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Regulatory Oversight Report for
Canadian Nuclear Power Generating
Sites: 2022 and Mid-term update for
Ontario Power Generation's Pickering
Nuclear Generating Station

Rapport de surveillance réglementaire
des sites de centrales nucléaires au
Canada : 2022 et Rapport de mi-parcours
d'Ontario Power Generation pour la
centrale nucléaire de Pickering

Commission Meeting

Réunion de la Commission

December 13 and 14, 2023

13 et 14 décembre 2023

**SUBMISSION BY THE CANADIAN ENVIRONMENTAL LAW ASSOCIATION
TO THE CANADIAN NUCLEAR SAFETY COMMISSION REGARDING THE
REGULATORY OVERSIGHT REPORT FOR CANADIAN NUCLEAR POWER
GENERATING SITES: 2022 AND THE MID-TERM UPDATE OF LICENSED
ACTIVITIES FOR THE PICKERING NUCLEAR GENERATING STATION**

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I. INTRODUCTION

This submission is filed in response to the Canadian Nuclear Safety Commission’s (“CNSC”) Notice of Participation at a Commission Meeting and Participant Funding¹ in respect of the *Regulatory Oversight Report for Canadian Nuclear Power Generating Sites: 2022* (herein “ROR”)² and the mid-term update on the Pickering Nuclear Generating Station³. A public meeting with respect to this matter is scheduled for December 13-14, 2023.

The Canadian Environmental Law Association (“CELA”) has prepared this written submission with the support of the expert review of M.V. Ramana and Dr. Farrukh A. Chishtie, with the intention of presenting oral submissions during the December 13-14, 2023 Commission meeting.

CELA has reviewed the CMDs for the December 13-14, 2023 meeting associated with this ROR. While this submission is commenting on the whole ROR, CELA has chosen to focus on the discussions surrounding the Pickering Nuclear Generating Station (“Pickering”), since the mid-

¹ CNSC, Notice of Participation at a Commission Meeting and Participant Funding, online: <https://www.cnsccsn.gc.ca/eng/the-commission/participant-funding-program/opportunities/npgs-pmt.cfm>.

² CNSC, Regulatory Oversight Report for Canadian Nuclear Power Generating Sites for 2022, CMD 23-M36 [ROR 2022].

³ OPG, Mid-Term Update of Licensed Activities for the Pickering Nuclear Generating Station, CMD 23-M36.1 [Mid-term Review].

term update for this nuclear power generating station (“NPGS”) will be a focus at the upcoming Commission meeting.

CELA is a non-profit, public interest law organization. For over 50 years, CELA has used legal tools to advance the public interest, through advocacy and law reform, in order to increase environmental protection and safeguard communities across Canada. CELA is funded by Legal Aid Ontario as a specialty legal clinic, to provide equitable access to justice to those otherwise unable to afford representation.

CELA has engaged in detailed research and advocacy related to public safety and environmental protection by seeking improvements to nuclear emergency preparedness. We have also appeared before the CNSC on a number of licensing matters, as well as the federal environmental assessment proceedings for multiple NPGS and proposed projects. CELA also has an extensive library of materials related to Canada’s nuclear sector which is publicly available on our website.⁴

II. PICKERING MID-TERM REVIEW REPORT

In 2018, the CNSC held a public hearing for Ontario Power Generation’s (“OPG”) application to renew the Nuclear Power Reactor Operating Licence for the Pickering Nuclear Generating Station. The CNSC decided to renew Pickering’s licence for a 10-year term, allowing Pickering to operate until August 31, 2028.⁵ One of the conditions of the licence renewal required that, “around the mid-point of the 10-year licence period and no later than 2023, OPG shall present to the Commission a comprehensive mid-term update on its licenced activities at the PNGS.”⁶

Upon reviewing OPG’s Mid-Term Review, CELA is disappointed in the absence of comprehensive information presented within the Mid-Term Review. Much of the content within the review essentially amounts to a PR campaign for Pickering and OPG.⁷ The Mid-Term Review fails to provide a substantive discussion of issues that have arisen at Pickering over the last 5-years.

Due to the timing of the publication of the Mid-Term Review, CNSC Staff were unable to provide commentary on the review within the ROR. Instead, Appendix H: “Pickering Nuclear Generating

⁴ Canadian Environmental Law Association, online: www.cela.ca

⁵ CNSC, Record of Decision for Application to Renew the Nuclear Power Reactor Operating Licence for the Pickering Nuclear Generating Station [**Record of Decision**].

⁶ CNSC, Record of Decision at page 138, para 673, *emphasis added*.

