

August 18, 2017

CD# 92896-CORR-00531-01104

MR. M. LEBLANC
Commission Secretary
Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Mr. Leblanc:

**Supplemental OPG Written Submission in Support of the 2014 and 2017
Environmental Risk Assessments for the Pickering Waste Management
Facility's Waste Facility Licence Renewal**

References: 1. CNSC Letter, L. Levert to L. Morton, "Notice of Continuation of Public Hearing for Pickering Waste Management Facility," June 21, 2017, CD# 92896-CORR-00531-01097.

The purpose of this letter is to submit OPG's supplementary written submission to the Canadian Nuclear Safety Commission on the 2014 and 2017 Pickering Nuclear site Environmental Risk Assessments to support the Pickering Waste Management Facility licence renewal [Ref. 1].

Attachment 1 provides Commission Member Document (CMD) 17-H5.1C, *Written Supplemental Submission from Ontario Power Generation Inc.* The CMD provides clarification to the Commission on items raised by intervenors.

If you have any questions or concerns, please contact Ms. Leslie Mitchell, Manager, Regulatory Programs, Strategy and Support, at (905) 839-6746, extension 5198.

Sincerely,



Lise Morton
Vice President
Nuclear Waste Management
Ontario Power Generation Inc.

Attach.

cc: H. Tadros - CNSC (Ottawa)
K. Glenn - CNSC (Ottawa)
S. Oue - CNSC (Ottawa)
S. Watt - CNSC (Ottawa)

Attachment 1 to OPG Letter, L. Morton to M. Leblanc, "Supplemental OPG Written Submission in Support of the 2014 and 2017 Environmental Risk Assessments for the Pickering Waste Management Facility's Waste Facility Licence Renewal," CD # 92896-CORR-00531-01104

ATTACHMENT 1

**Written Supplemental Submission from Ontario Power Generation Inc. on the
Pickering Nuclear Site 2014 and 2017 Environmental Risk Assessments**

CNSC Commission Member Document (CMD)

CMD: 17-H5.1C

Date Submitted: 18 August 2017

Reference CMDs: 17-H5.11B, 17-H5.13C

Written Supplemental Submission from Ontario Power Generation Inc.

Pickering Waste Management Facility

Commission Public Hearing

Held on April 13, 2017

Request for a Licensing Decision:

Regarding:
Request to renew the Waste Facility Operating
Licence for the Pickering Waste Management Facility

Submitted by:
Ontario Power Generation Inc.

Table of Contents

Executive Summary	1
1.0 Introduction.....	2
2.0 Summary of 2017 Baseline ERA for Pickering Nuclear Site	2
2.1 Pickering Waste Management Facility (PWMF)	3
2.2 PWMF Future Development.....	5
3.0 Security	6
4.0 Safety Analysis	7
5.0 Conclusions	7
References	8

Executive Summary

The purpose of this supplemental Commission Member Document is to provide the Canadian Nuclear Safety Commission with additional information in support of Ontario Power Generation Inc.'s (OPG) application for renewal of the Pickering Waste Management Facility (PWMF), Waste Facility Operating Licence WFOL-W4-350.02/2018.

This additional information responds to issues raised by intervenors on the 2014 and 2017 Pickering Nuclear site Environmental Risk Assessments [R1], particularly in the areas of stormwater, groundwater and active liquid waste emissions for PWMF, and is provided in the expectation that it will be helpful in enabling the Commission to make its decision.

OPG has posted the 2014 and 2017 Environmental Risk Assessments on its website at <http://www.opg.com/generating-power/nuclear/nuclear-waste-management/Pages/PWMF-Licence-Renewal.aspx> under "2017 Licence Renewal Information". Going forward, OPG has committed to publicly post all future Environmental Risk Assessments.

OPG reaffirms that the continuing and proposed new activities at the PWMF will not result in adverse environmental or health effects, taking into account identified mitigation measures. OPG has made and will continue to make adequate provision for the protection of the environment and the health of persons.

OPG therefore respectfully reaffirms our request for a licence to operate the Pickering Waste Management Facility to August 31, 2028.

1.0 INTRODUCTION

Ontario Power Generation (OPG) has submitted an application for renewal of the Pickering Waste Management Facility (PWMF), Waste Facility Operating Licence WFOL-W4-350.02/2018.

In support of the Hearing process, OPG has chosen to respond to statements made in interventions on the 2014 and 2017 Pickering Nuclear (PN) site Environmental Risk Assessments (ERAs) [R1].

This additional information is provided in the expectation that it will be helpful in enabling the Commission to make its decision.

