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Oral presentation

Written submission from the Society of United Professionals

In the Matter of the

Ontario Power Generation Inc.

Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31, 2026

Commission Public Hearing

June 2024

Exposé oral

Mémoire de la Society of United Professionals

À l'égard d'

Ontario Power Generation Inc.

Demande visant à prolonger l'exploitation des tranches 5 à 8 de la centrale nucléaire de Pickering jusqu'au 31 décembre 2026

Audience publique de la Commission

Juin 2024

Canada

Re: Authorization to Operate Pickering NGS Units 5 to 8 Beyond December 31, 2024
Public Hearing 2024-H-05

The Society of United Professionals represents over 9,000 engineers, scientists, supervisors, and other professionals in Canada's energy and legal sectors. As an organization, we have represented professionals for over 70 years.

The Society represents employees working for a dozen different employers in the electricity sector, including Ontario Power Generation, Bruce Power, Nuclear Waste Management Organization, Hydro One, the Independent Electricity System Operator, the Ontario Energy Board, Toronto Hydro, Kinectrics, and the Electrical Safety Authority.

Our members work in every aspect of the electricity industry. They are involved in generation, transmission and distribution of electricity, management of the electricity system, regulation and enforcement of standards, and management of the electricity market. They are employed as first-line managers and supervisors, professional engineers, scientists, information systems professionals, economists, auditors and accountants, as well as many other professional, administrative, and associated occupations.

The Society's members are knowledge workers who take great pride in exercising their civic, social, and professional responsibilities. As a union, we stand behind our members' professionalism, integrity, and commitment to excellence in all areas, particularly workplace safety, public health, and environmental sustainability.

Advocating for safe and healthy operation of our nuclear workplaces is one of the Society's highest priorities as a union. Our members work inside of, and in close proximity to, nuclear facilities, and they are among the first in harm's way if the highest standards of safe operation, and occupational health and safety are not adhered to. They and their families are residents of Clarington and Durham and Port Elgin and they are very conscious of the importance of ensuring a safe and healthy environment in the areas where they live.

The Society is grateful for the opportunity to submit to the CNSC on the request for authorization from OPG to engage in commercial operations at the Pickering Nuclear Generating Station (PNGS) Units 5 to 8 beyond December 31, 2024.

The Society engaged a third-party consultant – Paradymshyft Nuclear Advisory Ltd – to provide an opinion on OPG's application to extend commercial operation of PNGS Units 5-8 beyond 2024.

Paradymshyft Nuclear Advisory Ltd.'s President, Robin Manley, has 35 years of experience in the nuclear sector, including as Vice President of New Nuclear Development, and VP of Nuclear Regulatory Affairs, at Ontario Power Generation. Robin has also previously served as a CNSC-certified Senior Health Physicist, Radiation Protection Manager, and Licensing Manager. Robin has led or supported licensing applications for five nuclear power plants and three nuclear waste sites.

Paradymshyft Nuclear Advisory's full report has been included with this submission.

Paradymshyft Nuclear Advisory Ltd.'s report offered the following conclusions, in support of their assessment that OPG's application to operate PNGS Units 5-8 until December 31, 2026 should be granted:

- OPG's PNGS 5-8 performance over the last number of years has been very strong, amongst the best ever in the history of the plant;
- OPG's safety culture is robust and effective to maintain continued safe operations of the plant for the requested period;
- OPG has demonstrated the ongoing safety and robustness of major components including fuel channels, for the requested licence period;
- OPG has management systems and programs in place to support contained operation in a way that will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed;
- CNSC staff have evaluated OPG's submissions as well as its past PNGS 5-8 performance and recommend approval of OPG's application;
- CNSC staff's independent inspection programs provide the Commission, and Canadians generally, assurance that OPG operates the plant per regulatory requirements, and CNSC takes actions as necessary should issues arise.

The Society, having reviewed the third-party assessment, supports the conclusions of the report, and submits that the license application by OPG to operate PNGS Units 5-8 beyond December 31, 2024 should be granted.

