.02
Total (Max)	**657**	**0.15**	**0.00**	**7.13**
[1]Includes contractors (NEWs) Quarterly Action Level 15.0 mSv (NEWs)				

Table 4 shows the employee average and maximum quarterly individual skin exposure for the fourth quarter of 2019 through to the fourth quarter of 2020. The average skin dose is consistent with previous quarters when production was operational. The maximum skin dose received by a UF_6 operator was related to flame reactor activities.

Table 4

Skin Dose Results by Quarter				
Monitoring Period	**Number of Individuals**	**Average Dose (mSv)**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**
Q4 2019	806	0.16	0.00	5.03
Q1 2020	729	0.30	0.00	6.73
Q2 2020	553	0.16	0.00	3.06
Q3 2020	642	0.14	0.00	2.53
Q4 2020	657	0.15	0.00	7.13
Quarterly Action Level 15.0 mSv (NEWs)				

Urine Analysis

The urine analysis action levels are presented in Table 5 below.

Table 5

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

No urine analysis action levels were exceeded in the fourth quarter of 2020.

Table 6 shows the distribution of urine results for the fourth quarter. A total of 7,103 urine samples were collected and analyzed for uranium during the fourth quarter of 2020.

The majority of routine urine analysis results (99.5%) were less than 5 µg U/L in the quarter.

All results above 13 µg U/L were screened by radiation protection staff. There was one official investigation for uranium in urine during the fourth quarter of 2020 related to work in the UF_6 plant.

Table 6

Fourth Quarter 2020 Routine Urine Analysis Results	
Distribution of Results	**Q4 2020**
Number of Samples < 5 µg U/L	7,068
Number of Samples > 5 to < 25 µg U/L	30
Number of Samples > 25 to < 50 µg U/L	2
Number of Samples > 50 µg U/L	3
Number of Samples Analyzed (Uranium)	7,103

Table 7 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 0.13 mSv, respectively, which was consistent with previous quarters.

Table 7

Internal Dose (Urine) by Quarter				
Quarter	**Number of Individuals**	**Minimum Dose (mSv)**	**Maximum Dose (mSv)**	**Average Dose (mSv)**
Q4 2019	681	0.00	0.18	0.01
Q1 2020	618	0.00	0.26	0.02
Q2 2020	410	0.00	0.22	0.02
Q3 2020	501	0.00	0.28	0.02
Q4 2020	532	0.00	0.13	0.01

Fluoride in Urine

A total of 2,983 urine samples were analyzed for fluoride during the fourth quarter, with summary results provided in Table 8.

There were three samples above the internal administrative investigation level of 4 mg F/L during the fourth quarter. All three samples were investigated and determined to be non-occupational (related to tea drinking).

Table 8

Fourth Quarter 2020 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	2,983	0.1	7.2
Routine post-shift fluoride samples >= 7 mg F/L	0	-	-
Routine pre-shift fluoride samples >= 4 mg F/L	0	-	-
Non-routine fluoride samples	202	0.1	3.5
Samples analyzed for U, insufficient volume (< 30mL) for F analysis	81	-	-

Lung Counting

The lung count trailer remained at the Blind River Refinery until the end of October to complete the counting campaign there. In November/December, the remaining PHCF employees and contractors were counted as well as CFM employees.

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 9.

Table 9

Fourth Quarter 2020 Alpha Contamination Monitoring Results			
Area	**Number of Samples Taken**	**Zone Contamination Criteria (Bq/cm²)**	**Number of Samples Above Criteria**
Zone 1	930	0.4	0
Zone 2	11,131	0.4	31

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.

Additional monitoring has been put in place due to Covid-19 protocols. Strategic conference and meeting rooms have been temporarily established as lunchrooms in response to the need of physical distancing during employee break times.

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 10.

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 10

Fourth Quarter 2020 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	5,005	9	688	52
UO_2 Plant	1,500	3	48	0
Waste Recovery	714	1	9	0
CUP	427	1	3	0

The maximum in-plant air sample of 688 µg U/m^3 was recorded on December 23, 2020. This result was due to an un-scheduled repair in the UF_6 plant. The entire area was posted as respirator required.

The average in-plant air concentrations were in line with the previous quarters in which production was operational.

