



Regulatory Oversight Report for Canadian Nuclear Power Generating Sites: 2022

Commission Meeting

December 13, 2023

CMD 23-M36.A



CNSC Staff Presentation



Outline

- Introduction
- General results for nuclear power plants (NPPs) and associated waste management facilities (WMFs)
- Highlights for each NPP
- Hydrogen Equivalent Concentration (Heq) update
- Highlights for the WMFs
- Closing remarks



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INTRODUCTION

CNSC Compliance Verification Program

The safety performance of NPPs and WMFs is assessed by CNSC staff using the results of the compliance verification activities



- **Verification activities** include surveillance by onsite inspectors at NPPs, inspections and compliance assessments
- CNSC staff track actions until closure and verify compliance via follow-up activities
- Over **1,700 findings** derived from compliance verification activities
- Licensees submitted **153 event** reports and over **90 scheduled reports** during the year, and these were reviewed by CNSC staff

The program is risk-informed and performance-based



Indigenous Consultation and Engagement

CNSC staff:

- Continued to engage and identify opportunities to discuss and address all topics of interest and concern (e.g., regular facility updates, ongoing regulatory processes, environmental monitoring, collaborative long-term engagement)
- Informed Indigenous Nations and communities of participant funding opportunities for this regulatory oversight report
- Hosted a virtual engagement session with Indigenous Nations and communities

CNSC staff are committed to sharing, collaborating and building long-term relationships with Indigenous Nations and communities



Indigenous Consultation and Engagement

Pickering and Darlington Sites

- Alderville First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island First Nation
- Beausoleil First Nation
- Georgina Island First Nation
- Rama First Nation
- Mohawks of the Bay of Quinte
- Métis Nation of Ontario

Gentilly-2

- W8banaki
- Nation Huronne-wendat

Point Lepreau Site

- Wolastoqey Nation of New Brunswick (representing 6 Maliseet communities)
- Mi'gmawe'l Tplu'taqnn Inc. (representing 8 Mi'kmaq communities)
- Kopit Lodge (representing Elsipogtog First Nation)
- Passamaquoddy Recognition Group Inc. (representing Peskotomuhkati Nation)

Bruce Site

- Saugeen Ojibway Nation
- Historic Saugeen Métis
- Métis Nation of Ontario



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GENERAL RESULTS FOR NPPs AND WMFs



General Safety Performance and Observations

- Releases of radioactivity to environment were below regulatory limits
- Radiological doses to the public and workers were below regulatory limits
- All nuclear material in Canada was retained for peaceful purposes and Canada's international obligations were fulfilled
- Licensees took appropriate follow-up actions on all reportable events
- Unplanned reactor transients were managed safely
- Over the past 5 years, the industry has seen a decreasing trend in lost-time injuries and accidents, well below international benchmarks

People and the environment were protected



Security Performance and Observations

All SCAs were rated “*Satisfactory*” (SA) for all NPPs and WMFs

with the exception of the **Security SCA** at Darlington and Pickering NPPs, which were rated “*Below Expectations*” (BE)

- Details are provided to the Commission in CMD 23-M36.C and will be discussed later today in an **in-camera session**



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HIGHLIGHTS FOR EACH NPP



Darlington Nuclear Generating Station

Power reactor operating licence:

January 2016 – November 2025

- Units 1, 2 and 4 operational in 2022
- Unit 3 entered refurbishment activities in September 2020
- In Oct 2022 began commissioning activities for the production of Molybdenum-99
- Satisfactory progress on Integrated Implementation Plan (IIP) – as of December 31, 2022, 69% of IIP complete



Darlington Nuclear Generating Station

Source: OPG



Darlington Nuclear Generating Station Highlights

Operating Performance:

- Safe operations within licensed conditions, controlled reactor power transients, adherence to reporting requirements
- CNSC staff increased regulatory scrutiny due to repeat non-compliance related to OPG not providing prior written notifications to changes in the Safe Operating Envelope documents
- OPG submitted an acceptable corrective action plan to correct this non-compliance

Radiation Protection:

- ALARA compliance, worker radiation doses below limits, effective Radiation Protection Program

Emergency Exercise:

- Full-scale exercise in Feb 2022
- 15 compliant findings, 1 non-compliant finding of negligible safety significance



Pickering Nuclear Generating Station

Power reactor operating licence:

September 2018 – August 2028

- Authorization from the Commission is required to operate beyond 2024
- Units 1, 4, 5, 6, 7 and 8 operational in 2022
- Units 2 and 3 defueled in 2008
- OPG informed CNSC of its intent to seek Commission authorization to operate Units 5–8 until 2026
- OPG commenced feasibility assessment for refurbishing Units 5-8



Pickering Nuclear Generating Station

Source: OPG



Pickering Nuclear Generating Station Highlights

- CNSC staff confirmed that all special safety systems for PNGS met their unavailability targets for 2022
- CNSC staff confirmed that PNGS critical corrective maintenance backlogs continued to remain very low
- OPG completed its Vacuum Building Outage in Fall 2022 in accordance with CNSC requirements
- CNSC staff have included information relevant to the PNGS mid-term update in **Appendix H** of CNSC staff's CMD