Sincerely,

Michelle Johnston
President
The Society of United Professionals

Paradymshyft Nuclear Advisory Ltd

Pickering Power Reactor Licence to Operate to Dec 31, 2026

A report to the Society of United Professionals

April 19, 2024

Pickering Power Reactor Licence to Operate to Dec 31, 2026

Executive Summary

Ontario Power Generation (OPG) has requested that its existing Power Reactor Operating Licence be extended for the Pickering Nuclear Generating Station (PNGS) Units 5-8 to Dec 31, 2026. In evaluating such an application, the CNSC Commission is required to consider whether the licensee (OPG) is qualified and will protect safety and the environment. At the request of the Society of United Professionals we have reviewed the CNSC regulatory requirements as well as submissions by both the licensee and CNSC staff, and we wish to highlight in this submission the reasons why this licence application should be granted.

OPG in its application and CMD has outlined its robust nuclear management system which ensures safety of the public, workers and the environment. OPG has documented policies, programs, procedures, standards and processes for the operation, maintenance, inspection and control of its PNGS. These, along with an established safety culture, provide the foundation for the demonstrated excellent performance of the PNGS as well as the basis for future strong performance meeting regulatory requirements.

The CNSC has established regulatory and technical requirements documented in Regulations and Regulatory Documents (REGDOCs). These requirements identify the conditions which must be met, in detail, in order to satisfy the overarching requirements of the Nuclear Safety and Control Act. OPG's application and CMD, and CNSC staff's CMD, identify how OPG has met these requirements in the past, and is confidently expected to meet these requirements throughout the requested licence period.

In addition to OPG's own internal processes to ensure safe operation of the PNGS, CNSC staff continuously inspect and monitor OPG's programs and performance to ensure regulatory requirements. In the occasional event where performance deviates from CNSC expectations, CNSC staff issue a variety of corrective measures to OPG (as with other licensees) to ensure performance continues to meet safety and regulatory requirements.

In conclusion, OPG meets the requirements for a continued operating licence through Dec 31, 2026.

Pickering NGS has been safely operated and continues to be maintained to the necessary regulatory standards. Excellent performance over the last number of years is a strong indicator of performance through the requested licence period.

OPG has demonstrated the ongoing safety and robustness of the Pickering NGS plant through the requested licence period, and has operation, maintenance, inspection, and control processes in place to ensure safety of the public, workers and environment.

In addition to OPG's own programs that ensure safety, CNSC staff maintain independent inspection and monitoring processes to ensure safety and drive corrective actions if necessary.

Requirements to be granted a power reactor operating licence

The fundamental requirements for a licence to be granted, per the Nuclear Safety and Control Act (Ref 1) are that:

> "No licence shall be issued, renewed, amended or replaced – and no authorization to transfer one given – unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee
> (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and
> (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed."

In the following sections, we will provide a summary of evidence that OPG meets both of these requirements - a) that it is qualified, and b) that will make adequate provisions to ensure safety.

We will start with a discussion of those two specific areas (qualification and safety) and then move on to a discussion of how OPG meets key technical regulatory requirements (important to safety and protection of the environment) such as validation of the plant condition and fitness for service of the PNGS 5-8 plant. Next we highlight key findings of CNSC staff in their review of OPG's application (Ref 2) and documented in the CNSC CMD. We then wrap up with a discussion of how the nuclear industry generally, and OPG specifically, employs its issues identification and corrective action program to drive for continuous improvement, including the role played by the World Association of Nuclear Operators to drive for best practices and, more directly relevant to the licence application, the role of the CNSC as nuclear regulator to independently inspect and monitor safety.

OPG has demonstrated it is qualified to continue to operate the PNGS 5-8 plant for the requested period

The strongest predictor of future performance is recent past performance. Given that OPG has maintained for many years a stable nuclear management system (policies, programs, procedures etc) and a consistently strong nuclear safety culture, there is every reason to believe that recent past performance of the PNGS will be maintained throughout the requested licence period to the end of 2026. Examples of that strong PNGS performance as documented in OPG's supplemental CMD (Ref 3) follow:

- Electricity Generation in 2023 - highest since 2019 (which was itself amongst the highest in the history of the plant)
- Equipment Reliability - performance has been improving through the last licensing period (see Ref 3 Figure 1) - and if one goes back to the 2018 PNGS relicensing documentation (Ref 8), one can see that it had been improving in the years up to 2018 as well. In other words - despite the numerical age of the plant, the PNGS 5-8 plant is in amongst its best condition ever, based both upon its reliability (electricity generation) and upon key industry-wide performance metrics.

