Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 19-M4
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Status Report on Power Reactors

Commission Meeting
February 20, 2019

This document summarizes the status of the Power Reactor facilities as of February 11th, 2018.

Rapport d'étape sur les centrales nucléaires

Réunion de la Commission
Le 20 Février 2019

Ce rapport résume le rapport d'étape sur les centrales nucléaires en date du 11 Février 2018.

Signed on / Signé le
2019-02-15

Gerry Frappier, P.Eng.
Director General, Directorate of Power Reactor Regulation
Directeur général, Direction de la réglementation des centrales nucléaires

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## 1. Power Reactors Status as of February 11, 2019

### 1.1 Bruce A and B

| Operational Status |
|---|
| Unit 1 is at Full Power |
| Unit 2 is at Full Power |
| Unit 3 is Shutdown |
| Unit 4 is at 85% of Full Power |
| Unit 5 is at Full Power |
| Unit 6 is at Full Power |
| Unit 7 is Shutdown |
| Unit 8 is at Full Power |
| Licensing |
| Power Reactor Operating Licence expires on August 31, 2028. |
| Comments |
| Unit 3 is in a planned maintenance outage, expected to return to service early March 2019.<br><br>Unit 4 is at 85% of full power due to an issue with a governor valve. This is a production related issue and has no safety impact. The unit is expected to be shut down in early March for repairs.<br><br>Unit 7 is in a planned maintenance outage, expected to return to service in May 2019. |
| Event Notifications and Updates |
| On October 15, 2018, during welding activities, a maintainer received an electrical shock. A preliminary verbal update, by both CNSC and Bruce Power staff, was provided to the Commission on November 8, 2018 (see CMD 18-M58). Ministry of Labour was notified and conducted an investigation into the cause of the event. It was determined that the welder had bent the welding rod, and while trying to get into an awkward place, the rod made contact with the worker's head. CNSC staff determined that appropriate corrective actions have been taken by Bruce Power to prevent recurrence. No further actions are required.<br><br>On December 6, 2018, one of the four transformers (TSS8) used to supply Class IV electrical power to the Bruce B station's transformer bus had an instantaneous fault which resulted in a fire. The event was reported to the Commission on December 13, 2018 in CMD 18-M62 and CMD 18-M62.1. There was no impact on nuclear systems, and there were no radiological releases as a result of the fire. Bruce Power is continuing its investigation on the failure mechanism of the transformer and will provide a detailed report to CNSC staff by April 8, 2019.<br><br>On January 24, 2019, an employee slipped and fell while troubleshooting the Fire Training Facility Heating, Ventilation and Air Conditioning (HVAC) system exhaust fan on the roof of the building. Medical attention was sought, and it was determined that the employee sustained a fracture to the right ankle. Ministry of Labour officer was notified and visited the site on January 29, 2019. As a result of the incident, Bruce Power will provide additional snow removal equipment and traction devices to HVAC crew members. A site wide communication was issued on slip and fall prevention. No further actions on CNSC staff are required in response to this incident. |
| Actions from previous Commission meetings |
| None. |

### 1.2 Darlington

| Operational Status |
|---|
| Unit 1 is at Full Power |
| Unit 2 is Shutdown for Refurbishment |
| Unit 3 is at Full Power |
| Unit 4 is Shutdown |
| **Licensing** |
| Power Reactor Operating Licence expires on November 30, 2025. |
| **Comments** |
| Unit 2 Fuel channel installation is the current focus of refurbishment. Currently 37% of the fuel channel installation work is complete.<br><br>Unit 4 is in a planned maintenance outage, expected to return to service in April 2019. |
| **Event Notifications and Updates** |
| See attached e-Doc 5786476 Update to the Commission 12(2) Requests related to Internal Contamination Events in the RWPB and DNGS Unit 2. |
| **Actions from previous Commission meetings** |
| See CMD 19-M7 - Follow-up on Alpha Contamination events at Darlington. |

