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**Written Submission from the
Radiation Safety Institute of
Canada**

**Mémoire
d'Institut de radioprotection du
Canada**

In the matter of

À l'égard de

Ontario Power Generation

Application to refurbish Pickering Nuclear
Generating Station and to renew licences
for the Pickering Nuclear Generating
Station and Waste Management Facility

Ontario Power Generation

Demande concernant la réfection de la
centrale nucléaire de Pickering et le
renouvellement de ses permis pour la
centrale et l'installation de gestion des
déchets

**Commission Public Hearing
Part 2**

**Audience publique de la Commission
Partie 2**

October 2026

Octobre 2026



Review of Ontario Power Generation's (OPG's) Application to Renew its CNSC Licence for the Pickering Nuclear Generating Station and Pickering Waste Facility

for

Canadian Nuclear Safety Commission
(Reference: Form number: *PFP 2025 PIC01*)

by

Radiation Safety Institute of Canada



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Report Date: 11 May 2026

Submitted to:

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1 Introduction

1.1 About the Radiation Safety Institute of Canada

Founded in 1980, the Radiation Safety Institute of Canada (RSIC) is an independent, national organization dedicated to promoting and advancing radiation safety in the workplace, in the environment, and in the community. Our commitment to the principle of “good science in plain language”® underpins everything we do. The Radiation Safety Institute of Canada is incorporated under federal statute as a not-for-profit corporation and is also a registered charity (number: 106861511RR001).

The Radiation Safety Institute of Canada offers a broad range of educational, technical, and scientific services to businesses, government organizations, health care providers, communities, and individuals across Canada and around the world. The Institute is known for the high quality and scientific integrity of its work, and the practical and helpful assistance of its staff. The Institute’s independent information service receives hundreds of calls and e-mails every year, for information and assistance on workplace radiation questions.

1.2 Project

The *Radiation Safety Institute of Canada* (Institute) applied for and is to receive funding through the CNSC’s Participant Funding Program (PFP 2025 PIC01). This funding is intended to assist in the review of *Ontario Power Generation’s* (OPG’s) application and associated documents, including CNSC and OPG Commission Member Documents and comment on RSIC’s areas of interest related to the refurbishment of the Pickering Nuclear Generating Station (Pickering NGS), and licence renewal for the Pickering NGS and Pickering Waste Management Facility (Pickering WMF).

This document summarizes the findings and recommendations for the Commission.

1.3 Background:

OPG provides considerable background information regarding the Pickering NGS on its website at [Nuclear power | Pickering Nuclear Station – OPG](#). OPG also provides background information on the Pickering WMF (and its other WMF) at [Nuclear waste, isotopes & decommissioning | Managing nuclear waste today – OPG](#).

Note that there are other, public, sources of information such as newspaper reports.

1.3.1 Pickering NGS: OPG info

OPG notes that Pickering NGS “is one of the largest nuclear stations in the world and has been safely and reliably providing Ontario with power for decades...features five operating CANDU® reactors (CANadian Deuterium Uranium), and accounts for approximately 10% of Ontario’s electricity needs, while generating power that is virtually emissions-free.” OPG has included

links to important documents including its “*Predictive Environmental Risk Assessment for Pickering Refurbishment, Decommissioning, and Continued Operations*” (P-REP-07701-00014 R000, 2025-04-07) and posted them on its website. This was downloaded by the RSIC for review as background information for the application.

1.3.2 Pickering WMF: OPG info

OPG notes that the Pickering WMF is located at the Pickering NGS (which helps explain the desire to consolidate the two existing licences). The used fuel bundles from Pickering are stored there along with some intermediate-level materials from previous work on the reactors. This facility would support the proposed refurbishment work.

