



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Canada



Pickering Nuclear Generating Station

Ontario Power Generation (OPG) Licence Amendment Application to Operate Units 5-8 to December 31, 2026

CMD 24-H5.A

Commission Hearing

June 19th & 20th, 2024



CNSC Staff Presentation

E-doc #7207232 (pptx)

E-doc #7259087 (pdf)



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- Introduction
- CNSC Staff Assessment Highlights
- Periodic Safety Review
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INTRODUCTION



Pickering Nuclear Generating Station

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- The Pickering Nuclear Generating Station (NGS) consists of 8 reactor units and their associated equipment
- Units 1–4 came online between 1971 and 1973 and units 5–8 between 1983 and 1986
- Units 1, 4, and 5–8 are currently in operation and units 2 & 3 are in permanent safe storage

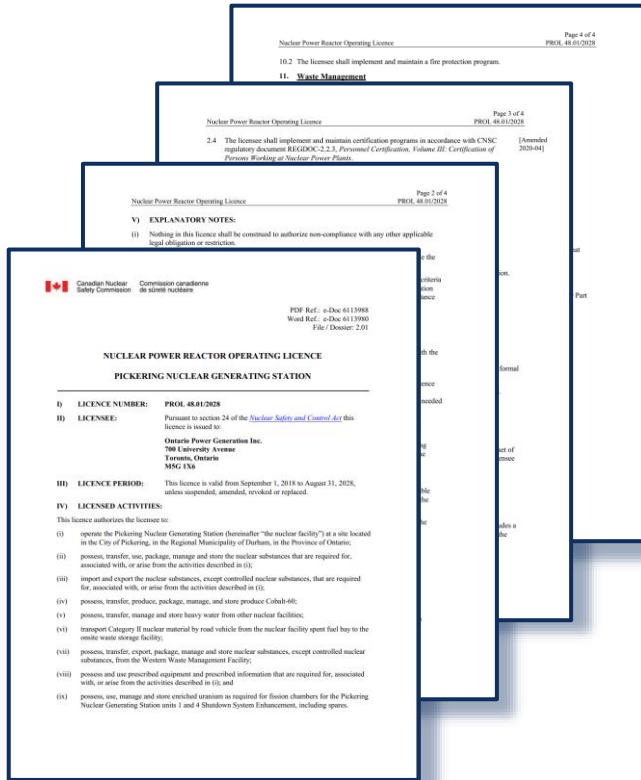


Pickering Nuclear Generating Station
Source: OPG



Current Operating Licence

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- OPG’s current licence for the Pickering NGS was renewed in 2018 and is valid until 2028
 - The current licence allows commercial operations to the end of 2024, followed by stabilization activities to transition units to a safe storage state
- The Pickering Waste Management Facility (PVMF) is located on the same site and licensed under a separate Class 1B waste facility operating licence



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- Operation of any Pickering NGS unit beyond 2024 requires Commission authorization via a licence amendment
 - Requirements are captured in licence condition 15.1 and 15.4.
- On June 16, 2023, OPG submitted a licence amendment application to operate units 5–8 until December 31, 2026
 - Units 1 and 4 will shutdown by the end of 2024.
- ***OPG has not submitted an application to refurbish units 5–8***