### 1.3 Pickering

| Operational Status |
|---|
| Unit 1 is at 97% of Full Power |
| Unit 2 is in a Safe Storage State |
| Unit 3 is in a Safe Storage State |
| Unit 4 is at Full Power |
| Unit 5 is at Full Power |
| Unit 6 is at Full Power |
| Unit 7 is Shutdown |
| Unit 8 is at Full Power |
| **Licensing** |
| Power Reactor Operating License expires on August 31, 2028.<br><br>Potassium Iodide (KI) Pill Working Group<br>• Draft Terms of Reference were posted on the CNSC website on December 24, 2018 for a 30-day public comment period. The public comment period was extended to February 14, 2019.<br><br>• The CNSC Advisory Committee for the KI Pill Working Group will have its first meeting on February 26, 2019 to discuss the draft Terms of Reference and operating procedures for the committee.<br><br>• All comments received through the public review period and from the CNSC Advisory Committee will be considered in finalizing the Terms of Reference. The Terms of Reference is anticipated to be finalized and circulated for signatures in March 2019, officially enacting the working group.<br><br>CNSC staff will continue to update the Commission through the Status Report on Power Reactors. |

| Comments |
| --- |
| Unit 1 is derated due to fuelling machine unavailability. There is no impact on the safety of workers, the public or the environment as a result of the fuelling machine unavailability.<br><br>Unit 7 is in a planned maintenance outage, expected to return to service in May, 2019. |
| Event Notifications and Updates |
| None. |
| Actions from previous Commission meetings |
| None. |

### 1.4 Point Lepreau

| Operational Status |
| --- |
| Unit is at 99.5% of Full Power |
| Licensing |
| Power Reactor Operating Licence expires on June 30, 2022. |
| Comments |
| The unit is limited to 99.5% of Full Power due to an issue on a reheater on the secondary side of the plant. There is no impact on the safety of workers, the public or the environment as a result of this situation. |
| Event Notifications and Updates |
| None. |
| Actions from previous Commission meetings |
| None. |

### 1.5 Other

Nothing to report

Government of Canada / Gouvernement du Canada

**MEMORANDUM NOTE DE SERVICE**

**To / À / CC**
Marc Leblanc
Commission Secretary

Ramzi Jammal

**From / De**
Gerry Frappier
Director General
Directorate of Power Reactor Regulation

| | |
|---|---|
| Security Classification - Classification de<br>Non-classified | |
| Our File – Notre référence<br>e-Doc 5786476 | |
| Your File - Votre référence | |
| Date<br>February 14, 2019 | Tel. No. - Nº de tél.<br>613-995-2655 |

Subject / Objet: Update on the CNSC requests issued pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations* related to internal contamination events in the Retube Waste Processing Building and in the Darlington Unit 2 Vault

This memo is to provide an update to the Secretariat on the two requests issued by Canadian Nuclear Safety Commission (CNSC) staff to Ontario Power Generation (OPG) pursuant to subsection 12(2) of the *General Nuclear Safety and Control Regulations* [hereafter referred to as the 12(2) request] related to internal contamination events in the Retube Waste Processing Building (RWPB) and in the Darlington Unit 2 Vault.

**February 2018 - Internal Contamination Event in the Retube Waste Processing Building**

This event was presented to the Commission on March 15, 2018 as an Event Initial Report (EIR) in CMD 18-M14.

On February 6, 2018, contamination was detected on two Canatom workers. The two workers were performing lidding operations on Darlington Storage Over-packs in the Waste Tooling System hardware station of the RWPB. At the time of the event, the Waste Tooling Station was classified as an Alpha Level I[1] contamination control area. The workers were wearing protective coveralls, double gloves and booties. The use of respiratory protection was not specified and therefore respiratory protection was not worn.

Contamination surveys of the work area, performed following the event, demonstrated that the alpha classification at the time of the event was not representative of the alpha hazards. OPG subsequently re-classified the area as Alpha Level III[2], and directed workers to wear respiratory protection as required by OPG's radiation protection (RP) program based on the revised classification.