1.3.3 Public Sources of Background Information

An opinion piece article in the *Globe and Mail* (24 Feb 2026) contends that the cost of adding new Nuclear plants and refurbishing old plants at Pickering (“\$26-billion refurbishment of Pickering B”) will lead to electricity costs that are double to triple today’s cost. The author suggests that such projects may not be in Ontario’s best interests and that a “serious, objective and independent assessment of its energy options” is needed. Another article in the *Globe and Mail* (18 April 2026) decried the cost and long-time scale required to build Nuclear Plants and suggested other generating methods (e.g., solar, wind) were quicker to build and less costly. Concerns about safety due to the aging of components (particularly pressure tubes containing fuel bundles) at the Pickering NGS were described in an earlier *Globe and Mail* article (11 Oct 2024).

2 Review of Documentation Related to Licence Application

The Institute downloaded the following files from the related CNSC website (<https://www.cnsccsn.gc.ca/eng/the-commission/hearings/cmd/>) on 1 May 2026:

June 23, 2026 public hearing

Published on March 9, 2026

- [Ontario Power Generation - Supplementary information to the Application: Update on Indigenous Engagement Activities \(PDF, 10 pages, 271 KB\)](#)

Published on January 22, 2026

- [Revised Notice of Public Hearing and Participant Funding – OPG’s Application to refurbish the Pickering Nuclear Generating Station and renew its Pickering Nuclear Generating Station and Waste Management Facility licences \(PDF, 5 pages, 112 KB\)](#)

Published on August 5, 2025

- [Ontario Power Generation - Application to renew Pickering Nuclear Generating Station Power Reactor Operating Licence and Pickering Waste Facility Operating Licence \(PDF, 354 pages, 8.27 MB\)](#)

Published on July 21, 2025

- [Notice of Public Hearing and Participant Funding – OPG’s Application to refurbish the Pickering Nuclear Generating Station and renew its Pickering Nuclear Generating Station and Waste Management Facility licences \(PDF, 4 pages, 112 KB\)](#)

2.1 Overview of Application

As noted in the application, OPG is requesting a 10-year licence renewal from January 1, 2027 to December 31, 2036. Although OPG’s current licences do not expire until 31 August 2028, OPG is requesting an early renewal of these licences to “align with the projected Pickering NGS refurbishment and decommissioning schedules”.

The key activities for this licence period are “During the requested licence term, OPG plans to refurbish Pickering NGS Units 5 to 8 for continued operation and to progress decommissioning of Pickering NGS Units 1 to 4.” OPG is also asking for “renewal of the licensed activities authorized under the Pickering Waste Management Facility (PWMF) Waste Facility Operating Licence (...) and consolidation of these licensed activities with the Pickering NGS PROL”. So, instead of the current separate licences for the waste facility and the reactors, there would just be one licence. The two types of activities (i.e., operating power plants and operating a waste facility) do not necessarily have the same type of radiation protection requirements, but, as the two are operated on adjacent spaces by the same company, the regulatory burden may be reduced or simplified by this consolidation.

The application appears to be complete. Data of interest is discussed below.

2.1.1 Environmental Radiological Monitoring

It is stated that “OPG’s comprehensive environmental protection programs aim to continually minimize impacts from station operation on the environment and human health. This is achieved by ensuring that there are multiple barriers in place to control and minimize emissions to the environment and to ensure all emissions are monitored.”