Consider application to operate units 5–8 until the end of 2026



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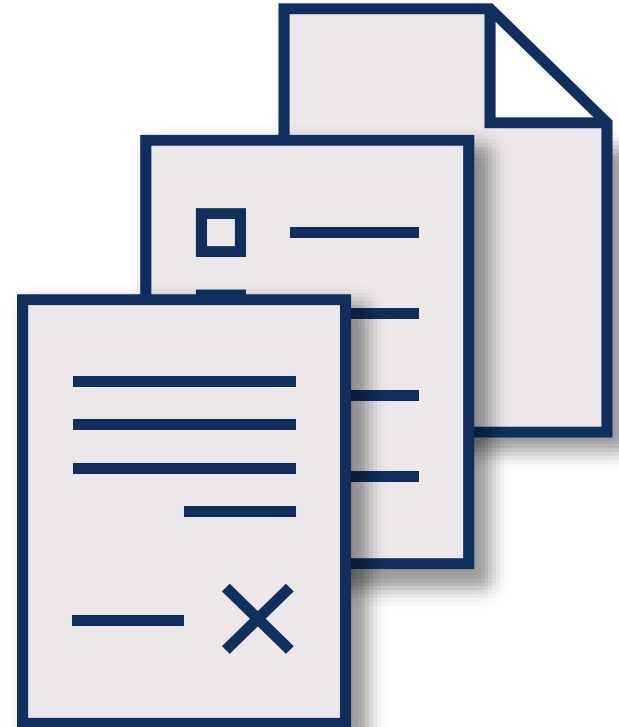
CNSC STAFF ASSESSMENT HIGHLIGHTS



OPG's Licence Amendment Application

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- OPG's [licence amendment application](#) requests that the Commission:
 - Authorize operation of Pickering NGS units 5–8 to December 31, 2026
 - Increase the 295,000 equivalent full power hour (EFPH) pressure tube operating limit to 305,000 EFPH
- To support the application, OPG updated the 2018 periodic safety review (PSR) and evaluated the condition of major components





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- Licence amendment applications are subject to the requirements of the [General Nuclear Safety and Control Regulations](#) (GNSCR) and the [Class I Nuclear Facilities Regulations](#) (CINFR)
- The Commission [established a June 30, 2023, deadline](#) for providing the application and supporting documents
- CNSC staff assessed OPG's licence amendment application to verify that it was complete and met all applicable regulatory requirements

OPG's application met all applicable requirements



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- CNSC staff’s assessment, recommendations, and conclusions are detailed in [CMD 24-H5](#)
- These recommendations are based on consideration of:
 - CNSC staff’s assessment of OPG’s application and supporting documentation
 - OPG’s updated PSR and associated integrated implementation plan commitments
 - OPG’s performance during the licence period and the results of CNSC compliance verification activities
 - The adequacy of existing programs for continued operation to the end of 2026



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PERIODIC SAFETY REVIEW REASSESSMENT



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- OPG's 2018 PSR considered operation until the end of 2024
- As required by the Commission, OPG [reassessed the 2018 PSR for operation until 2026](#) and concluded that:
 - The current plant design, condition, operation, processes and management system will support continued safe operation of Pickering units 5–8 for an additional two years
- CNSC requirements regarding this PSR reassessment are established under licence conditions 15.1 and 15.4



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- CNSC staff conclude that the integrated implementation plan (IIP) commitments will enhance the safe operation of the Pickering NGS
- CNSC staff agree with OPG's conclusion that the Pickering NGS will be supported for continued safe operation of units 5–8 to the end of 2026
- CNSC staff accepted OPG's updated PSR and associated IIP in July 2023



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- The PSR reassessment resulted in 32 total IIP commitments
- Key IIP actions include:
 - Update major component life cycle management plans
 - Demonstrate the continued fitness-for-service of tight-fitting fuel channel spacers
 - Update the heat transport system aging safety analyses
 - Update fuel channel periodic inspection plans (PIP)

OPG is on schedule to complete all commitments by the end of 2024



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PERFORMANCE ASSESSMENT



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- For each safety and control area (SCA), CNSC staff assessed:
 - OPG’s performance during the licence period against established compliance verification criteria
 - The adequacy of the programs within the SCA for continued operation until 2026
- CNSC staff are satisfied with OPG’s performance across the 14 SCAs
- CNSC staff found that OPG’s existing programs are adequate to support operation to the end of 2026