Follow-up bioassay samples for the affected workers confirmed that the workers received intakes of contamination. The two workers received a committed effective dose of 0.28 and 0.31 mSv (primarily due to the presence of alpha activity), well below the regulatory dose limit (i.e. 50 mSv/y) and the licensee's action level (i.e. 2 mSv above planned). A CNSC dosimetry specialist reviewed and concurred with OPG's dose assessment.

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**1.** Alpha I classification is used when the relative abundance of alpha contamination compared with beta-gamma contamination is minimal. In the unlikely case of an inhalation uptake, the internal dose from alpha emitters is not likely to exceed 10% of the total internal dose.

**2.** Alpha III classification is used when the relative abundance of alpha contamination compared with beta-gamma contamination is elevated. In the unlikely case of an inhalation uptake, the internal dose from alpha emitters is likely to exceed 90% of the total internal dose.

CNSC staff conducted a reactive inspection in response to the event in the RWPB. As a result of the inspection, enforcement actions were placed on OPG to address deficiencies in the implementation of its alpha monitoring and control in the RWPB. Areas of non-compliances included:

- Documenting and performing characterization and classification of alpha hazards
- Maintaining records of the survey results for work conducted in the RWPB
- Reviewing and verifying radiation survey results for the RWPB by supervision
- Implementing adequate radiological monitoring.

On June 29, 2018, CNSC staff issued a 12(2) request for additional information to provide adequate assurance that current and future work in the RWPB and in the Darlington NGS Unit 2 vault would proceed safely and take into account the lessons learned from the February 6, 2018 event in the RWPB.

OPG complied with the 12(2) request and submitted:

- An ALARA analysis for the installation activities planned on the Unit 2 Re-tube Tooling Platform
- A description of workplace controls to protect workers from intakes of alpha contaminants
- A description of OPG's enhanced RP oversight and alpha monitoring.

To confirm the effectiveness of OPG's corrective actions, CNSC staff have issued an action item AI 2019-13-18590 for OPG to perform a self-assessment of the implementation of the OPG's alpha monitoring and control program during refurbishment, prior to the commencement of refurbishment activities for Darlington NGS Unit 3. This action item is in addition to longer term corrective actions currently being implemented by OPG to improve the characterization, classification and monitoring of alpha hazards.

CNSC staff have also revised the CNSC compliance plan for the refurbishment of Darlington Unit 3 to include additional compliance oversight activities of OPG's Radiation Protection program.

**November 2018 – Low Alpha Activity Detected on Personal Air Samplers**

This event was reported to the Commission on December 13, 2018 in CMD 18-M63.

On November 29, 2018, OPG informed the CNSC staff that two Personal Air Samplers (PAS) worn by contractors working on Darlington Unit 2 feeder replacement were found to contain low levels of radioactive particulates, including alpha emitters. The workers were wearing half-mask negative pressure particulate respirators at the time[3] OPG immediately mandated that all work in the feeder cabinets be conducted in plastic suits[4], pending completion of OPG's investigation into the occurrence.

Subsequently, OPG identified seven instances for which PAS showed a positive result for alpha emitters and determined that the source of the activity on the samplers was due to removal of foreign material from inside the header.

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**3.** Half-mask negative pressure particulate respirators have an assigned protection factor (APF) of 10 – from OPG's N-PROC-RA-0025 (Table 3). **APF** means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program. In this case an APF of 10 would mean that the concentration of activity inhaled would be expected to be $\leq$ 1/10th of the concentration of activity in the breathing zone of the worker.

**4.** Plastic suits have an APF of 100 – from OPG's N-PROC-RA-0025 (Table 3), meaning the concentration of activity inhaled would be expected to be $\leq$ 1/100th of the concentration of activity in the breathing zone of the worker.