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 11.

Table 11

2020 Safety Statistics					
Quarter / Parameter	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**	**YTD**
First Aid Injuries	12	10	10*	9	41
Medical Diagnostic Procedures	1	1	1*	0	3
Medical Treatment Injuries	2	1	3*	2	8
Other Recordable Injuries	0	0	1	0	1
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

*Correction from Q3 2020 report due to reclassification of a first aid injury and a reclassification of an injury to non-occupational.

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

Health and Safety Activities

- **Communications**: COVID teams (PPE, Protective Measures, HR & Medical and Logistics) continued to meet and disposition changes to existing site protocols and create new ones as the COVID Interruption protocols are updated by the Ontario Government.
- **Education and Training**: Training continues to be deployed by utilizing social distancing and maximum room occupancy levels. Room occupancies were adjusted (decreased) with provincial guideline updates.
- **Safety Awareness Activities**: The 'Caught Working Safely' promotion was suspended for Q4, but the site safety committee deployed an Ergonomic video constructed with one of our own employees.

- **CSSC and Safety Subcommittees:** The CSSC (CLC regulatory meetings) were executed for remainder of year. Safety subcommittees continue to meet at the discretion of each committee and within COVID protocol measures.
- **Safety & Industrial Hygiene**: Personal F_2 monitors continue to be deployed and performance improvements were identified and trialed with mixed success. Work with vendor continues. Personal HF monitors deployment program is being created with aim to be executed in 2021.
- **COVID Interruption**: Contractor and visitor approval to access the site continues to be managed on a priority basis. Vision in Motion work (Area 1) recommenced but was suspended again in early December. Some PHCF employees continue to work from home with some transitioning to Flexible work plans.
- **Total Recordable Injury Rate (TRIR):** Decreased from previous quarter. Seven First Aids and one reportable. The site reached 2,000,000 hours worked without an LTI.

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

Note that as of July 1, 2019 TLD 13 has been replaced by TLD 10 in the gamma dose calculation for Site 1 due to the removal of the Centre Pier from the licensed property.

The monthly dose from Site 1 and Site 2 are based on monitoring results for each dose component as shown in Table 12.

Table 12

Quarterly Dose (mSv/quarter)					
ORL Component	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**	**YTD 2020**
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	0.033	0.037	0.036	0.021	0.128
Gamma – Site 2	0.037	0.027	0.027	0.024	0.115
Quarterly Dose – Site 1	0.033	0.038	0.037	0.022	0.129
Quarterly Dose – Site 2	0.037	0.028	0.028	0.024	0.117

Gamma Monitoring

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 10 (as of July 1, 2019) 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.

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

Table 13

Fourth Quarter 2020 Public Dose Gamma Monitoring Results					
Station Number	**October**	**November**	**December**	**Action Level (µSv/h)**	**Licence Limit (µSv/h)**
2	0.16	0.17	0.16	0.480	0.570
10	0.00	0.01	0.00	0.480	0.610
21	0.02	0.00	0.00	0.330	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 14.

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 is slightly higher than previous quarters due to UF_4 baghouse issues experienced during the quarter.

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 consistent with previous quarters during which production was operational.

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 UF_6 main stack average fluoride emission rate is slightly higher than previous quarters due to a few elevated occurrences during the quarter. Elevated results were all investigated through the Cameco Incident Reporting System (CIRS).

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 consistent with previous quarters in which production was operational.

The depleted circuit was not operated in the fourth quarter 2020.

Table 14

Daily Main Stack Emissions by Quarter									
Plant	**Parameter**	**Licence Limit**	**Action Level**	**Value**	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
UF_6	Uranium g U/h	280	40	Quarterly Daily Average	2.2	2.3	2.5	2.1	2.9
				Quarterly Daily Maximum	4.5	4.7	7.7	7.0	8.2
	Hydrogen Fluoride g HF/h	650	230	Quarterly Daily Average	20	24	23	29	34
				Quarterly Daily Maximum	56	97	139	273	137
UO_2	Uranium g U/h	240	10	Quarterly Daily Average	0.6	0.7	0.6	0.4	0.6
				Quarterly Daily Maximum	1.0	1.5	1.1	1.5	2.5
	Ammonia kg NH_3/h	58	10	Quarterly Daily Average	2.2	2.0	1.9	1.7	2.2
				Quarterly Daily Maximum	4.1	3.6	3.5	4.4	4.9

Liquid Discharges

Production facility cooling water return quality data is summarized in Table 15 and Table 16.