⁷ *For instance*, page 6 of the Mid-Term Review discusses OPG’s Commitment to Excellence, noting that “Pickering NGS was recognized with Business Excellence Awards”, and on page 8 of the Mid-Term Review, OPG comments on being named “one of Canada’s Best Diversity Employers.”

Station Mid-Term Update” provides “CNSC staff’s regulatory oversight context on topics covered in OPG’s mid-term update that were of public interest during the 2018 relicensing hearing.”⁸

As Appendix H reveals, Pickering has received a “below expectations” rating for complying with the Security safety and control area (“SCA”) two years in a row (2021 and 2022). Furthermore, “CNSC staff have increased regulatory oversight of the PNGS security program and issued an Administrative Monetary Penalty (AMP) to OPG in June 2023 to deter future non-compliances.”⁹ This AMP totaling \$21,790¹⁰ is not mentioned in within the Mid-Term Review, nor is the “below expectations” rating that Pickering has repeatedly received for the Security SCA. AMPs are not often issued for NPGS, and therefore this notable penalty should have been highlighted within the Mid-Term Review, along with a note about how OPG has assured CNSC that such problems will not recur.

In the Mid-Term Review, OPG has claimed that “Pickering NGS is exhibiting its strongest performance ever, including achieving its highest yearly production output.”¹¹ However, the plant’s performance data as reported by the International Atomic Energy Agency’s (“IAEA”) Power Reactor Information System Database suggests otherwise.¹² In each of the operating reactors at Pickering, there were at least two years when the reactor’s performance fell below its average lifetime load factor. The only exception was Pickering-1 whose lifetime load factor is a paltry 66 percent. But even for Pickering-1, the 2020 load factor was just 49.6 percent and the 2022 load factor was 66.2 percent, barely over the lifetime average. In the case of the other Pickering reactors, Pickering-4 fell below its lifetime average in 2018 and 2020, Pickering-5 fell below its lifetime average in 2019, 2021, and 2022, Pickering-6 fell below its lifetime average in 2018 and 2020, Pickering-7 fell below its lifetime average in 2019 and 2021, and Pickering-8 fell below its lifetime average in 2018 and 2021. Since Pickering is not a particularly well-performing nuclear power plant, this poor record should have been clearly noted.

According to the IAEA’s Operating Experience with Nuclear Power Stations in Member Stations document for 2023, Pickering-1 was not functioning for 2714 hours in the year 2022, or roughly 30 percent of the time; Pickering-4 for 740 hours; Pickering-5 for 3826 hours (44 percent of the time), which includes 57 hours because of environmental conditions such as lack of cooling water due to dry weather, cooling water temperature limits, flood, storm, lightning; Pickering-6 for 915 hours, including 94 hours because of environmental conditions; Pickering-7 for 790 hours; and

⁸ CNSC, ROR 2022 at page 162.

⁹ CNSC, ROR 2022 at page 163.

¹⁰ CNSC, Regulatory Action—Ontario Power Generation (31 May 2023), online: <https://www.cnscccsn.gc.ca/eng/acts-and-regulations/regulatory-action/ontario-power-generation.cfm>

¹¹ OPG, Mid-Term Review at page 1.

¹² IAEA, “Power Reactor Information System (PRIS)”, Canadian plant details, online: <https://pris.iaea.org/pris/CountryStatistics/CountryDetails.aspx?current=CA>

Pickering-8 for 971 hours.¹³ In other words, two of the units were not contributing energy for extended periods of time, and two were shut down for 2-4 days due to causes that might well have to do with climate change.

CELA **submits** that the Mid-Term Review should not just be a document boasting about a licensee's accomplishments during a licence period. It should address shortfalls and provide clarity on what is being done to alleviate and prevent these shortfalls from happening in the remainder of the licence term.

Climate change discussions within the Mid-Term Review are rather minimal, with no discussion of how OPG has been and plans to mitigate the impacts of climate change on Pickering. The Mid-Term Review focuses largely on the climate mitigation element of nuclear power production, highlighting reduction of greenhouse gases by such means. While there is mention of hazards like fires, floods, high winds and seismic events with related preparation as follows:

External events such as fires, floods, high winds, and seismic events have a specific PSA for both Pickering NGS A and B which are utilized for ad-hoc assessments that require specific risk-informed insights. Pickering has successfully updated all models to utilize the latest EPRI Instantaneous Risk Monitor software (Phoenix) with features like remote risk quantification proved to be very beneficial during COVID for off-site support staff. Pickering has a multi-hazard risk monitor which is a CANDU first-of-a-kind that allows insights for all available internal/external monitors in one screen.¹⁴

For those mentioned hazards, the Mid-Term Review does not discuss the connection to climate change and related adaptation. A major concern in this regard is the record-breaking Canadian wildfire season in 2023 which also affected Ontario, such impacts can be anticipated as conceivable threats to operations of nuclear reactors. Moreover, climate related events such as droughts, algae growth and related actions are also entirely missing. This report therefore misses climate related impacts and associated adaptation actions.