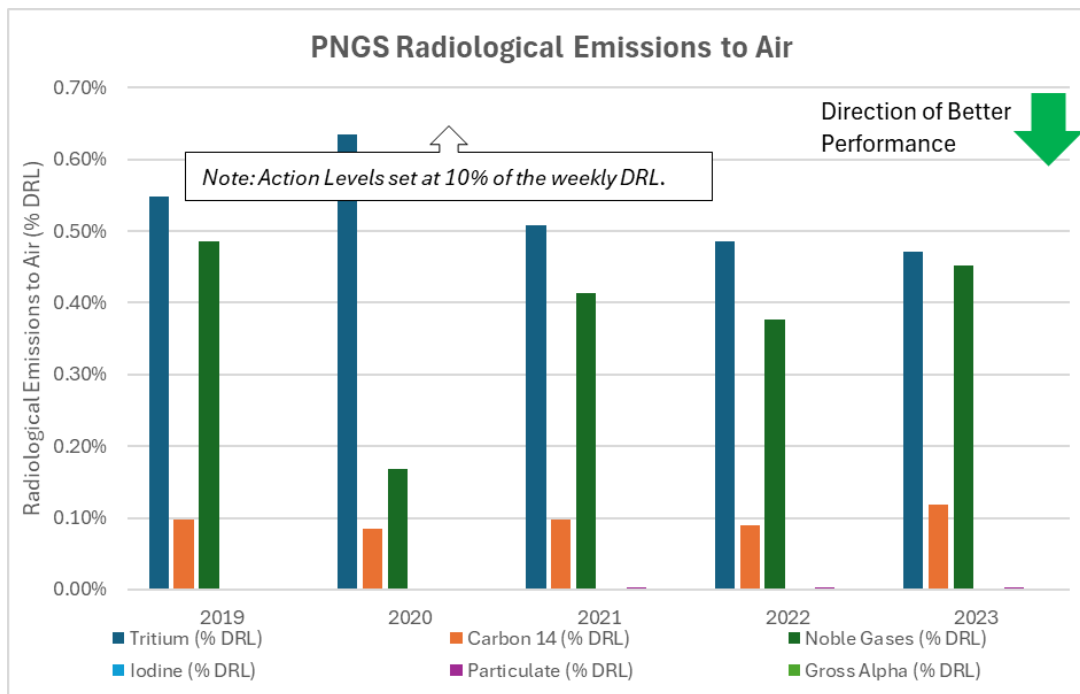


Figure 1 Pickering Nuclear Generating Station Air Emissions. The "DRL" is the derived release limit". Emissions have been well below levels of concern

Radiological emissions to the atmosphere as measured by OPG have been minimal and of no concern to human health.

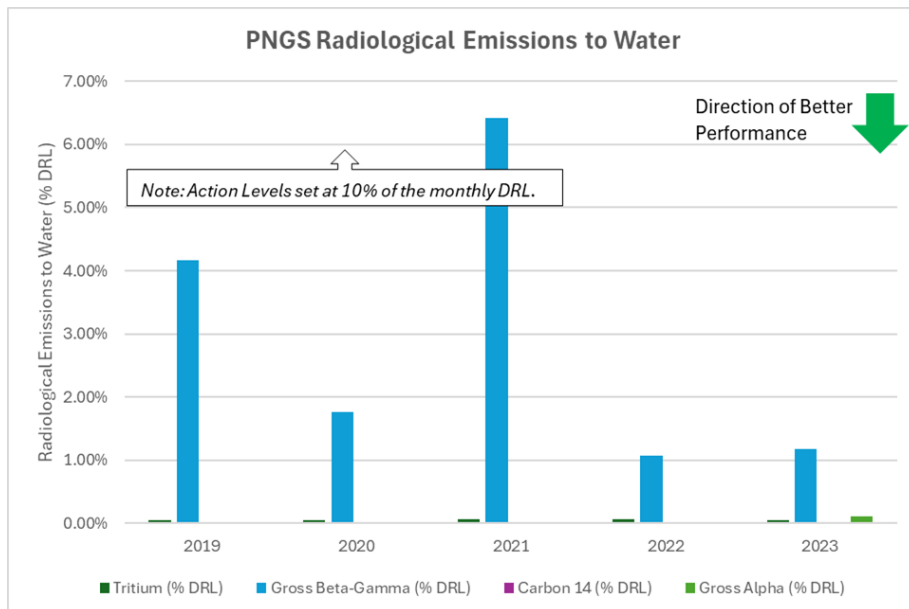


Figure 2 Pickering Nuclear Generating Station emissions to water as % of DRL. The percentages are higher than the air emissions, but still well below levels of concern

Radiological releases to water measured by OPG have also been very low and are of little or no concern to human health.

