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Safety Commission

Commission canadienne
de sûreté nucléaire

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Status Report on Power Reactors

Rapport d'étape sur les centrales
nucléaires

This document summarizes the status of
the Power Reactor facilities as of
November 29, 2023.

Ce rapport résume le rapport d'étape sur
les centrales nucléaires en date du
29 novembre 2023.

Signed on / Signé le
2023-12-04

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1. Power Reactors Status as of November 29, 2023

1.1 Bruce A and B

Operational Status
Unit 1 is at Full Power
Unit 2 is at Full Power
Unit 3 is Shut Down for Major Component Replacement (MCR)
Unit 4 is at Full Power
Unit 5 is at Full Power
Unit 6 is at Full Power
Unit 7 is at Full Power
Unit 8 is Shut Down for a planned outage
Licensing
Power Reactor Operating Licence expires on September 30, 2028.
Comments
<p>Unit 3 Major Component Replacement (MCR) started in March 2023.</p> <ul style="list-style-type: none"> • The MCR project is on schedule • Bulkhead installation is complete • Removal of feeder tubes is ongoing • Moderator drain and dry work is ongoing <p>Unit 8 was shutdown on September 15, 2023 for a planned maintenance outage. The unit is expected to return to service in December 2023.</p>
Event Notifications and Updates
None
Actions from previous Commission meetings
<p>CNSC staff are providing CMD 23-M52, Update on the Unit 4 Primary Heat Transport Purification System Leak at the Bruce Nuclear Generating Station A. Bruce Power is providing the Commission with a submission on this topic via CMD 23-M52.1. Bruce Power has conducted a root cause investigation (RCI) on the event, and developed a comprehensive response plan to address the identified gaps. CNSC staff have reviewed the corrective actions taken and determined that they were adequate.</p> <p>The Commission directed CNSC staff to track on-going work on hydrogen equivalent concentration (Heq) research and development (R&D) in a Record of Decision (DEC 23-H103) issued on October 13, 2023. The progress update is provided in Section 1.5 of this report.</p>

1.2 Darlington

Operational Status

Unit 1 is Shut Down for Refurbishment
Unit 2 is at Full Power
Unit 3 is at Full Power
Unit 4 is Shut Down for Refurbishment
Licensing
Power Reactor Operating Licence expires on November 30, 2025.
Comments
<p>Unit 1 refurbishment started in February 2022.</p> <ul style="list-style-type: none"> • Refurbishment project is on schedule. • Current critical path is Fuel Channel installation. • OPG is expected to submit the formal request to release the regulatory hold point to allow fuel load in April 2024. <p>Unit 4 refurbishment started in July 2023.</p> <ul style="list-style-type: none"> • Refurbishment project is on schedule. • Critical path is fuelling machine bridge removal and retube tooling platform installation. • OPG is expected to submit the formal request to release the regulatory hold point to allow fuel load in July 2025.
Event Notifications and Updates
<p>In August 2023, CNSC site inspectors identified several concerns with the condition and availability of the Public Address (PA) System in large areas of Darlington NGS during routine surveillance activities. On October 12, 2023, an impairment of the PA system was declared by OPG. CNSC staff initiated regulatory actions later that month related to compliance with Licence Conditions 10.1 and 10.2 of the Power Reactor Operating Licence (PROL) 13.03 2025. OPG’s response to that action item addressed some of the elements raised by CNSC staff but some items were outstanding and the timeline and justification offered by OPG for replacement of the system was determined to be insufficient. Due to the concerns around the extent and duration of PA System impairment, CNSC staff concluded that OPG remained in non-compliance with Licence Conditions 10.1 and 10.2 of PROL 13.03/2025, CNSC staff have issued a request pursuant to Subsection 12(2) of the <i>General Nuclear Safety and Control Regulations</i>, in order to ensure the timely replacement/upgrade of the PA System at Darlington NGS, as well as continuous monitoring of the effectiveness of compensatory measures put in place during this period.</p>
Actions from previous Commission meetings
None.

1.3 Pickering

Operational Status
Unit 1 is at 100% 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 98% Full Power
Unit 6 is at Full Power
Unit 7 is at Full Power
Unit 8 is Shutdown for a planned outage
Licensing
Power Reactor Operating Licence expires on August 31, 2028. OPG requires Commission approval to operate PNGS beyond December 31, 2024.
Comments
None.
Event Notifications and Updates
Unit 5 is at 98% Full Power due to Governor Valve Safety Related System Testing (SRST). Unit 8 is Shutdown as it is in a planned maintenance outage. The unit is expected to return to service in January 2024.
Actions from previous Commission meetings
None.