The specific topics are primarily in the areas of stormwater, groundwater and active liquid waste emissions.

2.0 SUMMARY OF 2017 BASELINE ERA FOR PICKERING NUCLEAR SITE

OPG has several decades of experience in sampling, monitoring, testing, documenting and reporting on air, water, soil and other environmental media at the PN site and the surrounding vicinity. The site is well characterized and the impacts are documented through a number of Environmental Assessments and ERAs carried out for both the PN Generating Station and the PWMF. OPG continues to have robust programs for effluent, groundwater and environmental monitoring. The effects of our activities and operations on the environment are examined through an ERA. The ERA has been prepared to meet the requirements of CSA Standard N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills*.

The ERA is a systematic process used to identify, quantify, and characterize the potential for biological effects arising from contaminants and physical stressors in the environment. It addresses potential effects on both humans and the natural environment (i.e. plants and animals) that may be exposed to contaminants or physical stressors. The contaminants of interest may be radionuclides or other chemical substances released to the environment. Physical stressors may include emissions of noise, or heat, or the intake of cooling water at a nuclear generating station. The ERA includes a Human Health Risk Assessment for humans, and an Ecological Risk Assessment for biota.

The ERA process is considered to be an ongoing process, with review and update every five years (CSA, N288.6-12). An ERA for the PN site was completed in 2014, and was revised in 2017 to support the licensing process for the continued operations and eventual Safe Storage of the PN Generating Station. The 2017 PN site ERA utilized routine environmental and effluent monitoring data for the period 2011 to 2015. Based on recommendations from the 2014 ERA, the age of site environmental data, and site alteration from the development of Storage Building #3 for the PWMF, a comprehensive field sampling and survey campaign was carried out in 2015 to collect additional samples and data in a number of environmental media. The results of the field sampling

(surface water, sediment, stormwater and soil) and survey (noise) campaign were considered in the 2017 assessment.

2.1 Pickering Waste Management Facility (PWMF)

The ERA characterized the baseline environment and assessed the human health and ecological risks from operations of all facilities located on the PN site, which includes PWMF. Emissions from the PWMF are a very minor contributor to the overall emissions from the site and are accounted for in the overall reported emissions and environmental monitoring program associated with the PN site. This is demonstrated through a number of publications posted on www.opg.com. Annual emissions and environmental measurements are available in the Environmental Monitoring Program reports. Environmental emissions data for the PN Generating Station and the PWMF are provided quarterly on the website. In addition, OPG has summarized historical emissions specific to the PWMF in section 3.9.2 of OPG's Commission Member Document (CMD) 17-H5.1 [R2] submitted in support of the April 2017 PWMF licence renewal hearing.

It is recognized that the focus of the 2017 ERA is primarily on emission sources and physical stressors related to the operation of PN Generating Station as a major contributor. However, the following provides a summary of the findings of the ERA as it pertains to the environmental risk associated with the operations of PWMF, to put into context the impact of this facility.

Used Fuel Dry Storage and Retube Components Storage have negligible radiological emissions although they are a source of gamma radiation. The Dry Storage Container (DSC) Processing Building is the primary PWMF source of radiological emissions. Airborne radioactive particulates are monitored at the ventilation exhaust and have typically been below the Minimum Detectable Activity (refer to Figure 15 in [R2] for historical emissions). A small quantity of radioactive liquids from the DSC Processing building may be collected from floor drains or condensate from the heating and air conditioning system in the DSC Processing Building. This liquid is routed to the PN Generating Station's Radioactive Liquid Waste Management System for monitoring, processing and treatment as required prior to discharging to the Condenser Cooling Water System (refer to Figures 16 and 17 in [R2] for PWMF historical emissions). The impact of the radiological emissions including gamma radiation from PWMF were carried forward in the Human Health Risk Assessment and Ecological Risk Assessment for exposure assessment and the conclusions are described below.

Due to the nature of the activities carried out at the PWMF, non-radiological emissions at the PWMF are negligible. In the DSC Processing building, DSC touch-up painting and welding operations involve minimal quantities. Residual paint and welding fumes are passed through High Efficiency Particulate filters before exhausting to the active (forced air) ventilation system. Due to small quantities, painting methods, and the use of appropriate filtration, no significant emissions are expected. The PWMF also has a 130 kW emergency generator which is a source of nitrogen oxides emissions during testing and operations. This emission source is included in the Ontario Ministry of Environment and Climate Change's Emissions Summary and Dispersion Modelling report for the PN site. In the ERA, non-radiological Contaminants of Potential Concern in air were compared to air quality criteria. Based on the screening, none of the non-radiological

Contaminants of Potential Concern from PWMF operations were carried forward for further assessment.