- Likewise, fuel handling equipment reliability and forced loss rate indicators have continued to improve and been amongst the best in station history over the last several years.
- Maintenance backlogs - the backlog of plant maintenance is a topic that has been discussed in all recent nuclear power plant relicensing Hearings, and often if not always at Commission NPP Regulatory Oversight Report meetings. At the last PNGS relicensing Hearing, OPG showed considerable improvement in this area yet the Commission noted (see Ref 7 para's 282-287) that there was still opportunity to improve. In OPG's supplemental CMD for this Hearing (Ref 3, Figure 3) one can see clear evidence that OPG has done exactly that - continued to improve, and very impressively.
- The longest 6-unit run (without any outages) in the history of the 6 unit station (see Ref 2).

This kind of performance improvement does not happen by accident - it requires many factors to be brought to bear including plant leadership setting expectations for excellent performance, the right management systems and processes, driving human performance and continuous improvement, nuclear professionalism of staff, continued company financial investment in plant equipment, and many others. Independent oversight, including by the CNSC and the World Association of Nuclear Operators, contributes to achieving higher levels of performance (see more on this point in a later section).

Key Facts that Demonstrate OPG's Safety Case for the requested licence period

OPG's licence application and CMD provide extensive examples over the last licence period of how it has made, and will continue to make, adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. We cannot practically summarize them all here, but rather provide key illustrative examples as evidence to grant a licence for the requested period.

From OPG's licence application (Ref 2):

- During the past licensing period OPG has completed various safety upgrades such as Phase 2 Emergency Mitigation Equipment to provide additional emergency back-up power supplies to important containment equipment.
- OPG continues to maintain radiation releases far below (approximately 0.2% of) the regulatory limits, providing evidence of a strong safety culture that wherever possible OPG will do better than the regulatory requirements. Investments have been made in vapour recovery dryers and other means to further reduce tritium emissions to the environment.
- OPG has completed an extensive assessment of Defence in Depth per CNSC requirements and aligned to those of the International Atomic Energy Agency (IAEA), as described in Section 4.1.2.1 of Ref 2, which confirmed that Pickering NGS design and operation have adequate and effective barriers in all applicable levels of defence-in-depth and that significant improvements to barriers have been implemented.
- OPG has updated its Probabilistic Safety Assessment (PSA) based on the most current analytical models and Environment Canada data, showing that the plant is better than all the Safety Goals.

- OPG has completed an updated Environmental Risk Assessment which confirmed that the PNGS is being operated in a way that is protective of the public and the environment.
- Additionally OPG has recently completed an update to the Predictive Effects Assessment which does a similar assessment but in a forward-looking way, to show that continued operation of PNGS 5-8 though 2026 has no predicted adverse effects.

OPG's supplemental submission updates its licence application with additional details and updated information that became available after the application was filed. For example, some key indicators of safety performance that further illustrate OPG's safety case and qualification for the requested licence period are as follows (Figure references are to Ref 3):

- Radiation Protection performance - worker dose has been better than target each year of the last licence period (see Figure 4).
- Conventional worker safety - Accident Injury Rate trending down (see Figure 5) and PNGS has had 5 consecutive years with no lost time injuries.
- Safety corrective actions completed on time (with no extensions) - 100% since the metric was introduced in 2018.

OPG meets CNSC Technical Requirements for a Licence through the requested period

This intervention does not purport to outline the complete technical requirements for obtaining a CNSC licence (see OPG's and CNSC's submissions). However, we have identified below a few particularly key technical requirements which must be met, and which regularly feature in CNSC relicensing Hearings, and we provide our perspective on the evidence in each case.

Fuel Channels (pressure tubes)

One of the most important technical points related to OPG's application pertains to the fitness for service - longevity, robustness and overall safety - of the pressure tubes (fuel channels) in the PNGS 5-8 reactors. This matter is discussed in depth in OPG's submissions e.g. Ref 2 in section 4.1.3.2 and Ref 3 in section 5 and Appendix A.