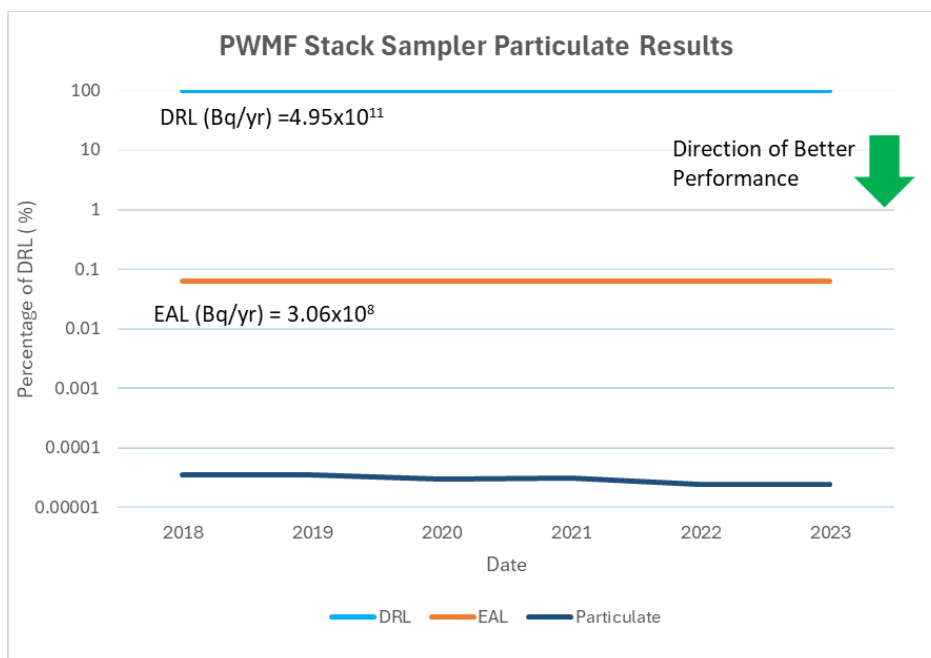


Figure 3 Waste Management Facility airborne particulates from stack monitor. As there have been no significant emissions and no reason to believe this will change, stack monitoring has been ended for this location as of 2024.

While the figures above show no annual exceedances, *“there were four monthly EAL exceedances for radiological emissions to water (for gross-beta gamma), the majority of which were attributed to sediment entrainment from the Lake or laboratory sample contamination. There was also one monthly DRL exceedance (for gross-beta gamma), which was attributed to the accumulation of lake sediment and not due to station operations. In addition, during the 2018 to 2024 licensing period, EAL for sewage gross beta-gamma was exceeded four times. These exceedances did not impact the health of the public or the environment and were investigated fully. Efforts continue to prevent recurrence”*.

Any monthly exceedance of an environmental action level (EAL) is of concern to RSIC. The statement “efforts continue to prevent recurrence” is *not* completely reassuring. **OPG should indicate what active steps they have taken or plan to take to prevent recurrence.**

2.1.2 Radiation Dose Monitoring

OPG notes that perimeter dose monitoring in 2024 averaged 0.11 $\mu\text{Sv/h}$. If one assumes a maximum occupancy per year at the perimeter of 2000 hours (i.e., a very conservative assumption) this would result in 0.22 mSv/y. OPG cites a dose rate at the boundary of 0.5 $\mu\text{Sv/h}$ as resulting in the “public limit” of 1 mSv/y. However, meeting the 1 mSv/y public limit does not correspond to an ALARA approach. As noted in CNSC REGDOC-2.7.1, *Radiation Protection*, the point at which no additional analysis is required to prove a licensee is meeting ALARA is when “doses to individual members of the public are unlikely to exceed 50 μSv per year” which corresponds to 0.05 mSv per year. The above calculated 0.22 mSv/y for the public (using 2000 h of public exposure per year) is above this ALARA threshold. It would make sense, therefore, for OPG to show that, based on an actual expected occupancy at the boundary, this 50 $\mu\text{Sv/y}$ is unlikely to be exceeded.