Our submission provides a more in-depth discussion on climate change in Section III, as the issue of climate change impacts and mitigation measures extend beyond the Mid-Term Review of Pickering, and are applicable to the regulatory oversight of all NPGS.

Another topic that would benefit from greater discussion within the Mid-Term Review is the distribution of potassium iodide pills ("KI Pills"). According to the 2018 Record of Decision:

¹³ IAEA, "Operating Experience with Nuclear Power Stations in Member States 2023 Edition" (2023), online: https://www-pub.iaea.org/MTCD/Publications/PDF/OPEX_2023_web.pdf.

¹⁴ OPG, Mid-Term Review at page 15.

The Commission noted the suggestion in the intervention from E. Munro that OPG use modern means of communication to inform and encourage the public beyond the DPZ to order KI pills. The Commission requests that OPG consider this suggestion in future KI distribution and emergency communications planning.¹⁵

Within the Mid-Term Review, OPG notes that:

KI public awareness campaigns are held regularly (three times per year). The campaigns are focused on the 10 km DPZ but they are also extended into the 50 km IPZ, through various media (e.g., news releases, print advertisements, social media, and digital display boards). Durham Region has produced videos to raise general awareness about KI, one of which focused on the availability of KI within the 50 km IPZ.¹⁶

It is unknown as to whether the public awareness campaigns are actually effective means of communication to inform and encourage the public beyond the DPZ to order KI pills. The Mid-Term Review does not shed light on how frequently OPG reviews engagement metrics, and whether the public awareness campaigns result in an influx of KI pills being ordered outside of the DPZ. CELA **recommends** that the Mid-Term Review of Pickering (and other NPGS) take the time to discuss and clarify the effectiveness of communications with the public surrounding KI pill distribution. Future reports should record how many KI pills are available in the 50 km IPZ along with an estimate of the current population within the zone.

In a similar vein to KI pill awareness, the Record of Decision for renewing the Pickering licence also notes concerns surrounding public awareness surrounding nuclear preparedness:

The Commission notes the concerns submitted by CELA, DNA and individuals that nuclear emergency preparedness awareness beyond the DPZ was low. The Commission also notes that survey results submitted as part of interventions substantiated these concerns. The Commission expects OPG to review its means of communication with the public in regard to nuclear emergency preparedness awareness outside the DPZ during the renewed licence period.¹⁷

The Mid-Term Review does not shed much light on how OPG has reviewed its means of communication with the public outside the DPZ during the renewed licence period. For instance, the report states:

¹⁵ CNSC, Record of Decision at page 109.

¹⁶ OPG, Mid-Term Review at page 21.

¹⁷ CNSC, Record of Decision at page 112.

The primary focus area for the engagement activities, in addition to the public at large, includes three municipalities proximate to the Pickering NGS site including the host community (City of Pickering) and adjacent communities within 10 km of the project (the City of Toronto, the Town of Ajax, and the Town of Whitby). The 10 km radius is consistent with the Pickering NGS DPZ for nuclear emergency planning purposes, an area where residents are most familiar with nuclear plant operations and regularly receive information station and operational updates.¹⁸

Based on OPG's focus on the 10 km radius, there is a lack of focus on the communities beyond the 10-km radius who are likely less familiar with nuclear plant operations and the actions they would have to take in the event of an emergency. As the population within the GTA has grown in the last 5 years and will continue to grow over the next 5 years, CELA **submits** that it is crucial for OPG to provide more information about how it has reviewed its means of communication with the public in regard to nuclear emergency preparedness awareness outside the DPZ during the renewed licence period.

Recommendations

1. The Mid-Term Review should not just be a document boasting about a licensee's accomplishments during a licence period. It should address shortfalls and provide clarity on what is being done to alleviate and prevent these shortfalls from happening in the remainder of the licence term.
2. When the CNSC has required mid-term reviews for licensees, the CNSC should provide required topics for discussion, including climate change impacts and mitigation.
3. OPG should provide more information on how effective their communication methods have been to improve awareness about KI pills beyond the DPZ and information on the availability of KI pills in these areas.
4. OPG must provide more information about how it has reviewed its means of communication with the public in regard to nuclear emergency preparedness awareness outside the DPZ during the renewed licence period.