Increases in the recorded fourth quarter 2019 uranium concentrations were noted at the UF_6 Plant/Building 2 (UO_2N) and UO_2 Plant (UO_2S) cooling water return locations as a function of elevated cooling water intake trending over the same period.

The uranium trending reflected changes in the ambient harbour quality that had been attributed to Canadian Nuclear Laboratories (CNL) harbour remedial work. Uranium concentrations at the UO_2N and UO_2S monitoring locations subsequently stabilized in the second quarter of 2020, albeit slightly above typical conditions, and trending returned to baseline conditions in the second quarter.

Increases in the mean uranium concentrations were further noted at the production facility cooling water return locations in the fourth quarter. The fixed PHCF cooling water intake structure has been increasingly impacted by algae/floating debris and sediment accumulation in the Port Hope harbour approach channel and the adjacent CNL wave attenuator installation has exacerbated cooling water intake operational challenges. Among other mitigating actions, Cameco installed temporary harbour water intake lines within the CNL harbour enclosure to facilitate the pumping of surface water from the CNL harbour enclosure to the fixed PHCF cooling water intake structure.

The minor increases in fourth quarter cooling water return uranium concentrations were a function of slightly elevated cooling water intake uranium concentrations trending in association with the supplemental harbour water supply pumping arrangement operations. Though slightly elevated relative to baseline, daily sample uranium concentration results were reported below the Canadian Council of Ministers of the Environment (CCME) water quality guideline of 15 µg U/L (long-term) throughout the quarter.

Due to sample matrix interferences, ammonia+ammonium sample analyses included sample dilutions and a revised method detection limit of 0.014 mg/L as of late January 2020. Ammonia results recorded for the balance of the 2020 calendar year were in turn primarily influenced by the revised detection limit.

An amended industrial sewage works ECA was issued to the PHCF in the fourth quarter. Though primarily focused on stormwater management improvements associated with the VIM project execution, the amended ECA also included changes to facility cooling water monitoring requirements among other items. Consistent with the revised ECA monitoring schedule, daily ammonia+ammonium and daily nitrate monitoring will be discontinued in 2021.

Table 15

UO_2N Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Uranium	µg U/L	Average	11	5.6	3.3	3.2	6.6
		Maximum	44	12	5.8	9.1	10
Fluoride	mg F/L	Average	0.090	0.092	0.11	0.090	0.077
		Maximum	0.19	0.16	0.15	0.21	0.13
Ammonia & Ammonium	mg N/L	Average	0.066	0.011	0.014	0.021	0.015
		Maximum	0.20	0.040	0.014	0.30	0.077
Nitrate	mg N/L	Average	1.1	1.2	0.80	0.49	0.91
		Maximum	1.5	1.6	1.3	1.5	1.6
pH	-	Minimum	7.98	8.12	8.16	7.98	7.87
		Maximum	8.47	8.52	8.50	8.33	8.38

Table 16

UO_2S Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Uranium	µg U/L	Average	12	5.9	3.4	3.1	7.0
		Maximum	47	13	6.1	7.1	11
Ammonia & Ammonium	mg N/L	Average	0.076	0.011	0.014	0.017	0.020
		Maximum	1.6	0.014	0.014	0.17	0.30
Nitrate	mg N/L	Average	1.2	1.3	0.81	0.50	0.94
		Maximum	1.6	1.6	1.3	0.66	1.6
pH	-	Minimum	7.92	8.16	8.18	8.03	7.89
		Maximum	8.50	8.49	8.50	8.37	8.47

In 2016 and early 2017, as part of the relicensing process, a daily sanitary sewer discharge action level of 100 µg U/L (0.100mg U/L) and a monthly mean release limit of 275 µg U/L (0.275 mg U/L) were developed and accepted. Tables 17 and 18 summarize uranium concentrations and pH values observed during the fourth quarter. No action level exceedances were recorded for the fourth quarter and discharges remained well below the facility monthly mean release limit throughout the quarter.