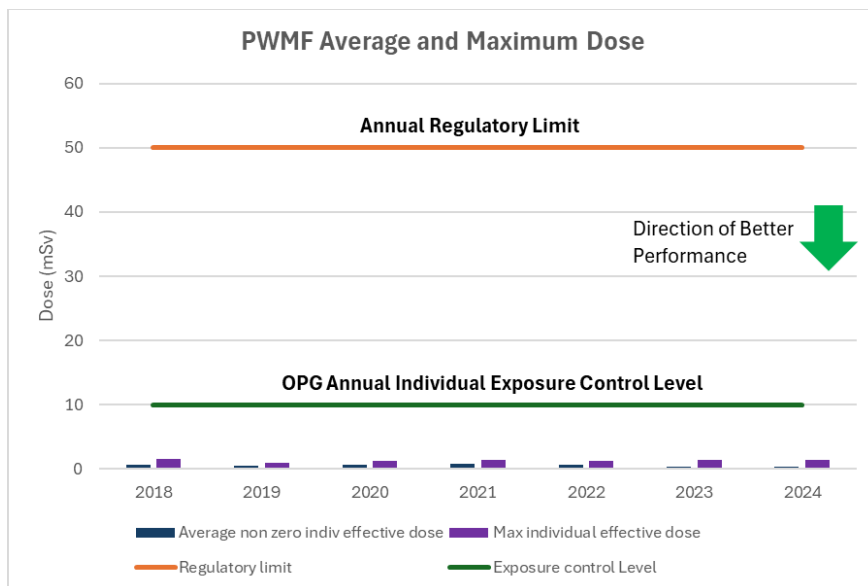


Figure 4 Data from the application indicates that individual effective doses have been low. However, they also suggest that the OPG annual individual exposure control level is set too high to be of benefit in driving ALARA

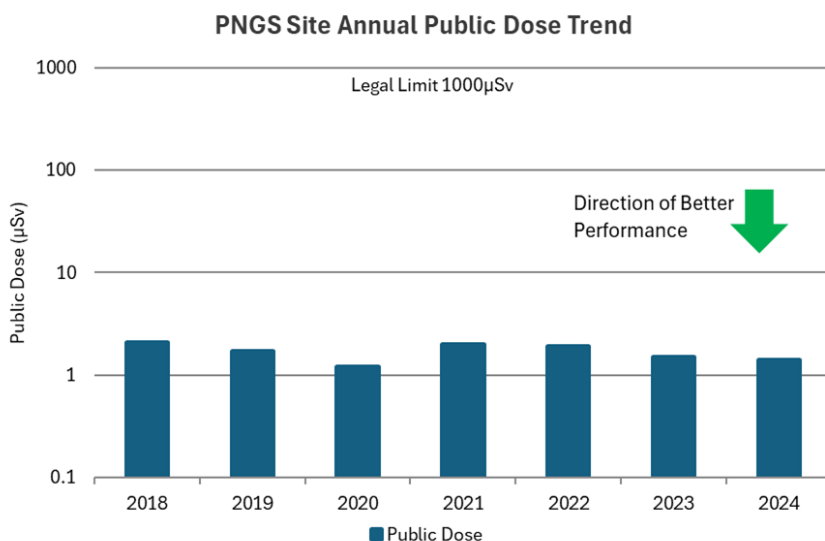


Figure 5 Pickering Nuclear Generating Station annual public dose

The values shown in Figure 5 above are reassuring that off-site air, water, fish, fruits, vegetables, animal feed, soil, etc. are not being significantly contaminated with radioactive materials. However, the values in this table are somewhat misleading, as they do not appear to include the potential dose to the most exposed member of the public from perimeter dose monitoring.