The impact of PWMF's operation on the stormwater runoff is negligible given that there are no discharges of liquid effluents into the stormwater system. Stormwater drainage from the PWMF Phase I site is directed through the PN site drainage network into the PN Unit 5-8 discharge channel. Surface drainage from the PWMF Phase II site in the East Complex area drains to Lake Ontario via the stormwater system. Stormwater impacts from the PN site as a whole are included in the ERA. Specifically, stormwater outfall locations MH15 and M5-1 (refer to Figure 2.17 of the 2017 ERA) associated with PWMF Phase I and Phase II sites, respectively, were sampled in 2015 and the results reported in Appendix A of the 2017 ERA. In the Phase II Environmental Assessment, the original plan was to divert stormwater to the east wetland. However, due to the possibility of overloading the wetland during peak flow periods, the design of the stormwater system was modified so that the stormwater is directed through a Stormceptor® and eventually to the outfall via M5-1. The Stormceptor's® scour prevention technology ensures pollutants (debris, sediment, and hydrocarbons) are captured and contained during rainfall events. Screening of stormwater quality against water quality guidelines was conducted in the ERA. There were no exceedances of guidelines protective of the environment, and therefore, stormwater quality does not result in any adverse effects on the environment.

The ERA considered the effects of site groundwater flow and its interaction with the environment. On-site groundwater is not used as a source of potable drinking water. The site is considered industrial with drinking water supplied by the municipality. There are no groundwater drinking water wells downgradient of the potential sources on-site. Groundwater on the site generally flows from the north to the south towards the PN Generating Station buildings and Lake Ontario. The groundwater flow in the PN Generating Station's Protected Area and around the Powerhouse is highly influenced by foundation drain sumps that act as a hydraulic sink (lowest points on site). Water captured in these sumps pumps out eventually to the outfall through a monitored pathway and is captured in the surface water assessment. Due to the direction of groundwater flow at the site, there is no exposure pathway to offsite terrestrial biota. Groundwater at the PWMF Phase II site flows towards Lake Ontario and the effects on aquatic biota are assessed in the lake. Groundwater Contaminants of Potential Concern are not carried forward for further assessment in the ERA. With respect to the operations of PWMF, and based on the activities as described earlier, there are no sources (emissions) that could adversely affect the groundwater quality nor has there been any radiological contamination identified through the monitoring of the wells in the vicinity.

Physical stressors such as noise, thermal and impingement/entrainment were considered in the ERA. The PWMF operation and activities do not contribute to these physical stressors. Where there is a contribution (e.g. noise), the impact is minor in comparison to the PN Generating Station operations.

Based on the above discussion, the PWMF is a source of direct gamma radiation and a minor contributor to the total radiological emissions reported for the PN site. The conclusion of the assessment in the Human Health Risk Assessment and Ecological Risk Assessment is described below:

Human Health Risk Assessment Conclusion

For exposure of human receptors to radiological Contaminants of Potential Concern, the relevant exposure pathways were those presented in OPG's annual public dose assessments. The annual dose to the critical group (the urban resident adult) during this five year period ranged from 0.9 to 1.2 $\mu\text{Sv}/\text{year}$, approximately 0.1% of the regulatory public dose limit of 1,000 $\mu\text{Sv}/\text{year}$, and less than 0.1% of the dose due to Canadian background radiation (1,800 $\mu\text{Sv}/\text{year}$).

The Sport Fisher critical group may receive a maximum dose up to 0.14 $\mu\text{Sv}/\text{year}$ from direct gamma exposure to the PWMF operations; this is a small fraction of the 1,000 $\mu\text{Sv}/\text{year}$ regulatory public dose limit. Other potential critical groups are farther away and would receive much lower, negligible exposures. The Sport Fisher dose from other PN operations is 0.3 $\mu\text{Sv}/\text{year}$. The total dose of 0.44 $\mu\text{Sv}/\text{year}$ is a small fraction of both the regulatory public dose limit and dose due to Canadian background radiation.

Ecological Risk Assessment Conclusion

Radiation doses were calculated for fish, aquatic plants and invertebrates, and riparian (water based) birds and mammals at the PN outfall and Frenchman's Bay, and for terrestrial plants and invertebrates, and terrestrial birds and mammals on the PN site. Calculated doses were compared to accepted dose benchmarks of 400 $\mu\text{Gy}/\text{hour}$ (9.6 mGy/day) for aquatic biota, and 100 $\mu\text{Gy}/\text{hour}$ (2.4 mGy/day) for terrestrial biota, including riparian birds and mammals. The radiation doses calculated for all receptors at all locations were well below these benchmark values.