Bruce A and Bruce B Nuclear Generating Station

Power reactor operating licence:

October 1, 2018 – September 30, 2028

- Units 1 - 5, 7, 8 were operational in 2022
- Major Component Replacement (MCR) outage continued at Unit 6 with the component installation
- MCR outage preparation activities at Unit 3 continued in 2022
- The licence was amended on October 13, 2023, to require that Bruce Power implement and maintain an enhanced fitness for service program for fuel channels in extended operation
- Satisfactory progress with the IIP committed over a ten-year timeline from the Periodic Safety Reviews (PSRs) – as of December 31, 2022, 32% of IIP complete



Bruce A and Bruce B Nuclear Generating Stations
Source: Bruce Power



Bruce A and Bruce B Nuclear Generating Stations

Highlights

- Bruce Power's safety performance has remained stable
- Bruce Power implemented controls for managing radiological hazards at Bruce A and B that satisfied regulatory requirements
- Bruce Power continued to identify workplace hazards to ensure the protection of workers
- Bruce Power conducted the Nuclear Safety and Security Culture Assessment (NSSCA) per its licensing requirements

Key regulatory activities in 2022:

- Bruce A Vacuum Building Outage in May 2022
- Bruce Full Scale Emergency Exercise (Huron Endeavour) in October 2022
- Bruce Power installed and commissioned the Isotope Production System (IPS) in 2022



Point Lepreau Nuclear Generating Station

Power reactor operating licence:

July 2022 – June 2032

- In June 2022, the commission renewed the license for a ten-year period, which includes a mid-term update in 2027
- Satisfactory progress on IIP - as of December 31, 2022, 84% of IIP complete



Point Lepreau Nuclear Generating Station
Source: NB Power



Point Lepreau Nuclear Generating Station Highlights

- Partial Loss of Class IV Power and Heavy Water Leak event on Dec 14, 2022 (Event Initial Report #CMD 23-M7, Update #CMD 23-M41).
- There was one medium finding in the area of training from the Type I cybersecurity inspection, NB Power submitted an acceptable corrective action plan and implementation is in progress
- All special safety systems met reliability targets except for Emergency Core Cooling and Containment
- CNSC staff reviewed NB Power's 2021 Probabilistic Safety Assessment update and determined that it met the requirements of REGDOC-2.4.2.

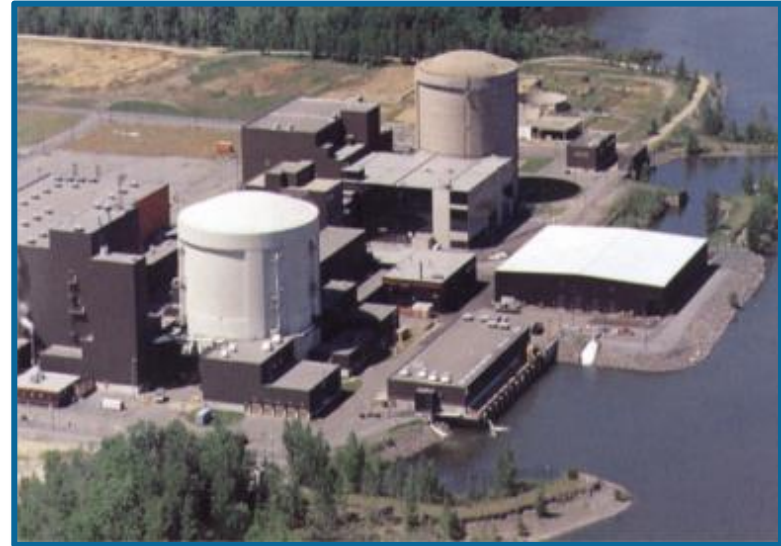


Installations de Gentilly-2

Permis de déclassement d'un réacteur nucléaire de puissance :

Juillet 2016 à juin 2026

- Les activités de préparation au déclassement de Gentilly-2 (campagne de stockage à sec) ont suivi leur cours en 2022
- Aucune mise à jour faite au MCP en 2022
- Émission le 5 décembre 2002 d'un ordre en matière de sécurité toujours en vigueur
 - Les mesures prises jusqu'à présent répondent aux attentes du personnel de la CCSN.



