



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

UNPROTECTED / NON PROTÉGÉ

ORIGINAL / ORIGINAL

CMD : 24-M15

File/Dossier # 6.02.04

e-Doc 7272233 (Word)

e-Doc 7283026 (PDF)

Date signed / Signé le: May 15, 2024

STATUS REPORT ON POWER REACTORS

RAPPORT D'ÉTAPE SUR LES CENTRALES NUCLÉAIRES

This document summarized the status of the
Power Reactor Facilities as of May 2, 2024.

Ce rapport résume le rapport d'étape sur les
centrales nucléaires en date du 2 mai 2024.

Signed on / Signé le
2024-05-15

Alexandre Viktorov, Ph. D.
Director General, Directorate of Power Reactor Regulation
Directeur général, Direction de la réglementation des centrales nucléaires

1. Power Reactors Status as of May 02, 2024

1.1 Bruce A and B

Operational Status
Unit 1 is at 88.8% 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 Shut Down for a Vacuum Building Outage (VBO)
Unit 6 is Shut Down for a VBO
Unit 7 is Shut Down for a VBO + Planned Outage
Unit 8 is Shut Down for a VBO
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"> • Refurbishment project is on schedule. • End fitting removal is complete. • Next step is Pressure Tube removal. <p>Bruce Power is expected to submit the formal request to release the regulatory hold point to allow fuel load in December 2025.</p> <p>Unit 1 is slightly derated due to elevated vibrations on a turbine bearing. Bruce Power intends to take the unit offline to complete repairs, after the Vacuum Building Outage is completed.</p> <p>Unit 7 was shutdown on April 17, 2024 for a planned maintenance outage. The outage is expected to last approximately 55 days.</p> <p>Unit 8 was shutdown on April 18, 2024. During the execution of a Safety System Test the unit experienced an unexpected manual turbine trip. Bruce Power proceeded with a controlled shut down of the unit.</p> <p>The Vacuum Building Outage (VBO) started on April 24, 2024. All four Bruce B units (5-8) are shutdown to allow for inspections and maintenance of the containment and vacuum building. The VBO is expected to last approximately 20 days.</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 Shut Down for a Planned Outage
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. • CNSC staff received Ontario Power Generation’s (OPG) formal request to release the regulatory hold point (RHP-1) to allow fuel load on April 25, 2024 and approved the request on April 29, 2024. <p>Unit 2 was shut down on February 19, 2024 for a planned maintenance outage. The unit is expected to return to service on May 08, 2024.</p> <p>Unit 4 refurbishment started in July 2023.</p> <ul style="list-style-type: none"> • Refurbishment project is on schedule. • Critical path is Calandria Tube Insert release. • OPG is expected to submit the formal request to release the regulatory hold point to allow fuel load in June 2025.
Event Notifications and Updates
None.
Actions from previous Commission meetings
None.

1.3 Pickering

Operational Status
Unit 1 is at 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 72% Full Power
Unit 6 is at Full Power
Unit 7 is Shut Down for a Planned Outage
Unit 8 is at 93% Full Power
Licensing
Power Reactor Operating Licence expires on August 31, 2028. OPG requires Commission approval to operate PNGS beyond December 31, 2024. A public hearing to consider OPG's request to operate Units 5-8 to December 2026 is scheduled for June 2024.
Comments
Unit 5 is operating at 72% Full Power due to the west Fueling Machine (FM) being unavailable. On April 12, 2024, an event occurred during the irradiated fuel discharge process that resulted in the FM being unable to complete the discharge. OPG is implementing a plan to return fuel handling to service.
Unit 7 was shutdown on January 5, 2024 for a planned maintenance outage. The unit is scheduled to return to service on May 19, 2024.
Unit 8 is operating at 93% Full Power due to the east Fueling Machine (FM) being unavailable. On April 17, 2024, the east FM bridge would not ascend or descend following a fueling run. OPG works to return the FM to service.
Event Notifications and Updates
An update on a security event involving an ex-OPG employee will be provided to the Commission in a closed session.
Actions from previous Commission meetings
None.

1.4 Point Lepreau

Operational Status
The Unit is Shut Down for Planned Outage
Licensing
Power Reactor Operating Licence expires on June 30, 2032.
Comments
The unit was shutdown on April 06, 2024 for a planned maintenance outage. The outage is expected to last approximately 100 days.

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.

Bruce Power and OPG have submitted the third semi-annual update in March 2024. While CNSC staff’s detailed review of the second and third semi-annual updates is ongoing, CNSC staff have verified that licensee progress to date is acceptable. Progress 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*	Software has been updated. Verification and validation activities are underway.
Develop finite element software to simulate inlet rolled joint Heq evolution	Fall 2023*	Software has been developed. Verification and validation activities are underway.
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*	Preliminary work was completed. Sensitivity studies for key input parameters are underway.

R&D Activity	Planned Completion Date (from CMD 22-M37.1 and 22-M37.3)	Updated Status of R&D Activities
Improve characterization of ‘blip’ and expected evolution of the inlet region of elevated Heq with continued operation	Spring 2024*	Original work scope has been completed and additional work added with TCD of Fall 2024.
Confirm the potential roles of hydrogen isotope ingress and redistribution on the development of the inlet regions of elevated Heq	Summer 2023*	Preliminary work has been completed. Sensitivity studies are underway.
Improve characterization of solubility behaviour of hydrogen isotopes in tubes with elevated Heq	Winter 2024*	Original work scope has been completed and additional work added with TCD of Fall 2025.
Enhance modeling of temperature distributions near the outlet rolled joint region of pressure tubes	Summer 2023*	Work has been completed.
Define input parameters required for interim updates to the Heq model	Summer 2023*	Work has been completed.
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

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

Based on the review of the R&D plans and updates provided, 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. CNSC staff expect to complete their review of Bruce Power’s and OPG’s second and third semi-annual updates by the end of August 2024.