Table 17

Sanitary Sewer Discharge Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Uranium	mg U/L	Average	0.012	0.023	0.016	0.0052	0.0065
		Maximum	0.10	0.16	0.049	0.024	0.024
pH	-	Minimum	7.80	7.82	7.60	7.55	7.36
		Maximum	8.34	9.10	8.31	8.48	8.11

Table 18

Q4 2020 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	6.2	14
November		6.5	24
December		6.8	14

Ambient Air Monitoring

Table 19 shows the quarterly all-station average and maximum uranium dustfall results from the fourth quarter of 2019 through to the fourth quarter of 2020.

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 2020 were consistent with the uranium in dustfall averages during the previous quarters.

Table 19

Uranium in Dustfall Results by Quarter (mg U/m^2/30 days)					
Value	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Average	0.1	<0.1	0.1	0.1	0.1
Maximum	0.2	0.1	0.3	0.2	0.2
Internal Administrative Screening Level = 10 mg U/m^2/30 days					

Table 20 summarizes the average and maximum uranium hi-vol results from the fourth quarter of 2019 through to the fourth quarter of 2020.

Average and maximum results for the quarter are below regulatory criteria. The average results for the Waterworks, Hayward Street and Shuter Street stations are comparable to levels observed in the previous quarters. The maximum result at the Marsh Street station caused the average to be slightly higher in the fourth quarter than previous quarters. The maximum Marsh Street result was captured and tracked in CIRS. While no specific cause was identified, it is important to note that this single, maximum, isolated result remains below regulatory criteria and in an industrial area.

Table 20

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 2019	Average	0.001	0.001	0.003	0.002
	Maximum	0.007	0.003	0.015	0.010
Q1 2020	Average	0.001	0.001	0.003	0.002
	Maximum	0.005	0.009	0.019	0.010
Q2 2020	Average	0.001	0.001	0.003	0.002
	Maximum	0.007	0.008	0.018	0.010
Q3 2020	Average	0.001	0.001	0.003	0.002
	Maximum	0.004	0.008	0.076	0.005
Q4 2020	Average	0.001	0.001	0.005	0.001
	Maximum	0.007	0.005	0.221	0.005
Average <0.06 µg U in TSP/m^3 (annual) AAQC Maximum <0.3 µg U in TSP/m^3 (24 hr) AAQC					

Table 21 shows the quarterly all-station average and maximum fluoride dustfall results from the fourth quarter of 2019 through to the fourth quarter of 2020.

The average fluoride in dustfall results in the fourth quarter of 2020 is consistent with fluctuations observed in the previous quarters.

Table 21

Fluoride in Dustfall Results by Quarter (mg F/m^2/30 days)					
Value	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Average	1.4	1.1	1.1	1.1	1.4
Maximum	12.0	7.1	9.6	6.9	8.1
Internal Administrative Screening Level = 20 mg F/m^2/30 days					

Table 22 shows the average and maximum lime candle results from the fourth quarter of 2019 through to the fourth quarter of 2020. The average results are comparable to levels observed in the previous quarters.

Table 22

Monthly Lime Candle Results by Quarter (µg F/100 cm^2/30 days)					
Value	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Average	3	3	3	4	2
Maximum	6	6	8	13	5
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 winter 40µg F/100cm^3/30 days, changing to 80µg F/100cm^2/30 days in winter					

Ambient Water Quality Monitoring

A summary of SCI water quality data is presented in Table 23. The fourth quarter 2019 uranium trending reflected changes in the ambient harbour quality. As noted in the UO_2N and UO_2S discussion text, the trending had been attributed to CNL harbour remedial work. Uranium concentrations stabilized in the first quarter of 2020, albeit slightly above typical conditions, and trending returned to baseline conditions in the second quarter.

The minor increases in fourth quarter cooling water return uranium concentrations were associated with the supplemental harbour water supply pumping arrangement operations noted in the UO_2N and UO_2S discussion text. Though slightly elevated relative to baseline, daily sample uranium concentration results were reported below the Canadian

Council of Ministers of the Environment (CCME) water quality guideline of 15 µg U/L (long-term) throughout the quarter.

