Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Event Initial Report

Rapport initial d'événement

Canadian Nuclear Laboratories

Canadian Nuclear Laboratories Port Hope Project Waste Water Treatment Plant - Exceedance of Copper discharge criteria in plant effluent

Laboratoires Nucléaires Canadiens

Usine de traitement des eaux usées du projet de Port Hope des Laboratoires Nucléaires Canadiens - Dépassement des rejets de cuivre critères dans les effluents de l'usine

Commission Meeting

Réunion de la Commission

June 28, 2022

Le 28 juin 2022

Canada

EVENT INITIAL REPORT (EIR)

E-DOCS-# 6817460

EIR: Canadian Nuclear Laboratories Port Hope Project Waste Water Treatment Plant - Exceedance of Copper discharge criteria in plant effluent	
Prepared by: Directorate of Nuclear Cycle and Facilities Regulation, Canadian Nuclear Laboratories Regulatory Program Division	
Licensee: Canadian Nuclear Laboratories	**Location:** Port Hope Project (PHP) Waste Water Treatment Plant (WWTP)
Date Event was Discovered: 2022 June 1	**Have Regulatory Reporting Requirements been met?** Yes ☒ No ☐ **Proactive Disclosure:** Licensee: Yes ☒ No ☐ CNSC: Yes ☒ No ☐

Overview

Reporting Criteria: Issues, events, occurrences that the Directors-General (DGs) or their designates judge to have potential for repercussions outside the CNSC and for which the DGs or their designates believe the Commission should be informed.

Description:

CNL must ensure they meet the release limits as cited in their Environmental and Biophysical Monitoring Plan (e-Doc 5693437). To measure compliance, the effluent from the Port Hope Project (PHP) Waste Water Treatment Plant (WWTP) is sampled on a weekly basis against the contaminates listed in the PHP Environmental and Biophysical Monitoring Plan. The weekly effluent sample consists of several grab samples, collected every 15 minutes, over the period of one week by an automated sampler. This sample is commonly referred to as a composite sample. The composite sample is then sent to a third-party laboratory for analysis with the results being reported to CNL. The WWTP was operating normally and all treated effluent results were within normal concentrations prior to the event.

CNL submitted a preliminary event report to the CNSC on June 6, 2022 (e-Doc 6822126) indicating that during routine compliance sampling at the PHP WWTP the composite effluent sample for the week ending June 1, 2022, exceeded the weekly release limit for copper and the action level for zinc.

The water samples were analyzed 3 times to ensure the accuracy of the lab results. The sample results and applicable licence limit, action level and guideline are summarized as follows:

Copper Results

53 µg/L (Quality Assurance Sample), 52.1 µg/L (Primary Sample) and 52.9 µg/L (Retest of Primary)

As stated in the Port Hope Project Environmental and Biophysical Monitoring Plan, the PHP WWTP weekly composite release limit for copper is 30 µg/L and the weekly action level limit is 5 µg/L.

The Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life for short-term exposure in fresh water has no limit in the guideline for copper.

Zinc Results

39 µg/L (Quality Assurance Sample), 42 µg/L (Primary Sample), and 44.7 µg/L (Retest of Primary)

As stated in the PHP Environmental and Biophysical Monitoring Plan, the PHP WWTP weekly composite release limit for Zinc is 420 µg/L and the weekly action level limit is 15 µg/L

The CWQG for Protection of Aquatic Life in generic freshwater conditions is 37 µg/L for Zinc, but this guideline can vary based on water quality parameters such as hardness and dissolved organic carbon.

Cause(s):

The preliminary event report submitted by CNL on June 6, 2022 (e-Doc 6822126), indicated that the cause of the copper and zinc exceedances were believed to be related to brass components on the treated effluent side of the treatment process. A detailed review of the analytical results suggested that the treatment processes were working as intended with acceptable contaminant removal rates. CNL indicated that they would conduct a full review of the treatment system to identify systems that contained brass components – with brass being primarily composed of copper and zinc. In addition, an extended sampling campaign was being initiated to understand the potential impact of brass components.