¹⁸ OPG, Mid-Term Review at page 32.

III. GENERAL FINDINGS WITHIN THE REGULATORY OVERSIGHT REPORT

When reviewing the 2022 ROR, CELA has chosen to focus the discussion on Pickering, while also touching upon a number of general comments and concerns stemming from reviewing the entirety of the report. CELA notes that a more in-depth discussion of the Darlington NPGS will be provided within CELA's upcoming submissions for the Darlington New Nuclear Project. And, subject to funding approval by the CNSC, a more in-depth discussion surrounding the extension of Pickering's Units 5-8 will be explored by CELA in future submissions.

A. Operating Performance

The ROR gives data about the numbers of unplanned transients but it does not offer any data on the length of the resulting outages.¹⁹ That piece of information will help contextualize the severity of the unplanned transient. This information would have been particularly useful to understand the performance trends in the Point Lepreau nuclear station, which is underperforming relative to global trends.

The discussion about operating performance of the Pickering units does not mention the length of the periods when Pickering-1 and Pickering-5 were not operating, nor about the challenges posed by environmental conditions.²⁰

Recommendation

5. Additional data surrounding the length of reported outages is essential for understanding and contextualizing the severity of unplanned transients. This information should be provided at the upcoming Commission meeting.

B. Fitness for Service

Table 6 on page 19 of the ROR highlights the safety system test performance for 2022.²¹ The table indicated that for Pickering, all 13,283 planned safety system tests were completed in 2022. CELA notes that Pickering has seen a positive trend over the last five years in terms of completed safety system test performance, and is relieved to see that the 5 missed tests at Pickering in 2018 has not been a recurring issue since then.²²

¹⁹ CNSC, ROR 2022 at page 16, Table 5: Number of unplanned transients.

²⁰ CNSC, ROR 2022 at page 72.

²¹ CNSC, ROR 2022 at page 19, Table 6: Safety systems test performance for 2022.

²² CNSC, ROR 2022 at page 20, Figure 5: Trend of safety system performance for NPPs and industry.

Given the age of Pickering and its systems, having all planned safety system tests performed on an annual basis is crucial, and CELA hopes to see this 100% completion trend continue for the remainder of Pickering's operations.

C. Radiation Protection

On page 26 of the ROR, there are two reports of radiation doses in the 20-50 mSv range.²³ While the dose limit for nuclear workers is indeed 50 mSv per year, there is also a limit of 100 mSv over five years. If the same individual is obtaining over 20 mSv doses in successive years, they can breach the 100 mSv limit in a few years.

It is unclear if the individuals in 2018 who received radiation doses in the 20-50 mSv range (in 2018 there were 6 reported events in this range) are the same individuals who received the doses in 2022. For example, at Bruce A and B, maximum individual effective doses over the last five years have ranged between 16.69 and 22.19 mSv.²⁴ CELA **requests** further information on how long-term, repeated high radiation doses are being monitored and prevented at each licenced site.

Recommendations

6. Additional information is requested regarding the measures being implemented at each licenced site to monitor and prevent long-term, repeated high radiation doses being administered to individuals.

D. Environmental Performance

The environmental performance of reactors is described in terms of the assessed dose to the public.²⁵ For example, the dose from the Point Lepreau site is mentioned as 0.0011 mSv. This piece of information does not shed any light on what radionuclides were released, how much of each radionuclide (in Bq/year) was released, and how these releases compare with corresponding figures from earlier years. At a minimum, the releases of important radionuclides that are known to be particularly dangerous to human health—for example, Tritium and tritiated water—should be released on an annual basis. Without such detailed information, it is not possible to gauge how well a reactor is performing.

CELA **submits** that the publication of annual radionuclide loadings to the environment from nuclear facilities on the CNSC Open Government Portal does not provide clarity for the data

²³ CNSC ROR 2022 at page 26, Figure 10: Trend of distribution of annual effective doses received by all monitored persons at Canadian NPPs.

²⁴ CNSC, ROR 2022 at page 25, Figure 9: Trend of maximum individual effective doses.

²⁵ CNSC, ROR 2022 at page 29, Table 9: Trend of estimated dose to the public from Canadian nuclear power generating sites (mSv).

presented within the ROR, as the radionuclide loadings on the portal are presented in NPRI format, whereas the data in Table 9 is provided in mSv.

Recommendation

7. The ROR should provide detailed information (in Bq) on an annual basis regarding the releases of important radionuclides that are known to be particularly dangerous to human health—for example, Tritium and tritiated water. Without such detailed information, it is not possible to gauge how well a reactor is performing.