OPG's Performance During the Licence Period

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	2018	2019	2020	2021	2022
Management System	SA	SA	SA	SA	SA
Human Performance Management	SA	SA	SA	SA	SA
Operating Performance	FS*	SA	SA	SA	SA
Safety Analysis	FS*	SA	SA	SA	SA
Physical Design	SA	SA	SA	SA	SA
Fitness for Service	SA	SA	SA	SA	SA
Radiation Protection	SA	SA	SA	SA	SA
Conventional Health and Safety	FS*	SA	SA	SA	SA
Environmental Protection	SA	SA	SA	SA	SA
Emergency Management and Fire Protection	SA	SA	SA	SA	SA
Waste Management	SA	SA	SA	SA	SA
Security	SA	SA	SA	BE	BE
Safeguards and Non-Proliferation	SA	SA	SA	SA	SA
Packaging and Transport	SA	SA	SA	SA	SA

Fully satisfactory* (FS)
Satisfactory (SA)
Below Expectations (BE)

*As of 2019, the FS rating is no longer used



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- The following slides present highlights of OPG's performance across the SCAs most relevant to this matter:
 - Fitness for Service
 - Environmental Protection
 - Waste Management
 - Emergency Management and Fire Protection
 - Security
- Performance details for all 14 SCAs are provided in CNSC staff's [CMD 24-H5](#) and are also presented to the Commission through annual Regulatory Oversight Reports (RORs)

CNSC staff are satisfied with OPG's performance



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- CNSC staff are satisfied that OPG's existing programs within the fitness for service SCA continue to meet regulatory requirements
- OPG demonstrates fitness for service through periodic inspections and assessments of structures and components
- CNSC staff found OPG's approach to demonstrate the continued fitness for service of feeders, fuel channels, and steam generators until 2026 and up to 305,000 EFPH acceptable

Fitness for service must be demonstrated on an ongoing basis



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- In 2021, elevated hydrogen equivalent concentration ([Heq]) in pressure tubes in extended operation was discovered at another CANDU facility
- Certain models and evaluation processes used to assess pressure tube fitness for service have not been validated for elevated levels of [Heq]
- For Pickering NGS units 5–8, OPG demonstrated the low likelihood of relevant flaws in the identified regions of interest (ROIs)
- OPG has committed to participate in an industry wide research and development program to improve models at elevated [Heq]

Operation to 2026 requires updated [Heq] compliance verification criteria



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- **Remove licence condition 15.3** – *Before hydrogen equivalent concentrations exceed 120 ppm, the licensee shall demonstrate that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm*
 - With the recent evolution of compliance verification criteria for pressure tubes in extended service, the licence condition no longer serves its intended purpose
- **Include licence condition 6.2** – *The licensee shall implement and maintain an enhanced fitness for service program for fuel channels in extended operation*
 - The proposed licence condition would remain in place until the R&D work is complete and OPG can again demonstrate that all fitness for service criteria can be met for the [Heq] regions of interest

This approach is consistent across NPPs in extended operation



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- OPG has a well-established and robust environmental protection program that includes an Environmental Risk Assessment (ERA)
- CNSC staff reviewed OPG's 2022 [ERA report](#) and [predictive effects assessment \(PEA\) addendum report](#) and found that:
 - The ERA and PEA met regulatory requirements
 - Adverse effects to ecological and human health due to the operations of the Pickering NGS are unlikely
- CNSC staff are satisfied that OPG has made adequate provision to protect the environment and the health of people

The environment and the health of people continue to be protected



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CNSC staff collecting samples in the vicinity of the Pickering NGS during the 2021 IEMP

- CNSC staff published an [environmental protection review report](#) for the Pickering Nuclear Site in 2024
 - The potential risks from releases to the environment are low to negligible
- [CNSC Independent Environmental Monitoring Program \(IEMP\) results](#) support CNSC staff’s assessment that OPG’s environmental protection program is effective