Due to sample matrix interferences, ammonia+ammonium sample analyses included sample dilutions and a revised method detection limit of 0.014 mg/L as of late-January 2020. Mean ammonia results were in turn primarily influenced by the revised detection limit for the balance of the calendar year.

An amended industrial sewage works ECA was issued to the PHCF in the fourth quarter. Consistent with the revised ECA monitoring schedule, daily ammonia+ammonium and daily nitrate monitoring will be discontinued in 2021.

Table 23

SCI Water Quality Data by Quarter							
Parameter	**Units of Measure**	**Value**	**Q4 2019**	**Q1 2020**	**Q2 2020**	**Q3 2020**	**Q4 2020**
Uranium	µg U/L	Average	12	6.0	3.4	3.3	7.0
		Maximum	46	12	5.9	7.3	12
Fluoride	mg F/L	Average	0.086	0.092	0.10	0.085	0.080
		Maximum	0.18	0.13	0.15	0.13	0.14
Ammonia & Ammonium	mg N/L	Average	0.057	0.011	0.014	0.017	0.014
		Maximum	0.17	0.030	0.014	0.14	0.044
Nitrate	mg N/L	Average	1.2	1.3	0.81	0.53	0.98
		Maximum	1.6	1.6	1.2	1.5	1.7
pH	-	Minimum	8.10	8.12	8.21	8.05	7.75
		Maximum	8.49	8.50	8.50	8.43	8.36

Cooling Water Intake – Visual Inspections

Table 24 below presents all non-conformities observed during daily visual inspections of the cooling water intake system. Overall, the cooling water intake fish protection system remained effective.

Table 24

Date	Quantity of Fish Observed	Observations
October 6	1	One small (3") immobile fish was observed in the traveling screen sump. Investigation determined that screen panel #6 (counted from the south) was slightly raised above the sill plate. Divers confirmed that Zebra mussels built up in the panel track prevented the screen panel from resting flush on the sill. The track was cleared, and the screen was then re-placed to rest flush on the sill.
November 30 & December 1	2	One - two fish (4" to 8") observed at travelling screen sump. Investigation determined that screen panel #5 (counted from the south) was raised approximately 2" to 3" above the sill plate. An obstruction in the screen panel track was preventing this screen from resting flush on the sill. The screen was replaced with a blank on December 3rd using the inside panel track. The blank was placed to rest flush on the sill.
Various dates between December 4 – 31	3	The same two fish observed as noted (November 30 and December 1) along with a smaller (1") fish were sighted at the travelling screen sump. The screen panel positions were verified to be correct. No further investigation occurred as these are considered to be the same fish previously observed and recorded.

5.0 Public Information Program

During the fourth quarter of 2020, PHCF continued to meet the requirements of CNSC RD/GD 3.2.1, Public Information and Disclosure programs.

Public Engagement

From September 19 to October 31, Cameco partnered with Dalewood Golf Club to offer the Cameco Charity Golf Package, an alternative to a traditional one-day golf tournament fundraising event. Cameco matched a portion of all player registration fees and matched all sponsorships at 100 per cent. The golf package was promoted using social media and local radio. On November 27, Cameco announced via a news release and social media that a total of $43,500 was raised through the tournament, employee fundraisers and other donations. Applications for the funds were accepted from November 27 to December 20, 2020. The news release was posted to the website: Cameco Announces Over $40,000 Raised for Local Mental Health Initiatives - News Archive - Media - Cameco Fuel Services.

Cameco provided a quote for the United Way's grant news release. Cameco funded the Northumberland United Way grant stream through the Cameco COVID-19 Relief Fund. A news release was issued locally by the United Way to announce the recipients of the grant stream.

Cameco participated in the Capitol Theatre Festival of Trees from November 12 to December 18 and sponsored Westben's Virtual Concert at the Barn on November 21 featuring Jordan Mowat.