E. Climate Change

The impacts of climate change on nuclear reactors includes various climate-related hazards such as heat waves, floods, droughts, storms, lightning events and wildfires which can pose challenges to nuclear safety, necessitating enhanced safety assessments and adaptive management strategies.²⁶ Rising temperatures can threaten nuclear reactors, as they often rely on large external sources of water for cooling. In the case of Canadian reactors, this water is usually from the Great Lakes, or the Bay of Fundy in the case of Point Lepreau. Higher water temperatures can reduce the thermal efficiency of nuclear reactors and even lead to temporary shutdowns when the required cooling cannot be ensured. Heightened water stress, either from reduced availability or competing uses, is a concern since nuclear reactors require significant amounts of water for cooling purposes.²⁷ The IAEA highlights the need to reassess nuclear installations' safety against external hazards due to climate change.²⁸ These hazards include meteorological events like lightning and tropical cyclones, hydrological events such as floods and storm surges, and fire-related hazards. Continuous site hazard assessment and timely management of plant reactions to extreme events are essential for ensuring nuclear safety. Besides these hazards, increasing temperatures leads to growth in algae species, which can water intake create blockages and shutdowns.²⁹

A recent study by Wang et al utilizes a Regional Climate Model to analyze the climate-driven alterations in energy sectors in Ontario, Canada, with a resolution of 25 km × 25 km.³⁰ The study provides reliable projections of climatic variable changes, assessing their impacts on cooling degree days, heating degree days, and energy availability. Rising temperatures, influenced by

²⁶ Linnerud, K., Mideksa, T. K., & Eskeland, G. S. (2011). The impact of climate change on nuclear power supply. *The Energy Journal*, 32(1).

²⁷ Linnerud, K. et al.

²⁸ International Atomic Energy Agency (2023, 12 October). *Impact of Climate Related Hazards on the Safety of Nuclear Installations: Experts Discuss*, online: <https://www.iaea.org/newscenter/news/impact-of-climate-related-hazards-on-the-safety-of-nuclear-installations-experts-discuss>

²⁹ Lin, H., Zhang, S., Cao, R., Yu, S., Bai, W., Zhang, R., ... & Zhang, X. (2023). A review on the risk, prevention and control of cooling water intake blockage in coastal nuclear power plants. *Nuclear Engineering and Technology* (in-print)

³⁰ Wang, S., Zhu, J., Huang, G., Baetz, B., Cheng, G., Zeng, X., & Wang, X. (2020). Assessment of climate change impacts on energy capacity planning in Ontario, Canada using high-resolution regional climate model. *Journal of Cleaner Production*, 274, 123026.

Ontario's high latitudes, significantly affect the region's residential and commercial energy demand, showcasing a temperature-sensitive energy demand pattern based on seasonal variability. According to their study, anticipated temperature increases will result in nuclear power production reductions of 1.5% and 2.5% under RCP4.5 and RCP8.5 scenarios respectively for the 2050s, and 2.5% and 4.0% reductions respectively for the 2080s. Since this is a relatively coarse regional model-based analysis and not specific to particular reactors, to gather an accurate extent of climate change impacts on nuclear reactors in Canada requires more localized studies and analyses. Further, this study only looks at the loss of thermal efficiency. A second source of reduced output is having to shut down nuclear reactors for shorter or longer periods of time because of extreme weather conditions, including high water temperatures.³¹ These concerns mean that it is vital to carry out comprehensive climate vulnerability assessments of nuclear reactors across Canada.

For the Pickering reactor section of the ROR, there is mention of a requirement for recent data for floods in the context climate change:

CNSC staff has finished reviewing the PSA Hazard Screening Analysis and identified an issue regarding the external flood PSA's use of old precipitation data, when more recent data should be used. In response, CNSC staff communicated their expectations to OPG that they incorporate more up-to-date climate change precipitation data to account for the potential impact of climate change.³²

While this covers only one type of impact, there are others such as heat waves, droughts etc., which require further accounting for to fully assess the risk from climate risks. Moreover, there is no further mention how such flood risks are planned to be ascertained. Fires are also mentioned in the Physical Design section.³³ However, there is no mention or consideration of climate impacts such as wildfires, lightning events or extreme heat events.

Overall, there is a significant gap in addressing the increased risks to nuclear plant operations and safety as a result of the impacts of climate change and the development of adaptive strategies.

Recommendations

8. With latest regional and local scale models assess present and future risk of relevant climate impacts on all nuclear reactor facilities across Canada. This includes risks from algal growth.