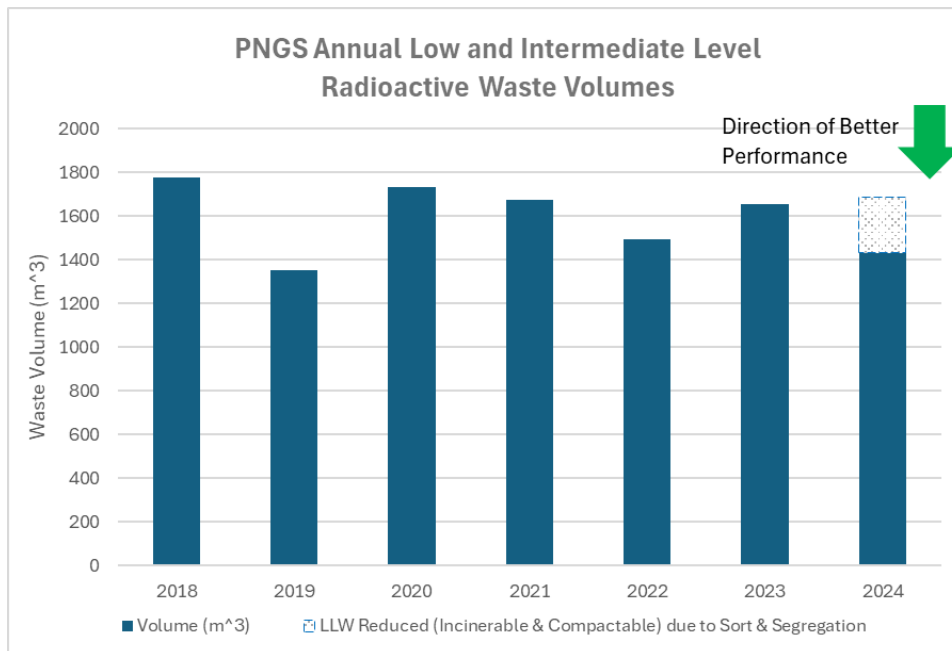


Figure 6 Pickering Nuclear Generating Station low and intermediate level radioactive waste produced annually

As seen in the figure above, the generating station produces a significant volume of waste. 2024 did see a reduction in overall volume due to a “sort and segregate” program. While a good thing, it would be appropriate for OPG to indicate the additional dose to workers required to carry out the sort and segregate procedures.

2.2 CNSC-based information

CNSC staff did not post a document containing CNSC staff comments on OPG’s Pickering NGS and Pickering WMF’s application as of the time of this review. However, there is information available on the CNSC website, which RSIC reviewed.

As stated on the CNSC website, the CNSC has full-time staff at the Pickering NGS. They conduct inspections to evaluate operations and verify that regulatory requirements and licence conditions are followed.

A related document that is available on the CNSC website provides information on the CNSC staff assessment (i.e., “Record of decision for the Application to Extend the Operation of the Pickering Nuclear Generating Station Units 5 to 8 until December 31, 2026”). This document includes relevant information on OPG’s performance in “Safety and Control Areas” (SCAs).

In that document, CNSC staff “reported that OPG’s performance was “satisfactory” in all SCAs over the licence period, with the exception of the security SCA, which was “below expectations” for 2021 and 2022.” In addition, during the most recent licensing period it was noted “... that findings of non-

compliance made by CNSC staff were of low or negligible safety significance, and that OPG had implemented satisfactory corrective actions to address them."

We have summarized CNSC staff findings and RSIC comments for the SCAs in the table below

Table 1 CNSC staff findings during recent licensing period and RSIC comments for SCAs

SCA	CNSC	RSIC comment
Management System	Findings of non-compliance made by CNSC staff were of low or negligible safety significance, and OPG had implemented satisfactory corrective actions to address them.	None
Human Performance	CNSC staff made findings of non-compliance during the, including OPG's report of a small number of minimum shift complement violations to the CNSC. CNSC staff noted that the findings were of low or negligible safety significance.	Not meeting the minimum shift complement is of potentially significant concern, given the relatively small number of appropriately trained individuals for some positions.
Operating Performance	CNSC staff made findings of noncompliance related to the Safe Operating Envelope (SOE). CNSC staff noted that it was satisfied with OPG's corrective actions.	Again, noncompliance in SOE matters is of potential concern.
Safety Analysis	No major concerns were identified by CNSC staff	None
Physical design	Physical design adequate for continued operation	None
Fitness for Service	CNSC staff expected OPG to augment its major component condition assessments, particularly for pressure tubes, through additional inspections, research and development activities, and analysis to further understand and control aging mechanisms.	The issue of aging components in a relatively old NGS is of significant concern. OPG and the CNSC must take this issue extremely seriously.
Radiation Protection	Inspection findings of noncompliance were of low or negligible safety significance; OPG reported one action level exceedance for a dose to a Nuclear Energy Worker (well below the regulatory limit).	All Action Level exceedances are of concern.