We do not claim to present a detailed technical understanding of pressure tube life and aging effects. Instead, we draw your attention to the extensive and ongoing inspection, R&D and analysis programs undertaken by OPG and its partners for over a decade, the results of which are extensively described in OPG's application and updated in OPG's supplemental CMD. In summary, OPG submitted evidence that fitness for service of the PNGS 5-8 fuel channels for operation through Dec 31 2026 has been established.

CNSC staff in Ref 4 (see section 4.6) have concurred, and have also proposed a new Licence Condition for OPG to implement and maintain an enhanced fuel channel fitness for service program. CNSC staff's conclusion on this topic is contained within their overall conclusion on OPG's licence application, at the end of their Executive Summary (Ref 4):

> *"CNSC staff conclude that OPG has adequately demonstrated, in accordance with regulatory requirements, the fitness for service of major components, including fuel channels, feeders, and steam generators, at the Pickering NGS for continued operation of units 5–8 until the end of 2026. CNSC staff also conclude that OPG remains qualified to carry out the activities authorized in its licence and will continue to make adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security. Therefore, CNSC staff recommend that the Commission amend OPG's PROL to authorize OPG to operate Pickering NGS units 5–8 to December 31, 2026, and increase the pressure tube operating limit from up to 295,000 EFPH to up to 305,000 EFPH."*

This new Licence Condition appears to us a practical balance that recognizes the evidence of robust fitness for service presented by OPG, while also ensuring an ongoing in-depth program of inspection, monitoring, analysis and reporting. Similar to this point, in our review of materials for this submission, we noted in CNSC's CMD (Ref 4) that the Commission has directed that an update on pressure tube R&D work be presented at each Commission meeting during the status report on power reactors. This also seems to us a worthwhile step to ensure continued focus on this important topic.

We would additionally like to draw your attention to pressure tube aging matters discussed in previous CNSC Commission Hearings for the relicensing of the Pickering NGS, over the last decade or so. The safety, robustness and lifetime of the pressure tubes has been discussed in front of the Commission on numerous occasions. These discussions have also discussed the case of "what if" the safety case for the pressure tubes were wrong, and one failed, either with a leak or "catastrophically" (it is not credible that more than one fails simultaneously due to aging effects). It is beyond the scope of this present document to explain the impact in detail, but for anyone wishing to understand the matter, the transcripts of those previous Hearings (see e.g., Refs 5, 6) document how the CANDU reactor design, including the PNGS reactors, has defence in depth in place to detect and mitigate such an event, including to control, cool and contain; that is, to shutdown the reactor rapidly; to provide emergency cooling water to protect the fuel from melting; and to contain any small amounts of radiation released from the reactor core through the pressure tube leak or rupture. In essence, even if a pressure tube failed, the consequences would be only economic. No significant safety consequences would arise. A summary of the 2018 Hearing discussion on this topic is available in the detailed Record of Decision (Ref 7) on the CNSC website where it says in para 314:

> *314.* " *In regard to the potential consequences if a leak was not detected and a pressure tube ruptured, CNSC staff explained that this type of event was considered to be a DBA* [noted added: Design Basis Accident]. *CNSC staff also explained that a pressure tube rupture was addressed in the Pickering Safety Report and that OPG had adequately demonstrated that it would be able to shut down the reactor safely and contain any releases should such an event occur. The Commission is satisfied on this point.* "

<u>Completion of an updated Periodic Safety Review</u>

As described in Refs 2-4 (see eg Ref 2 section 4.1.3.1), a Periodic Safety Review (PSR) to assess the condition of the plant, on a 10-year interval, is a requirement for renewal of a power reactor operating licence. For this

requested 2-year licence, OPG has re-assessed the validity of the previous PSR and concluded that the current plant design, component condition, processes, operation and nuclear management system will ensure continued safe operation to the end of Dec 2026. CNSC staff have independently reviewed OPG's findings and have concurred. OPG has updated existing actions and incorporated them into its Integrated Implementation Plan (IIP), where they will be tracked and monitored by CNSC staff as per existing and effective practices.