³¹ See: Ahmad, Ali. "Increase in Frequency of Nuclear Power Outages Due to Changing Climate." *Nature Energy* 6, no. 7 (July 2021): 755–62. <https://doi.org/10.1038/s41560-021-00849-y>; see also Ahmad, Ali, Andrei Covatariu, and M. V. Ramana. "A Stormy Future? Financial Impact of Climate Change-Related Disruptions on Nuclear Power Plant Owners." *Utilities Policy* 81 (April 1, 2023): 101484. <https://doi.org/10.1016/j.jup.2022.101484>.

³² CNSC, ROR 2022 at page 74.

³³ CNSC, ROR 2022 at page 74.

9. Conduct a climate vulnerability assessment which ascertains adaptive capacity of present reactors and with participation from various partners, develop implementable adaptive strategies.
10. Have dedicated sections in Regulatory Oversight reports for specific reactors and respective climate change risks and related adaptation strategies along with an overview of these power plants.

F. Human Performance Management

When reviewing the human performance management commentary on Pickering, the ROR notes there were 8 non-compliant findings within the SCA, with three being of negligible safety significance, and five were of low safety significance.³⁴ With two of the low safety significance findings being associated with discrepancies in non-certified training programs related to Fire Protection training program, and the three other low safety significance findings being related to discrepancies in documentation and training material for OPG's Emergency Response Organization Training Program, there are concerns that arise surrounding complacency and staff competency at Pickering.

Pickering is an aging facility with its operational lifespan coming to an end, and with its limited lifespan, it calls into question whether Pickering is maintaining staff competency and adequate staffing numbers. With job security coming into question as Pickering approaches various phases of winding down, there is the risk of employees not taking safety training and safety practices seriously. CELA **requests** additional information on the employment trends at Pickering, and whether these instances of human performance management non-compliance are being an increasingly notable trend with every passing year.

Recommendation

11. Additional information is requested related to the employment trends at Pickering, and whether these instances of human performance management non-compliance are being an increasingly notable trend with every passing year.

³⁴ CNSC, ROR 2022 at page 72.

G. Physical Design

According to the ROR’s discussion of CNSC staff’s review of the 2021 Annual Fuel Performance Report, “the residency time for defected bundles in the core is high relative to the industry average, due to the design limitations.”³⁵ This is doubly concerning because of the age of the Pickering reactors and because the discovery of “elevated hydrogen equivalent concentration near the rolled joints” at two of the units at Bruce.³⁶ The latter problem might well afflict the Pickering reactors too.

CNSC staff have recommended that OPG take steps to detect and remove these defects from the core in a timely manner.³⁷ CELA **requests** that OPG provide an update on what steps are being done, as well as a timeline for removing these defects, be provided at the upcoming Commission meeting.

Recommendation

12. OPG should provide an update on what steps are being done, as well as a timeline for removing these defects from core bundles, be provided at the upcoming Commission meeting.

H. Emergency Management and Fire Protection

Following an inspection of the Fire Protection Program at Pickering, CNSC staff found three non-compliances of low safety significance: “the non-compliances pertained to compressed gas storage, minimization of impairment durations of fire protection systems, and some inconsistencies between pre-fire plans and the conditions of the plant.”³⁸ According to the ROR, the CNSC staff reviewed and agreed with the proposed corrective plan by OPG. However, there is no discussion or explanation of this corrective plan. To improve transparency with the public, CELA **requests** that the corrective plan be provided, or at a minimum, provide a high level summary of the plan so that the public can understand the risks surrounding these non-compliance instances. This request becomes even more relevant when the recent fire event at Pickering is taken into consideration.

The ROR briefly discusses a fire on February 22, 2022 that was traced to poor vendor quality of the motor rewind complete in 2014.³⁹ However, the report does not specify whether the reactor

³⁵ CNSC, ROR 2022 at page 75.

³⁶ CNSC, ROR 2022 at page 75.

³⁷ CNSC, ROR 2022 at page 75.

³⁸ CNSC, ROR 2022 at page 78.

³⁹ CNSC, ROR 2022 at page 78.

was shut down due to the fire, as one would expect from a cautious operator. Indeed, one would expect that the reactor should be shut until the underlying reason for the fire was fixed. CELA therefore **requests** additional information regarding this fire event be provided at the upcoming Commission meeting.