On June 13, 2022, CNL notified CNSC staff that it had confirmed the source of the elevated copper and zinc concentrations were due to brass components on the cooling loop that had lost their protective layer over time and began corroding (e-Doc 6816498). These components are on the treated effluent side of the WWTP, therefore are not related to water influent requiring

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treatment.

As per the WWTP operating procedures, CNL isolated the brass components in the cooling loop by directing the cooling loop water to the plant process drain for treatment with the influent water. CNL indicated that the June 8, 2022, compliance sampling results for copper and zinc had returned to normal levels following the recirculation. This confirmed that the source of the elevated cooper and zinc levels were from the cooling loop and that the copper and zinc levels had returned to normal operating levels. The water sample results after the fix were 0.6 µg/L for copper and zinc was not detectable, below the laboratories detectable limit.

CNL informed CNSC staff that the PHP WWTP would return to service since the source of contamination was identified and that corrective measures had been put in place until the brass components could be replaced. CNL is also taking daily grab samples in addition to the weekly compliance samples to ensure they correctly identified the issue and to get a better indication of any potential variations in discharge concentrations. Based on the information provided, CNSC staff found that CNL had appropriately identified the source of contamination and the corrective actions taken to monitor and prevent a similar event in the future were adequate to start discharging treated effluent.

Impact of the Event

On People:

How many workers have been (or may be) affected? 0

How many members of the public have been (or may be) affected by the event? 0

How were they affected?

This event has not resulted in an exposure to CNL workers, Indigenous people, or members of the public

On the Environment:

The CWQG for the protection of aquatic life for short-term exposure in fresh water has no limit indicated in the guideline for copper. Given the amount of dilution that occurs at the discharge point in Lake Ontario, there is no risk to aquatic life as a result of this event.

Other Implications: There are no actual or potential implications as a result of this event.

Licensee Actions

Taken or in Progress:

Upon confirmation that the water sample results exceeded the copper licence limit and zinc action level, CNL ceased discharging to the environment on June 7, 2022, at 4:55 pm. This was achieved by redirecting the treated effluent back to the water collection pond. The water collection pond is used to store untreated water from the site.

Taken:

- On June 8, 2022, CNL inspected the facility piping, associated with treated water, for potential sources of both copper and zinc (brass). An extensive sampling campaign was conducted to locate the source of the copper and zinc. It was determined that the evaporator cooling loop was the source of the abnormal copper and zinc concentrations.
- On June 10, 2022, CNL took daily grab samples in addition to the required compliance sampling to ensure the contamination issue has been rectified.
- On June 10, 2022, the evaporator cooling loops were redirected to the plant process drain for water treatment.

Planned:

- Continuation of daily grab samples in addition to the required compliance sampling to ensure the contamination issue has been rectified. CNL will continue to trend the monitoring results at the point of release.
- The evaporator cooling loops will remain redirected to plant process drain until brass components can be modified and then tested to confirm the absence of copper and zinc concentrations in excess of the applicable licence limits and action levels for copper and zinc.
- An extent of condition evaluation to be completed on all systems potentially impacting the facility's final effluent to identify and address future sources of copper (both brass and bronze).

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CNSC Actions

Taken or in Progress:

- CNSC staff conducted a technical review of the preliminary report (e-Doc 6822126) and supplemental information following CNL's notification to resume normal operations (e-Doc 6816498).
- A link to CNL's public disclosure of the event was posted on the CNSC website.
- CNSC staff took confirmatory influent and effluent water samples from the PHP WWTP for analysis at the CNSC lab on June 16, 2022.

Planned:

- CNSC will conduct a technical review of the final event report submitted by CNL.
- The confirmatory influent and effluent water sample results from the PHP WWTP will be assessed by the CNSC lab and CNSC subject matter experts

Additional reporting to the Commission Members anticipated:

☒ Yes

☐ No

If Yes, provide method of reporting:

Any future developments will be reported to the Commission at the time of the PHP licence renewal hearing scheduled to take place on November 22, 2022.

Name and Title	Signature	
Kavita Murthy DNCFR	Director General	2022-06-24 Date