In December, the fall issue of Energize was mailed out to residents in Port Hope and posted to social media and the website: Energize - Fall 2020 - Making a Difference - Community - Cameco Fuel Services. The newsletter featured a message from the vice president, Fuel Services Division, along with information about the Cameco Fund for Mental Health and Vision in Motion. The year-end message was also separately posted to the website and promoted via social media: Year-end Message from Cameco Vice-President, Dale Clark - News Archive - Media - Cameco Fuel Services

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

On December 20, Cameco announced its first positive COVID-19 case at its Port Hope Conversion Facility. A statement was issued to local media and posted on the website:

Positive COVID-19 Case at Port Hope Conversion Facility - News Archive - Media - Cameco Fuel Services. As an extra precaution, Cameco arranged for rapid testing at the facility on December 21 and temporarily suspended production at its UF_6 plant in order to conduct the testing. The results of the rapid testing were all negative and this was shared through a statement to media on December 23. The statement was also posted to the website: Onsite COVID-19 Rapid Testing Update - PHCF - News Archive - Media - Cameco Fuel Services.

Public Disclosure

Cameco's PHCF made two public disclosures during the fourth quarter involving ERT activation and a release of town water.

No one was injured and there was no impact on the health or safety of the public or the environment.

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

Cameco added a 'contact us' link to the Public Disclosure area.

Social Media

Cameco Ontario's Facebook community grew by 26 new followers (920 total) and had a total of 896 page likes at the end of the quarter. Cameco Ontario's 26 posts covered information such as:

- Promotion for the Cameco Charity Golf Package raising money for the Cameco Fund for Mental Health, including recognition of sponsors, and encouraging participation
- Encouraging organizations to apply to the Cameco Fund for Mental Health
- Sharing industry news from Bruce Power and the Nuclear Innovation Institute
- Job postings at Ontario facilities
- The release of the fall issue of Energize
- A year end message from Cameco vice-president, Fuel Services Division
- Promotions for community partners.

By the end of the quarter the Instagram account had grown by 11 new followers for a total of 511 followers. Photos and information featured was similar to the Cameco Ontario Facebook account.

Indigenous Engagement

On November 26 and December 11, Cameco mailed out letters and information to the seven William's Treaty First Nations to help establish open lines of communication and for Cameco to learn about respective interests and preferred methods for receiving information. These letters provided some background information on Cameco's Northumberland operations, links to quarterly and annual compliance reports and to the public disclosure protocol.

Cameco's vice president, Fuel Services Division provided a short video message for the Métis Nation of Ontario's virtual Annual General Assembly on November 6. The opportunity was provided as a result of Cameco's contributions to the Métis Nation of Ontario through the Cameco Covid-19 Relief Fund.

Website

Two Public Disclosures were posted to the website in the fourth quarter: Environment & Safety - Conversion: Port Hope - Fuel Services - Businesses - Cameco

A year-end message from the vice-president, Fuel Services Division was posted to the website: Year-end Message from Cameco Vice-President, Dale Clark - News Archive - Media - Cameco Fuel Services

Two statements related to the positive COVID-19 case at PHCF were posted to the website:

- Positive COVID-19 Case at Port Hope Conversion Facility - News Archive - Media - Cameco Fuel Services
- Onsite COVID-19 Rapid Testing Update - PHCF - News Archive - Media - Cameco Fuel Services

One news release was posted to the website:

- Cameco Announces Over $40,000 Raised for Local Mental Health Initiatives - News Archive - Media - Cameco Fuel Services

The fall issue of Energize was posted to the website:

- Energize - Fall 2020 - Making a Difference - Community - Cameco Fuel Services

A notice regarding Temporary Pump Installation which was originally posted to the website on September 24, 2020 was updated on October 15, 2020 and again on Dec. 1.

- Port Hope Conversion Facility – Extension of Temporary Harbour Water Supply - News Archive - Media - Cameco Fuel Services (note that this link will only show the most recent posting).

Media Analysis

Cameco received media coverage regarding the Cameco Fund for Mental Health, the positive COVID-19 case at PHCF and a feature in Watershed Magazine on medical isotopes:

- No other positive COVID-19 tests among Cameco employees | 93.3 myFM (gonorthumberland.ca)
- Employee at Cameco's Port Hope Conversion Facility tests positive for COVID-19 | 93.3 myFM (gonorthumberland.ca)
- COVID-19 case confirmed at Cameco's Conversion Facility in Port Hope (northumberlandnews.com)
- UPDATE: No new positive COVID-19 cases among Cameco Port Hope staff after onsite rapid testing: company (northumberlandnews.com)
- Cameco confirms new case of COVID-19 in Port Hope | Brighton Today.ca
- Cameco - Positive COVID-19 Case at Port Hope Conversion Facility - Today's Northumberland - Your Source For What's Happening Locally and Beyond
- COVID-19 case confirmed at Cameco's Conversion Facility in Port Hope | Toronto.com
- UPDATE: No new positive COVID-19 cases among Cameco Port Hope staff after onsite rapid testing: company | Toronto.com
- Deadline Dec 20 for Cameco Mental Heath Fund | Port Hope Now - News Magazine
- Deadline Dec 20 for Cameco Mental Heath Fund | Cobourg Now - News Magazine
- United Way-Cameco partnership supports six agencies — Northumberland 89.7 FM
- Rays of Hope - Watershed Magazine

Communication Products

One news release was posted to the website. Cameco Announces Over $40,000 Raised for Local Mental Health Initiatives - News Archive - Media - Cameco Fuel Services

The fall issue of Energize was posted to the website and mailed to all addresses in Port Hope: Energize - Fall 2020 - Making a Difference - Community - Cameco Fuel Services.

A year-end message from the vice-president, Fuel Services Division was posted to the website: Year-end Message from Cameco Vice-President, Dale Clark - News Archive - Media - Cameco Fuel Services

Two statements related to the positive COVID-19 case at PHCF were posted to the website:

- Positive COVID-19 Case at Port Hope Conversion Facility - News Archive - Media - Cameco Fuel Services
- Onsite COVID-19 Rapid Testing Update - PHCF - News Archive - Media - Cameco Fuel Services

6.0 Other Matters of Regulatory Interest

6.1 Vision in Motion

Vision in Motion (VIM) engineering activities continued for site-wide infrastructure, renovation of Building 27, the deep excavation and future demolition of buildings and equipment.

The ECA amendment for improvements to site storm water management was received from the Ontario Ministry of Environment, Conservation and Parks (MECP). Subsequently, the new stormwater system at the south end of the facility began operation.

Work was substantially completed at the south end of the facility (area of the new hydrogen station) and commissioning activities were in progress.

CNL suspended acceptance of Cameco waste materials at the LTWMF in November while concerns regarding the placement of certain safeguarded materials (depleted UF_4) were addressed with the CNSC and the IAEA.

CNL remediation activities on Cameco property at the former water treatment were completed. A special circumstance application related to a deviation to remediation verification of the underground tanks is pending. Site restoration activities began but were not completed before winter weather stopped work.

Regular monthly coordination meetings between the Municipality of Port Hope (MPH) and Cameco in relation to VIM activities continued. Presentation to council of the MPH and Cameco agreement for remediation of municipal properties was put on hold while MPH addressed questions about post-remediation regulatory requirements on the property.

MPH Council passed a resolution to accept, in principle, the proposed change to the VIM scope that would eliminate the need for the Choate St. extension. MPH staff were directed to work with Cameco on preparing the necessary modification to legal agreements needed to implement the change.

The Supplementary Environmental Monitoring Plan for Vision in Motion and Other Clean-Up Program Projects was developed to monitor environmental impacts for the VIM activities, primarily during demolition/excavation. The following environmental monitoring exceedances/reportable events occurred in the fourth quarter.

PHCF-2020-001335, the Yacht Club VIM hivol sample on November 2, 2020 dust result exceeded the administrative level of 100 ug/m^3 TSP with a result of 101 ug/m^3 TSP. This measurement is below the reportable level of 120 ug/m^3 TSP dust criteria for visibility. CN rail construction and CNL Centre Pier remediation are believed to be contributing factors to the measured dust result.

PHCF-2020-001334 was created to capture multiple 1-hour dust trak exceedances in VIM Area 1 on November 3, 2020. The dust exceedances were caused by asphalt activities during VIM Area 1 road paving.

PHCF-2020-001373 was created to capture a 1-hour dust trak alert in VIM Area 1 on November 12, 2020. A result of 217 µg/m^3 TSP from 11am-12pm exceeded the VIM 1-hour administration level of 200 µg/m^3 TSP. Clean soil was dumped and packed near the unit. VIM corrective actions were implemented.

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 2020, 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.