Furthermore, the ROR notes that CNSC staff found that offsite emergency centers were not tested over a minimum of a five-year period, deeming OPG as non-compliant with a requirement in REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*.⁴⁰ The findings of non-compliance were raised in the Emergency Preparedness and Fire Protection SCA, and the Human Performance SCA. These instances of non-compliance once again call into question whether staff at Pickering are taking their roles in nuclear safety seriously as the lifespan of Pickering (and their job positions) shortens over time. The ROR notes that “OPG was requested to provide updates on planned drills for two offsite centers and to implement corrective action plans to align with REGDOC-2.10.1 and correct inconsistencies within its internal procedures.”⁴¹ CELA **requests** that this update be discussed at the upcoming Commission meeting.

Recommendations

13. The corrective plan to address inconsistencies between the pre-fire plans and the conditions of the Pickering plant should be provided, or at a minimum, provide a high level summary of the plan so that the public can understand the risks surrounding these non-compliance instances.
14. Additional information surrounding the pump fire on February 22, 2022 should be provided at the upcoming Commission meeting.
15. OPG should provide an update on planned drills for two offsite centers and to implement corrective action plans to align with REGDOC-2.10.1 and correct inconsistencies within its internal procedures at the upcoming Commission meeting.

I. Security

The ROR mentions that there were four non-compliant findings regarding security of the Pickering plant as well as five non-compliant findings in the cyber-security domain.⁴² While the report dismisses these findings as having “low safety significance”, in fact, vulnerabilities can open up the reactors to cyberattacks, which in turn can create a further pathway for accidents. Even

⁴⁰ CNSC, ROR 2022 at page 78.

⁴¹ CNSC, ROR 2022 at page 78.

⁴² CNSC, ROR 2022 at page 79.

if attacks themselves might not cause, say, the meltdown of the core, by potentially disabling safety systems or causing other problems, such as loss of electric power at the plant, these attacks could set the stage for a meltdown if it is combined with some other challenge to the plant's safety systems, for example a severe storm or an earthquake.⁴³

The issue of compliance with the Security SCA at Pickering is not a novel one; during the licence renewal hearing for Pickering in 2018: "... the Commission notes the decrease in OPG's rating in this [Security] SCA during the previous licence period and encourages that OPG implement measures to again achieve fully satisfactory rating in this SCA."⁴⁴

It is noted that based on a declining trend in compliance performance, CNSC staff are conducting enhanced regulatory oversight of the security SCA, and that staff findings will be detailed in a supplemental CMD as the details are confidential.⁴⁵ Due to confidentiality surrounding security breaches, little detail on these issues is available to the public. The fact that security oversight is non-transparent to the public; and that it engages international and domestic security risks elevates this issue to one of a high import for the commission. CELA **recommends** that the Commission members stringently and thoroughly delve into the causes and significance of this area of the supplemental report; and demand challenging and detailed, specific steps to show improvement and report back to the Commissioners themselves.

Recommendation

16. The Commission members must stringently and thoroughly delve into the causes and significance of this area of the supplemental report surrounding security non-compliance at Pickering; and demand challenging and detailed, specific steps to show improvement and report back to the Commissioners themselves.

J. KI Pill Distribution

The 2022 ROR briefly mentions potassium iodide ("KI" pill) distribution in the Appendices, mainly within the mid-term update for Pickering in Appendix H. For instance, the ROR states:

In October 2022, EMO was given the responsibility to complete the Phase II objectives of the working group through the revision of the PNERP anticipated for 2023. EMO and the Ontario MOH drafted a discussion paper concerning the Phase II objectives, including the development of a strategy for emergency distribution of KI pills and examination of the

⁴³ M. V. Ramana and Lauren J. Borja. "The Computer Infection of Kudankulam and Its Implications." *The India Forum*, January 7, 2020. <https://www.theindiaforum.in/article/computer-infection-kudankulam-and-its-implications>.

⁴⁴ CNSC, Record of Decision at page 120.

⁴⁵ CNSC, ROR 2022 at page 80.

feasibility of KI pill pre-distribution to all schools in the IPZ. This discussion paper was shared with the KIPWG in December 2022 for comments. The discussion paper is intended to inform the upcoming revision to the PNERP. The revised PNERP is expected to undergo a public review period, which will also provide an opportunity for the KIPWG to discuss the revision and provide comments to EMO. Additional information on the KIPWG is available on the CNSC.⁴⁶

According to the CNSC website, the 2023 update to the PNERP will undergo a 60-day public review, led by EMO, however, it is unclear when this review will take place.⁴⁷ CELA reiterates that adequate distribution of KI pills is an important element of emergency preparedness for all NPGS, and **submits** that a discussion of KI distribution requirements and any updates based on meetings of the CNSC-led KI Pill Working Group would fall well within the scope of this ROR.