1.4 Point Lepreau

Operational Status
The unit is at Full Power
Licensing
Power Reactor Operating Licence expires on June 30, 2032.
Comments
None.
Event Notifications and Updates
None.
Actions from previous Commission meetings
None.

1.5 Other

CNSC staff assessment of progress on hydrogen equivalent concentration (Heq) research and development (R&D) program commitments by Bruce Power and OPG

There is no update to provide since the previous Status Report on Power Reactors ([CMD 23-M45](#)).

In DEC 23-H103, “The Commission also directs CNSC staff to provide updates on Bruce Power’s progress in its research and development (R&D) activities through the regular Status Report on Power Reactors, which is presented at each public Commission Meeting. CNSC staff shall develop a consolidated table to track and communicate the ongoing work to the Commission through the aforementioned Status Report on Power Reactors”.

Although the Commission’s direction was to report on Bruce Power’s progress on its R&D activities, CNSC staff note that the Heq-related R&D program is being conducted jointly between Bruce Power and OPG.

R&D plans from OPG and Bruce Power can be found in [CMD 22-M37.1](#) and in [CMD 22-M37.3](#), respectively.

CNSC staff have reviewed the first semi-annual update submitted by Bruce Power and OPG on March 29th, 2023. Progress to date, against the original completion dates provided in the R&D plans, is summarized in the table below:

*Note that there is no change from the previous update to this table.

R&D Activity	Planned Completion Date (from CMD 22-M37.1 and 22-M37.3)	Updated Status of R&D Activities
Update finite element software to simulate outlet rolled joint Heq evolution	Fall 2023	Bruce Power and OPG have increased the scope of this activity. Completion date remains Fall 2023.
Develop finite element software to simulate inlet rolled joint Heq evolution	Fall 2023	Bruce Power and OPG have increased the scope of this activity. Completion date remains Fall 2023
Perform evaluation to assess the potential impact of the high levels of Heq on flaws at the inside surface of pressure tubes near the inlet region of interest	Fall 2023	Bruce Power and OPG have increased the scope of this activity. Completion date remains Fall 2023.
Improve characterization of ‘blip’ and expected evolution of the inlet region of elevated Heq with continued operation	Spring 2024	Progressing as planned.
Confirm the potential roles of hydrogen isotope ingress and redistribution on	Summer 2023*	Bruce Power and OPG have revised the completion date to Fall 2023.

R&D Activity	Planned Completion Date (from CMD 22-M37.1 and 22-M37.3)	Updated Status of R&D Activities
the development of the inlet regions of elevated Heq		
Improve characterization of solubility behaviour of hydrogen isotopes in tubes with elevated Heq	Winter 2024	Progressing as planned.
Enhance modeling of temperature distributions near the outlet rolled joint region of pressure tubes	Summer 2023*	Progressing as planned.
Define input parameters required for interim updates to the Heq model	Summer 2023*	Progressing as planned.
Develop interim Heq model	Fall 2024	Progressing as planned.
Validation activities for the interim Heq model to support development of final comprehensive model	Fall 2025	Progressing as planned.
Define input parameters required for the final comprehensive Heq model	Summer 2025	Progressing as planned.
Define the relative importance of variables influential to Heq evolution	Fall 2025	Progressing as planned.
Develop the final comprehensive Heq model	Winter 2026	Progressing as planned.
Complete hydride related crack initiation experiments for unirradiated material at Heq of 220 ppm or higher	Fall 2024	Bruce Power and OPG have revised the completion date to Spring 2025
Complete fatigue crack initiation experiments for unirradiated material at Heq of 220 ppm or higher	Fall 2024	Bruce Power and OPG have revised the completion date to Spring 2025
Complete crack initiation experiments for irradiated material with elevated Heq without flaws present	Fall 2024	Bruce Power and OPG have revised the completion date to Spring 2025
Complete crack initiation and crack growth experiments for irradiated material with elevated Heq with flaws present	Fall 2024	Bruce Power and OPG have increased the scope of this activity. Completion date has been revised to Spring 2025

*CNSC staff are currently reviewing the most recent R&D update, which could confirm completion of these items

Based on the review of the R&D plans and the first update, CNSC staff is satisfied with the progress and scope of work. At this time, Bruce Power and OPG have not reported any substantive delays in the R&D work that may adversely impact the overall project schedule. Bruce Power and OPG have submitted their second semi-annual update on September 27, 2023, which is currently being reviewed by CNSC staff.

CNSC staff have provided a written submission for the Commission:

- [CMD 23-M36](#) Appendix I, CNSC Staff Update on Elevated Hydrogen Equivalent Concentration Discovery Events in the Pressure Tubes of Reactors in Extended Operation [RIB 25788].