SCA	CNSC	RSIC comment
Conventional Health & Safety	Findings of non-compliance in the conventional health and safety SCA were of low or negligible safety significance, and OPG was found to have taken appropriate corrective actions to address the findings.	None
Environmental Protection	Radiological and non-radiological releases from the PNGS were below established limits and posed no risks to human health and the environment.	As expected.
Emergency management and fire protection	Non-compliance related to the maintenance of fire emergency response equipment and the utilization of fire fighting equipment and tools. OPG had implemented corrective action plans to address these non-compliances.	This is an issue of concern. It is crucial that OPG be prepared to deal with an initial response to any such emergency.
Waste Management	Findings of noncompliance of negligible safety significance; OPG had adequately addressed findings.	None
Security	Findings of non-compliance in both 2021 and 2022; failure to meet all applicable regulatory requirements across multiple areas of the security SCA. The CNSC issued an Administrative Monetary Penalty to OPG as a result of a failure to comply with a licence condition in relation to its security program at the Pickering and Darlington Nuclear Generating Stations. OPG implemented adequate corrective actions. CNSC staff increased its regulatory scrutiny and observed notable improvements in OPG's performance.	Details of security issues are, naturally, not provided. However, this is a potential issue, and OPG must ensure it meets security requirements. CNSC staff must be sure that OPG will meet those requirements.
Safeguards and non-proliferation	Met requirements.	None
Packaging and transport	Met requirements.	None

2.2.1 CNSC Independent Environmental Monitoring Program: Pickering nuclear site

The CNSC provides results from monitoring in 2017, 2021 and 2025. Brief summaries are provided below. The figure below shows the approximate locations of sampling.

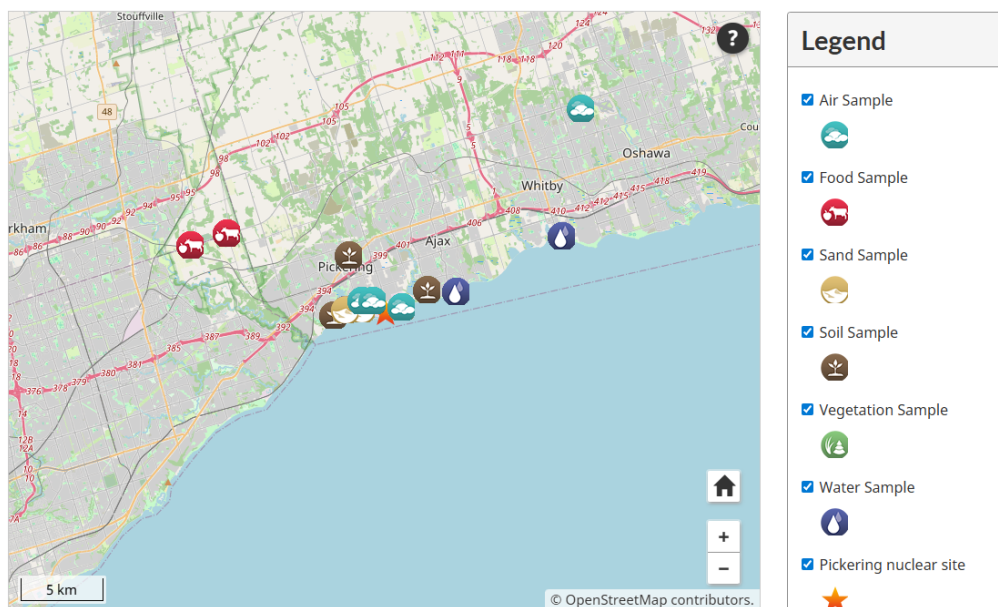


Figure 7 CNSC IEMP sampling locations near Pickering Nuclear Power Generating Station

2.2.1.1 2017

Samples were collected in publicly accessible areas outside the Pickering site perimeter and included air, lake water, soil, sediment and sand, grass and wild vegetation, and food such as milk, fruit and vegetables from a local farm near the Pickering site. The results indicate that no health impacts are expected at this dose level.