CELA remains an active member of the advisory group to the KI Pill Working Group and **submits** that distribution of KI pills is currently inadequate. While operators and regulators have spent years working on understanding the current framework for storing and distributing potassium iodide, the critical work has not begun as committed to in the last Pickering hearing to further distribute KI pills to residents living beyond 10 km. This measure is especially critical for vulnerable populations, such as children.

CELA continues to **recommend** expanding the delivery of KI pills to a pre-distribution area of 50 km, rather than the current 10 km pre-distribution area. CELA further **recommends** that KI pill distribution requirements and updates from the KI Pill Working Group be discussed at the upcoming Commission Meeting and integrated into this ROR.

Recommendations

17. The CNSC should consider expanding the delivery of KI pills to a pre-distribution area of 50 km, rather than the current 10 km pre-distribution area.
18. KI distribution requirements and updates from the KI Pill Working Group be discussed at the upcoming Commission Meeting and integrated into this ROR.

⁴⁶ CNSC, ROR 2022 at pages 166-167.

⁴⁷ CNSC, Potassium iodide (KI) Pill Working Group, online: <https://nuclearsafety.gc.ca/eng/resources/emergency-management-and-safety/potassium-iodide-pill-working-group.cfm#3>

IV. CONCLUSION

We respectfully provide these comments to assist the Commission in its review of the *Pickering Mid-Term Review Report* and the *Regulatory Oversight Report for Canadian Nuclear Power Generating Sites: 2022*.

Sincerely,

CANADIAN ENVIRONMENTAL LAW ASSOCIATION

A handwritten signature in black ink that reads "Sara Libman". The signature is written in a cursive style and is positioned above a horizontal line.

Sara Libman, Legal Counsel

Appendix 1

Summary of Recommendations

1. The Mid-Term Review should not just be a document boasting about a licensee's accomplishments during a licence period. It should address shortfalls and provide clarity on what is being done to alleviate and prevent these shortfalls from happening in the remainder of the licence term.
2. When the CNSC has required mid-term reviews for licensees, the CNSC should provide required topics for discussion, including climate change impacts and mitigation.
3. OPG should provide more information on how effective their communication methods have been to improve awareness about KI pills beyond the DPZ and information on the availability of KI pills in these areas.
4. OPG must provide more information about how it has reviewed its means of communication with the public in regard to nuclear emergency preparedness awareness outside the DPZ during the renewed licence period.
5. Additional data surrounding the length of reported outages is essential for understanding and contextualizing the severity of unplanned transients. This information should be provided at the upcoming Commission meeting.
6. Additional information is requested regarding the measures being implemented at each licenced site to monitor and prevent long-term, repeated high radiation doses being administered to individuals.
7. The ROR should provide detailed information (in Bq) on an annual basis regarding the releases of important radionuclides that are known to be particularly dangerous to human health—for example, Tritium and tritiated water. Without such detailed information, it is not possible to gauge how well a reactor is performing.
8. With latest regional and local scale models assess present and future risk of relevant climate impacts on all nuclear reactor facilities across Canada. This includes risks from algal growth.
9. Conduct a climate vulnerability assessment which ascertains adaptive capacity of present reactors and with participation from various partners, develop implementable adaptive strategies.

10. Have dedicated sections in Regulatory Oversight reports for specific reactors and respective climate change risks and related adaptation strategies along with an overview of these power plants.
11. Additional information is requested related to the employment trends at Pickering, and whether these instances of human performance management non-compliance are being an increasingly notable trend with every passing year.
12. OPG should provide an update on what steps are being done, as well as a timeline for removing these defects from core bundles, be provided at the upcoming Commission meeting.
13. The corrective plan to address inconsistencies between the pre-fire plans and the conditions of the Pickering plant should be provided, or at a minimum, provide a high level summary of the plan so that the public can understand the risks surrounding these non-compliance instances.
14. Additional information surrounding the pump fire on February 22, 2022 should be provided at the upcoming Commission meeting.
15. OPG should provide an update on planned drills for two offsite centers and to implement corrective action plans to align with REGDOC-2.10.1 and correct inconsistencies within its internal procedures at the upcoming Commission meeting.
16. The Commission members must stringently and thoroughly delve into the causes and significance of this area of the supplemental report surrounding security non-compliance at Pickering; and demand challenging and detailed, specific steps to show improvement and report back to the Commissioners themselves.
17. The CNSC should consider expanding the delivery of KI pills to a pre-distribution area of 50 km, rather than the current 10 km pre-distribution area.
18. KI distribution requirements and updates from the KI Pill Working Group be discussed at the upcoming Commission Meeting and integrated into this ROR.