A good example of such an IIP action is shown in CNSC's CMD (Ref 4) in section 4.4.2 where there is a discussion under Deterministic Safety Analysis of how OPG is required to continually update its safety case, showing adequate margin in its safety analysis throughout the proposed licence period:

> *"...In March 2023, [28] OPG submitted the safety analysis for the impact of aging on safety margins for small loss of coolant accident, loss of regulation, and loss of flow for reactor operation until April 2025. CNSC staff were satisfied with OPG's safety case and agreed that the analysis demonstrates that there is adequate safety margin. OPG has committed to update this analysis to account for the proposed operation until the end of 2026 by December 2024, and this commitment has been included in the PSR2-B IIP."*

Based on our experience reviewing previous PSR's conducted at OPG, the process used for this updated PSR appears consistent. The processes for performing a PSR and creating an IIP have been proven at all Canada's nuclear generating stations (including PNGS 5-8) and have been demonstrated effective in the past, so there is every reason to believe they will continue to be effective for the requested licence period.

Maintaining currency to Regulatory requirements

One of the crucial requirements for maintaining long-term operation of a nuclear power plant is completion of a Periodic Safety Review (discussed above). Another is to update the plant's licensing basis to comply with current regulatory documents, codes and standards. Doing so ensures that improvements to safety and implementation of operating experience is fundamentally integrated into the licensee's processes. Evidence that this is continually being done is shown in section 7.0 of OPG's supplemental CMD (Ref 3).

A related and important point, discussed briefly in CNSC's CMD (Ref 4), e.g., in section 4.4.2 in Management of Safety Issues, is that both CNSC and OPG continue to maintain research and development (R&D) programs to continually advance the science and knowledge of these reactors. OPG does this, at least in part, through participation in the CANDU Owners' Group (COG) R&D programs where Canadian and other international CANDU reactor operators share operating experience, R&D funding, and results.

Sufficient trained and qualified staff

OPG has for decades maintained a wide complement of skilled staff with a high standard of technical expertise to operate its nuclear power plants including PNGS 5-8. Many of these dedicated and experienced workers are represented by the Society of United Professionals. It is important to note that prior to the recent decision by the Ontario Provincial Government to proceed with PNGS 5-8 refurbishment, OPG had been for several years undertaking a process to prepare for Pickering station end of life, which was expected to result in a need to

downsize the overall OPG complement over a number of years. OPG has utilized a staffing strategy through recent years which incorporated fewer permanent new hires and use of more temporary personnel, and the plant has been safely operated through this period as discussed in the OPG application and OPG and CNSC CMDs.

With the new decision to instead refurbish these units, combined with the planned construction and later operation of a small modular reactor (SMR) at the Darlington New Nuclear Project, OPG will need to update its staffing strategy. The staffing strategy will need to be reviewed by the CNSC to ensure OPG maintains sufficient trained and qualified staff to refurbish the PNGS 5-8 units, build and operate SMRs, be ready to operate the refurbished units when they are ready, and of course continue to operate the Darlington NGS units.

For this current application, it is worthwhile to draw attention to a particularly critical human resource for safe plant operation, that is the training and staffing of so-called "certified" staff, that is staff whose training is monitored and evaluated by CNSC staff and an accreditation given (or denied) under a CNSC regulatory approval process. OPG's supplemental CMD (Ref 3) identifies in Table 2 that OPG has more than the required complement of staff in each of the certification program areas, with additional staff in the pipeline to become certified. This is evidence of sufficient certified staff to meet PNGS 5-8 needs for the requested licence period.

Ongoing updates to safety analysis and identifying opportunities to reduce risk

A qualified nuclear operator is required to maintain its safety case up-to-date, and is always seeking ways to further reduce the already-low risk of their nuclear power plant. As can be seen in section 6.4 of Ref 3, OPG has recently updated its safety analysis and identified opportunities to reduce risk around high wind events.

Fisheries Act Authorization

One of the most important regulatory topics discussed in PNGS licensing Hearings and Commission Meetings in the last ten or more years has been the topic of fish impingement and entrainment. OPG has continued to meet regulatory requirements in this areas, one of which is an authorization from the federal Department of Fisheries and Oceans (DFO). OPG's supplemental CMD (Ref 3, section 6.9) identifies that its existing Fisheries Act Authorization remains in place and valid for the requested future licence period.

Emergency Preparedness

As per regulatory requirements, OPG recently conducted a major inter-organizational emergency exercise, called Exercise Unified Command 2023. These major exercises demonstrate the interoperability and collective response of the many organizations which would be called upon in the unlikely event of a nuclear emergency. Such major exercises, conducted approximately every three years, are just one part of the ongoing testing of the emergency preparedness program, as shown in OPG's application, Ref 2.