2.2.1.2 2021

Air, water, soil, sand and vegetation samples were collected in publicly accessible areas outside the facility perimeter. The levels of radioactivity and hazardous substances measured were below available guidelines and CNSC screening levels. No effects on human health are expected.

2.2.1.3 2025

The CNSC collected air, water, soil, sediment, sand, and vegetation samples in publicly accessible areas outside the facility perimeter. Once again, the levels of radioactivity measured in the samples were below available guidelines and CNSC screening levels. No effects on human health are expected.

In one lake-water sample in 2025, the most restrictive guideline for aluminum was exceeded. The guideline was established for the protection of aquatic life given long-term (chronic) exposures. Previous results at this sampling location, and the 2025 data at other nearby

sampling locations, indicate that chronic exposure of aquatic receptors and potential adverse effects are unlikely. This elevated level of aluminum was well below another applicable guideline, that of the maximum acceptable concentration for drinking water. Therefore, no adverse effects on human health are expected. Elevated concentrations of aluminum and other metals measured in water cannot be exclusively attributed to the OPG facility.

Measurements conducted by the IEMP to date have consistently found levels of radioactivity in the environment to be low, and well within the range of natural background radiation levels.

2.2.2 CNSC website on Pickering site

2.2.2.1 Regulatory Action – Ontario Power Generation Inc - AMP

In 2023, the CNSC issued an administrative monetary penalty (AMP) of \$21,790 to Ontario Power Generation Inc. (OPG) with the following information:

“This AMP is being issued to OPG as a result of a failure to comply with a licence condition in relation to its security program at the Pickering and Darlington nuclear generating stations. The AMP is to promote compliance and deter recurrence.

All other information on the reasons for the AMP is considered confidential and cannot be published.”

Any AMP issued to a licensee is a serious matter. The purpose of the AMP system is to create an additional enforcement tool to ensure compliance with the nuclear regulatory requirements.

2.2.2.2 Neutron radiation from refurbishment waste containers

Pickering NGS was one of the sites with potential exposures to workers from unexpected neutron radiation emanating from waste containers. The CNSC requested an investigation and response regarding potential worker dose.

Investigations concluded the neutron radiation is caused by the presence of Californium-252 (Cf-252), a spontaneous fission neutron source. This isotope was determined to be formed in the pressure tubes and calandria tubes (Zr-alloy) due to trace amounts of Uranium-238 undergoing multiple neutron captures during decades of operation inside the CANDU reactor cores. *There were negligible such sources at the Pickering site.*

Fortunately, there were no significant doses to workers in Pickering, but the fact that Pickering NGS and other NGS were unaware of this radiation source underscores the complexity of running a radiation safety program at such a facility.

3 Discussion

Given the information that was available, the reviewer did not find any obvious reasons not to approve OPG's application.

The consolidation of the two licences is reasonable, given that the same overarching radiation safety program governs both, which will reduce some paperwork duplication.

It should be noted that the refurbishment is of interest to the public, as can be seen by various online articles. As such, the public relations aspect is going to be important going forward and should be considered by the CNSC when examining the licence renewal. Attention should be paid to potential issues that may arise due to the aging of components, and the plan to ensure that they are adequately monitored.

We suggest that OPG's Annual "Exposure Control Limit" be lowered, following the principle of "ALARA". Right now, it is set at 10 mSv/year, which we believe is too high to be useful in encouraging an ALARA approach to worker dose. Similar logic applies to controlling the annual dose for members of the public at the facility perimeter. OPG indicated their boundary dose limit was to maintain public doses at the site boundary to 1 mSv/y from external dose rates. We suggest that OPG should adjust their dose rate limits at the site boundary, to limit doses to members of the public to no more than 0.3 mSv/y, a common public dose constraint used internationally, recommended by the ICRP, and which is recognized by the CNSC, aiming to ensure that the total public dose remains well below the statutory limit. OPG's reported average dose rate in 2024 is below this, so adjusting their requirement should not adversely affect operations.