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- CNSC staff found that OPG continues to meet regulatory requirements in emergency management and fire protection
- CNSC staff are satisfied with OPG's actions to correct deficiencies with the maintenance of fire emergency response equipment
- Improvements expected by the end of 2024 include:
 - Construction of a new fire hall in the Pickering NGS protected area
 - Emergency Management Ontario's updated Provincial Nuclear Emergency Response Plan (PNERP)

OPG continues to be prepared to respond to emergencies



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- As reported through the RORs, CNSC staff were not satisfied with OPG's security performance in 2021 and 2022
 - In early 2023, the CNSC issued an administrative monetary penalty (AMP) to OPG to promote compliance and deter reoccurrence
 - Following enhanced regulatory scrutiny, CNSC staff have noted improvements with OPG's performance in 2023 and 2024
- OPG has completed all corrective actions to address identified non-compliances which are under CNSC staff review

CNSC staff are satisfied with OPG's recent security performance



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- High level waste (irradiated fuel) is stored at the PWMF
 - The PWMF has sufficient capacity for continued operation of the Pickering NGS until 2026
- OPG is required to update plans for decommissioning at least every 5 years
 - A detailed decommissioning plan for units 1–4 is expected in 2025



Aerial view of Pickering Waste Management Facility
Source: OPG

OPG's waste management program and decommissioning plans are adequate for continued operation until 2026



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CONSULTATION AND ENGAGEMENT WITH INDIGENOUS NATIONS AND COMMUNITIES



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- CNSC staff and the Commission seek to uphold the honour of the Crown and consider Indigenous peoples' potential or established Indigenous and/or treaty rights pursuant to section 35 of the Constitution Act, 1982
- CNSC staff notified and engaged identified Indigenous Nations and communities of OPG's application, this Commission hearing, and the availability of participant funding to support participation
- CNSC staff remain committed to building long-term relationships with Indigenous Nations and communities who have rights and/or interests in CNSC-regulated facilities within their traditional and/or treaty territories



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- The CNSC maintains Long-term Relationship Arrangements (LTRA) with Curve Lake First Nation, Hiawatha First Nation, Mississaugas of Scugog Island First Nation, and the Métis Nation of Ontario
- OPG's application to operate units 5–8 to 2026 has been raised at monthly LTRA meetings since July 2023. Upon request, 4 in-depth discussions have been held
 - CNSC staff received questions on fitness for service of major components
 - CNSC staff heard concerns about capacity with regards to the number of ongoing consultation requests and processes, in general and relating to the Pickering site

CNSC staff continue to consider and respond to all issues and concerns raised



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WHAT WE HEARD



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- A notice of public hearing and participant funding was published on August 8, 2023
- The CNSC awarded \$108,761.48 to 9 applicants to assist with participation in the regulatory process
- The CNSC received 54 interventions in this matter from members of the public, Indigenous Nations and communities, and stakeholders
- Several community organizations and businesses provided examples of OPG's public engagement practices



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- Engagement and collaboration with Indigenous Nations and communities
- Fitness for service of aging reactor components
- Emergency preparedness and response
- Impacts of [climate change](#)
- Frequent changes to the planned end of Pickering NGS commercial operations
- Public availability of information



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CONCLUSIONS AND RECOMMENDATIONS



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- OPG is qualified to perform the activities authorized in the proposed licence
- OPG continues to make adequate provision to protect workers, people, and the environment
- OPG adequately demonstrates the ongoing fitness for service of major components for continued operation
- The programs currently in place at the Pickering NGS are adequate for continued operation to the end of 2026

CNSC staff will continue to verify that OPG operates the Pickering NGS in accordance with all regulatory requirements and operational limits.



CNSC staff recommend that the Commission amend the Pickering NGS licence to:

- Authorize operation of units 5–8 to December 31, 2026
- Increase the pressure tube operating limit to up to 305,000 EFPH
- Remove licence condition 15.3 and include a new licence condition 6.2 related to an enhanced fitness-for-service program for fuel channels in extended operation

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