It is also worth noting that OPG continues to update its Evacuation Time Estimate studies every 5 years as required, and most recently in 2023. It is our view that the results continue to be satisfactory, as they have been in the past, and there is no reason to expect this would change over the requested licence period.

On the topic of potassium iodide (KI) pills, OPG's application provides a summary of the work done in conjunction with the Province of Ontario, CNSC, and other members of the KI Working Group established arising out of the last Pickering relicensing hearing. While that work continues to progress, OPG has continued to meet all requirements for provision of KI pills.

Indigenous Engagement

OPG summarizes its Indigenous engagement activities in its licence application. In addition, we feel it is worthwhile to note that OPG has gone beyond the regulatory requirements for Indigenous engagement, with the implementation of a Reconciliation Action Plan (RAP). OPG's supplemental CMD (Ref 3) provides an update on the status of the RAP. As an observer of nuclear industry Indigenous engagement across Canada, it is our view that OPG's RAP has been and continues to be an industry best practice.

CNSC Staff Assessment of requested licence

In addition to the summary of evidence in support of the requested licence presented by OPG, it is notable that the independent staff of the CNSC have likewise evaluated OPG's performance and found it to be acceptable. CNSC staff in their CMD have summarized OPG's PNGS 5-8 performance, compliance and challenges in each of the CNSC's 14 Safety and Control Areas (SCAs). A few examples from CNSC's CMD (Ref 4) are used to illustrate the point.

In the SCA on Operating Performance, CNSC staff make reference to the number of unplanned reactor transients at 5–8 during the licence period. An unplanned transient (power change) is a standard industry measure which is important as such events may indicate problems within the plant equipment, or human error, and can place undesired strain on plant systems. Reactor transients include reactor trips, stepbacks, and setbacks. CNSC staff noted that:

> *"Since 2019, OPG has maintained performance with respect to unplanned transients that is in line with the industry average and CNSC staff note an improving trend over the licence period."*

While longer-term historical performance is not presented by either OPG or CNSC staff, it is our assessment based on review of Regulatory Oversight Reports and their predecessor annual CNSC reports, that the number of transients has been trending down for over a decade. A review of several of those reports (Refs 9-11) for the PNGS 5-8 units found the following data.

Transient	2011	2012	2013	2020	2021	2022
Reactor trip	3	1	2	0	0	1
Stepback	0	0	1	0	0	0
Setback	4	4	1	3	5	1

From this one can easily see that the current performance is better than the historical performance as the number of total transients has reduced as has the number of the more significant event, reactor trips. This improving performance supports other presented evidence of continuous improvement both in Pickering 5-8 plant condition and human performance.

As has been noted elsewhere in our CMD, a nuclear power plant's physical condition, its fitness for service, is a major aspect which must be thoroughly reviewed before granting a licence for continued operation. Understandably, this is an area which receives a lot of attention from public intervenors in the case of any plant which has been operating for 30 or more years. CNSC assesses this area in its Fitness for Service SCA. In this area, CNSC notes that:

> *"OPG has demonstrated satisfactory (SA) performance in this SCA during the current licence period and continues to maintain adequate programs to ensure the fitness for service of SSCs. Overall, CNSC staff conclude that OPG's programs within the fitness for service SCA meet regulatory requirements and are adequate for continued commercial operations until the end of 2026."*

Regarding OPG's reassessment of the periodic safety review (PSR) conducted in 2018:

> *"CNSC staff found that the reassessed PSR met regulatory requirements and that the IIP commitments will enhance the safe operation of the Pickering NGS. Separately, OPG has also provided satisfactory implementation plans for various new or revised regulatory documents and CSA Group (formerly the Canadian Standards Association) standards at CNSC staff's request."*

The Society of United Professionals has in past relicensing CMD interventions noted the importance of worker safety and has recognized OPG's programs and measures to ensure worker safety. We are pleased to see in the CNSC's CMD section 4.8.2 a similar recognition:

> *"The conventional health and safety work practices at the Pickering NGS continued to achieve a high degree of personnel safety. OPG personnel at all levels exhibit proactive attitude towards anticipating work related hazards and preventing unsafe conditions. There continues to be a safe and efficient working environment where situational awareness and safe work practices are ensured."*