Installations de Gentilly-2
Source: Hydro-Québec



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HEQ UPDATE



Update on Elevated Heq Discovery Events

- The update applies to discovery events of elevated Heq in pressure Tubes of Reactors in Extended Operation
- CNSC staff have reviewed the first semi-annual update submitted by Bruce Power and OPG
- The update included key issues regarding the execution of the research and development (R&D) plans to update predictive model capabilities and analytical tools for the rolled joint region of pressure tubes
- Completion of the R&D is targeted for the summer of 2026



Scope of the First Update on Elevated Heq R&D

- The early phase was largely focused on planning, procurement of materials and preparation of samples for physical tests
- Some preliminary development work and sensitivity studies for analytical modelling were also included
- There are no new updates on specific model development activities or testing beyond what was previously reported to the Commission on November 3rd, 2022



CNSC Staff Overall Conclusions on R&D Activities

Based on the review of the first update of the R&D plans, CNSC staff conclude:

- Bruce Power and OPG continue to target key issues regarding pressure tube fitness for service with respect to the elevated Heq discoveries
- There was no reduction in scope of work and several activities included increases in scope
- There were no substantive delays reported that would impact the overall project schedule
- The second semi-annual update was submitted to CNSC staff at the end of September 2023, and it is currently under review



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HIGHLIGHTS FOR WMFs



Darlington Waste Management Facility (DWMF)

Waste Facility Operating Licence:

May 2023 to April 2033

- OPG processes and stores dry storage containers containing used nuclear fuel generated at DNGS
- OPG stores intermediate level waste generated from refurbishment activities at DNGS
- CNSC staff conducted three inspections at DWMF
- Waste Facility Operating Licence renewed for a period of ten years following the relicensing public hearing in January 2023



Aerial view of Darlington Waste Management Facility
Source: OPG

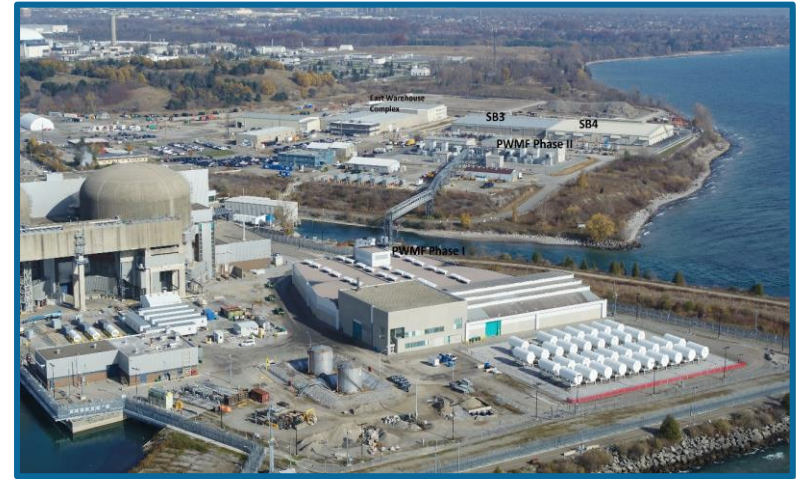


Pickering Waste Management Facility (PWMF)

Waste Facility Operating Licence:

April 2018 – August 2028

- OPG processes and stores dry storage containers containing used nuclear fuel generated at PNGS
- OPG manages intermediate level waste from refurbishment activities at PNGS
- CNSC staff conducted five inspections at PWMF



Aerial view of Pickering Waste Management Facility
Source: OPG



Western Waste Management Facility (WWMF) & Radioactive Waste Operations Site 1 (RWOS-1)

Waste Facility Operating Licence:

June 2017 – May 2027

- OPG processes and stores dry storage containers containing used nuclear fuel generated at BNGS and manages intermediate level waste from refurbishment activities at BNGS
- OPG manages low and intermediate level waste generated from operations at DNGS, PNGS and BNGS
- CNSC staff authorized OPG to operate additional in-ground storage containers
- CNSC staff conducted three inspections at WWMF

RWOS-1

Waste Nuclear Substance Licence:

October 2019 – October 2029

- In a state of care and maintenance
- CNSC staff conducted one inspection at RWOS-1



Aerial view of Western Waste Management Facility;
Source: OPG



Waste Management Facilities Highlights

In 2022, CNSC staff confirmed that:

- OPG operated DWMF, PWMF, WWMF, RWOS-1 in accordance with the regulatory requirements
- Maximum reported worker doses at WMFs were below regulatory limits
- There were no lost-time injuries at WMFs in 2022
- Releases to environment from WMFs were below regulatory limits and action levels



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CLOSING REMARKS



Interventions on 2022 NPGS ROR

Outlined below are the key intervention topics:

- Indigenous Nations and Communities' Terminology in the Report
- Climate Change Effects and Mitigation Measures
- Environmental Data Transparency and Standardization
- Fisheries Act Authorization at Point Lepreau
- KI Pills Pre-Distribution and Working Group Updates
- Emergency Management Program at Pickering
- Pickering Risk Assessments for Environmental Protection
- Legal Ownership of the Pickering Exclusion Zone

For the CNSC staff response to these topics refer to the supplemental CMD 23-M36.B



Final Conclusions

- People and the environment in the vicinity of NPP sites were protected
- Reported doses to workers and public were below regulatory limits
- All nuclear material in Canada was retained for peaceful purposes and Canada's international obligations were fulfilled
- Issues identified during compliance verification activities and events were either addressed or are being adequately addressed by licensees
- SCAs rated Satisfactory for all NPPs and WMFs with the exception of the Security SCA for Darlington and Pickering

Operations at NPPs and WMFs were conducted safely

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