On December 13, 2018 CNSC staff issued a 12(2) request for OPG to initiate follow-up dose assessment activities using in vitro bioassay methods for all individuals whose PAS showed positive results for alpha emitters, and to review and modify its alpha dosimetry program (including confirmatory dosimetry program) in light of the elevated risks of alpha hazards associated with refurbishment activities and in consideration of recent operating experience.

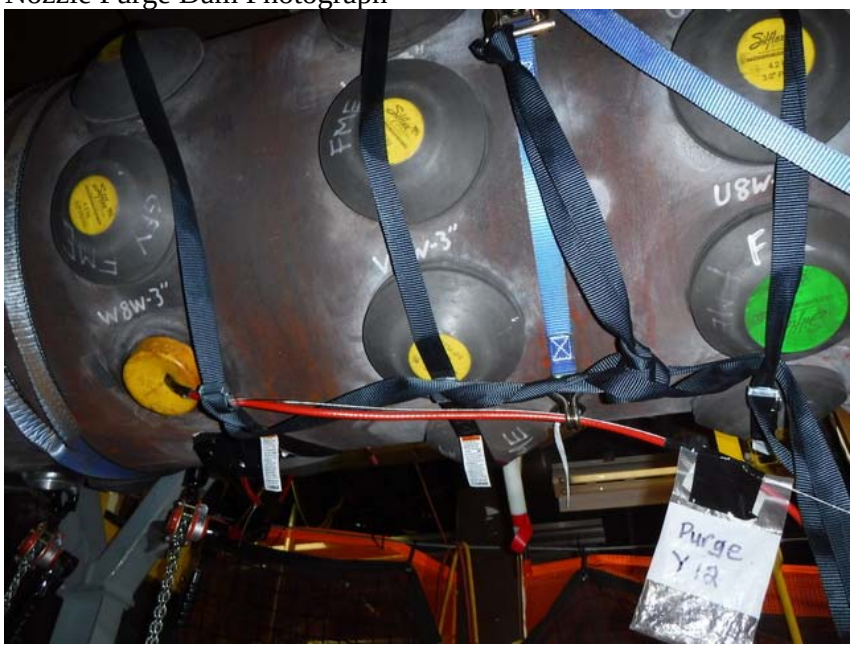
On January 31, 2019, OPG provided an interim update on its response to this CNSC 12(2) request:

- OPG confirmed that seven individuals submitted 24-hour fecal samples for in-vitro analysis. All samples were analyzed by an external approved vendor. For one worker, one alpha isotope of interest was above the detection limit and a dose assessment is on-going. The results for the remaining six individuals were below the detection limit for alpha isotopes, and therefore no internal dose will be assigned.
- OPG is currently completing a review of its alpha dosimetry program, taking into account benchmarking with other utilities and operating experience, to identify potential enhancements.

On February 7, 2019, OPG submitted the detailed event report summarizing the results of its investigation into the November 2018 occurrence. OPG's investigation identified that the cause of the event was "the failure to recognize the potential for localized airborne hazards during tool retrieval from the header nozzles during the Feeder Installation Series".

The Upper Feeder Installation Series involved the welding of new feeder tubes into the header nozzles. Part of the installation required the use of header nozzle purge dams (shown in the illustration below) to serve as Foreign Material Exclusion (FME) barriers and provide protection to the header internal surfaces during the welding operation.

Nozzle Purge Dam Photograph




It was later found that in some cases the header nozzle purge dams could not be readily removed following the welding operation. The nozzle purge dam components were removed using a wire and grabber tool that was pulled through the contaminated header.

CNSC staff are currently reviewing OPG's detailed event report, including conclusions drawn from the investigation and the measures taken by OPG to prevent recurrence.

**Conclusion**

OPG remains accountable for implementing all the necessary measures for the protection and safety of workers from all hazards in the workplace.

CNSC inspectors and support staff will continue to monitor OPG's activities to ensure workers are protected from alpha hazards. Enhanced oversight through more frequent walk downs and field inspections of the Unit 2 vault, and reviews by Radiation Protection and Dosimetry Specialists will continue to verify that the controls and measures identified by OPG are in place and remain effective.