Regarding OPG's updated Environmental Risk Assessment and Predictive Effects Assessment, CNSC staff concluded:

> *"CNSC staff are satisfied that the 2022 ERA captures the environmental risks during operations and that adverse effects to ecological and human health due to the operations of the Pickering NGS are unlikely."*

CNSC staff's CMD also documents some of their own independent analysis:

> *"Additionally, CNSC staff prepared an environmental protection review (EPR) report for the Pickering site that summarizes the environmental performance of the Pickering NGS and PWMF from 2016–2022. Overall, CNSC staff found that OPG continues to implement and maintain effective environmental protection measures to adequately protect the environment and the health of people living in and around the Pickering site."*

On the pressure tube (fuel channel) robustness question:

> *"CNSC staff conclude that OPG has demonstrated that major components at the Pickering NGS are fit for service to December 31, 2026, and that pressure tubes are suitable for operation up to 305,000 EFPH. CNSC staff will continue to verify that OPG demonstrates the ongoing fitness for service of major components at the Pickering NGS during the licence period."*

CNSC staff concluded in their CMD as follows:

> *"CNSC staff also conclude that OPG remains qualified to carry out the activities authorized in its licence and will continue to make adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security. Therefore, CNSC staff recommend that the Commission amend OPG's PROL to authorize OPG to operate Pickering NGS units 5–8 to December 31, 2026, and increase the pressure tube operating limit from up to 295,000 EFPH to up to 305,000 EFPH."*

CNSC Staff inspections and regulatory oversight, and nuclear industry organizations, identify gaps and drive corrective actions

Performance standards are always rising, and the nuclear industry through industry organizations like the World Association of Nuclear Operators (WANO) doesn't come and check on operators to see if they're meeting regulatory requirements and minimum standards - rather, they're looking to see if the operator meets industry best practices - and to find new best practices to measure others against. By WANO's standards, OPG's PNGS performance has been rated as excellent, a rating provided to nuclear power plants which have achieved the top performance in the industry.

Moreover, OPG like all nuclear operators uses a problem identification and corrective action program, and a self-assessment program, to identify errors and implement corrective actions, as well as opportunities for improvement (see for example Section 6.2.1.1 of Ref 2).

And, sometimes, OPG's own problem identification programs themselves do not function as desired. And this is one of those places where the independent regulator, the CNSC, plays a very important role, by independently assessing and inspecting NPP licensees' programs and performance, and by issuing Action Notices, Directives and the like to the licensee per CNSC's regulatory processes.

CNSC in its CMD (Ref 4) provides a number of examples where OPG's performance in some safety and control areas had opportunities for improvement over the past licensing period.

One example relates to a set of documentation called the "Safe Operating Envelope" (SOE). CNSC field inspections performed in 2023 identified non-compliant findings related to the SOE at the Pickering NGS.

> *"CNSC staff discovered that changes had been made to operating documentation such that the documentation no longer reflected the defined SOE. OPG was found to be non-compliant with the notification requirements of licence condition G.2 and SOE requirements of CSA N290.15. OPG has put corrective actions in place to address the non-compliant findings. CNSC staff continue to monitor the implementation of OPG's corrective actions to prevent recurrence and have been satisfied with these*

corrective actions to date."

A second example in CNSC's CMD is that during the 2022 PNGS Vacuum Building Outage (VBO)

"CNSC staff also conducted an inspection of OPG's activities during the VBO and identified non-compliant findings of low safety significance. CNSC staff will continue to monitor OPG's completion of corrective actions to address these findings."

An example of how CNSC inspections can complement a licensee's goals for effective implementation of program improvements, by identifying opportunities to improve how a licensee implements a program (in this case OPG's program to keep worker radiation dose as low as reasonably achievable (ALARA)), is shown in the following example from CNSC's CMD (Ref 3), section 4.7.2:

"In December 2022, CNSC staff conducted a desktop inspection to review the application of ALARA at the Pickering NGS and identified non-compliant findings of low and negligible safety significance. During the inspection, CNSC staff reviewed OPG's 5-year ALARA plan and found that OPG did not have the governance support documents in place to drive the creation and content of this plan. As a result, CNSC staff requested that OPG develop governance support documents to formalize the requirements for creating and maintaining a 5-year ALARA plan and create an implementation plan for corrective actions. CNSC staff will continue to monitor and assess OPG's implementation of these corrective actions and its 5-year ALARA plan at the Pickering NGS.

