



Canadian Nuclear
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 October
18, 2023.

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

Signed on / Signé le
2023-10-23

Alexandre Viktorov, Ph.D.
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 October 18, 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.
PROL 18.03/2028 was amended on October 13, 2023; see the Commission’s Record of Decision DEC 23-H103.
Comments
Unit 3 Major Component Replacement (MCR) started in March 2023. <ul style="list-style-type: none"> • Refurbishment project is on schedule • Bulkhead installation is complete • Next step is to install the retube maintenance platforms • 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
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.

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 following successful completion of the vault pressure test (target completion date Oct 20) includes putting the Vault Vapour Recovery System back into service and Moderator Drain. • 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
None.
Actions from previous Commission meetings
None.

1.3 Pickering

Operational Status
Unit 1 is at 95% 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 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 1 is at 95% Full Power due to fuelling machine unavailability. The unit is expected to return to 100% Full Power on October 19, 2023. 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

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:

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 the development of the inlet regions of elevated Heq	Summer 2023	Bruce Power and OPG have revised the completion date to Fall 2023.
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.

R&D Activity	Planned Completion Date (from CMD 22-M37.1 and 22-M37.3)	Updated Status of R&D Activities
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

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 will present a more detailed update on elevated hydrogen equivalent concentration discovery events in the pressure tubes of reactors in extended operation in the Regulatory Oversight Report on Nuclear Power Generating Sites on December 13-14, 2023 ([CMD 23-M36](#)).