As shown above, when CNSC identifies problems, investigations are performed and corrective actions are implemented, and then CNSC monitors to verify those actions are implemented to their satisfaction. This is a normal practice, across the whole of the Canadian nuclear industry, and we have decades of evidence of how it has been effective in maintaining safe operation of Canada's nuclear fleet, including the PNGS 5-8 plant. We have no doubt that CNSC staff through its inspection programs will continue to provide this valuable independent oversight through the requested licence period.

We would also like to take this opportunity to point to an example of where the CNSC Commission Hearing process contributes to a better public understanding of nuclear power plant operations. At the last Pickering NGS relicensing Hearing in 2018, one of the issues raised by intervenors and discussed at some length by Commissioners related to groundwater monitoring on and around the PNGS site. As is reported by CNSC staff in their CMD (Ref 4, section 4.9.2), the data shows that releases of radiological and non-radiological contaminants of potential concern have remained low and there are no adverse effects on groundwater. The point we wish to emphasize however is that in section 5.3.1 of CNSC's CMD, they note that

"...OPG has improved its PIDP [Public Information and Disclosure Program] *during the licence period, for example OPG now publishes annual monitoring reports on its website, including for fish impingement monitoring and groundwater monitoring, as well as operations and licensing information."*

It is our view that such increased publication of performance reports, in particular on groundwater monitoring, is likely due, at least in part, to the Hearing process and challenges raised during it.

In combination, independent CNSC regulatory oversight, industry organization assessments (e.g. WANO) and OPG's internal processes, provide layers of defence in depth to identify less than desired levels of performance or safety, and drive corrective actions and continous improvement.

Conclusion and Summary of the Case to Approve OPG's Licence Request

In summary, we conclude that:

- OPG's PNGS 5-8 performance over the last number of years has been very strong, amongst the best ever in the history of the plant;
- OPG's safety culture is robust and effective to maintain continued safe operations of the plant for the requested period;
- OPG has demonstrated the ongoing safety and robustness of major components including fuel channels, for the requested licence period;
- OPG has management systems and programs in place to support contained operation in a way that will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed;
- CNSC staff have evaluated OPG's submissions as well as its past PNGS 5-8 performance and recommend approval of OPG's application;
- CNSC staff's independent inspection programs provide the Commission, and Canadians generally, assurance that OPG operates the plant per regulatory requirements, and CNSC takes actions as necessary should issues arise.

Therefore, in our view OPG is qualified to continue to operate the PNGS 5-8 safely to Dec 31, 2026, and the Commission should grant OPG a licence to do so.

References

1 Nuclear Safety and Control Act https://laws-lois.justice.gc.ca/eng/acts/n-28.3/

2 CMD 24-H5.1 Submission from Ontario Power Generation – Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31 2024

3 CMD 24-H5.1A Supplementary Submission from Ontario Power Generation – Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31 2024

4 CMD 24-H5 Submission from CNSC – Application to extend the operation of Pickering Nuclear Generating Station Units 5 to 8 until December 31 2024

5 Commission Hearing transcript from 2018: See E-DOCS-#5652120-v1-Transcript_of_Pickering_Hearing_-_April_4__2018.PDF pages 133-135

6 Commission Hearing transcript from 2013: E-DOCS-#4152229-v1-Transcript_of_May_29__2013_Public_Hearing_-_Pickering_-_Transcription_de_l_audience_publique_du_29_mai_2013.PDF pages 179-180

7 CNSC Record of Decision in the Matter of Ontario Power Generation Inc. Application to Renew the Nuclear Power Operating Licence for the Pickering Nuclear Generating Station April 4 2018 and June 25-29 2018.

8 OPG CMD 18-H6.1A, Pickering Nuclear Generating Station, Part 1 Hearing Licence Renewal, April 4, 2018

9 CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants for 2011, CMD 12-M40

10 CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants for 2012, CMD 13-M30

11 CNSC Staff Integrated Safety Assessment of Canadian Nuclear Power Plants for 2013, CMD 14-M45