The maximum calculated dose rate to any receptor residing in close proximity to the PWMF (5 m from any wall) was 0.012 mGy/day, far lower than the 2.4 mGy/day radiation benchmark for terrestrial biota. The radiation dose benchmark of 2.4 mGy/day (100 $\mu\text{Gy}/\text{h}$) was selected for the PN assessment of effects on terrestrial biota as recommended in CSA Standard N288.6-12. This dose estimate is conservative, since wildlife species are unlikely to spend all their time so close to the PWMF. The doses expected from other PN operations are much lower, and total doses from the PWMF and other operations remain well below the benchmark.

Summary

Overall, the Environmental Risk Assessment confirms that PN and PWMF operations are continuing to operate in a manner that is protective of human and ecological receptors residing in the surrounding area.

2.2 PWMF Future Development

OPG has conducted several Environmental Assessments for Used Fuel Dry Storage buildings and DSC Processing buildings located on the Pickering, Darlington and Bruce Nuclear sites [R3], [R4], [R5], [R6] and [R7]. All of the Environmental Assessments concluded that, with mitigation measures, there were no significant residual adverse effects. Follow-up and monitoring activities confirmed the predictions made in the Environmental Assessments.

The proposed buildings (Used Fuel Dry Storage Buildings #4, #5, #6, and a new DSC Processing Building) are expected to be built and operated using a similar design and technology as the existing buildings. Operationally, the new DSC Processing Building is replacing an existing one. Although the processing capacity of the new DSC Processing Building will increase, the environmental emissions will remain essentially unchanged because, consistent with the existing DSC Processing buildings at Pickering, Darlington and Bruce Nuclear sites, airborne radioactive particulates are expected to be near or below the Minimum Detectable Activity. The future DSC Processing Building will be designed in a similar manner to the newer DSC Processing buildings located at Darlington and the Bruce Nuclear sites. For these newer DSC Processing buildings, active drainage is not needed.

Stormwater runoff will be managed as the Phase II site is expanded. A stormwater management plan will be developed and approval obtained from the Ontario Ministry of Environment and Climate Change through the Environmental Compliance Approval process. The expansion of the existing stormwater system will include additional Stormceptors® to ensure that the stormwater is free of any floating and settleable solids and oil.

In conclusion, the project activities for construction and operation of these buildings are well known and their effects can be mitigated to minimize environmental impacts. OPG is committed to carrying out follow-up monitoring activities to verify the prediction of the Environmental Assessments. The ERA will be reviewed and updated every five years in accordance with CSA Standard N288.6-12 to provide an on-going demonstration that the health and safety of people and the environment will continue to be protected.

3.0 SECURITY

As a Class IB Nuclear Facility that is used to handle and store Category II nuclear material, all buildings belonging to the PWMF are located within “protected areas” and are provided with appropriate security and alarm systems, in accordance with the CNSC’s *Nuclear Security Regulations* and CNSC Regulatory Documents RD-321 and RD-361. OPG Nuclear has established a comprehensive and effective security program for the two different “protected areas” belonging to the PWMF. A description of the program, in the form of a Security Report (security protected), has been submitted to the CNSC. Also, a separate Security Report Annex (security protected) has also been submitted to the CNSC to detail the measures that will be put in place for the new structures at PWMF.

OPG has assessed the transfer of a DSC between protected areas with the transfer clamp in the Safety Plan (security protected). The transfer clamp is designed to maintain the lid secured to the DSC base during all normal operations and abnormal events/credible accidents. Security will be provided in accordance with the approved Security Plan (security protected).

OPG maintains an armed response force capable of making an effective intervention, taking into account the security design basis threat and any other credible threat identified by security threat and risk assessment (security protected).

Security measures at PWMF meet the requirements in the *Nuclear Security Regulations*. These measures are evaluated by the CNSC at regular intervals to ensure that all measures are meeting the nature and intent of the *Nuclear Security Regulations*. Used fuel has been stored safely at this location since 1996. The proposed additional buildings will be built to meet or exceed the same requirements.

4.0 SAFETY ANALYSIS

As discussed at the hearing on April 13, 2017, there is no safety driver behind removing the used fuel from the irradiated fuel bays earlier than 10 years. The safety of the irradiated fuel bays has been assessed at length, both through the PN Generating Station safety reports and through the Fukushima review. As detailed in the August 2016 Commission meeting [R8], OPG is not currently pursuing the dry storage of used fuel younger than 10 years.

A drop of a Dry Storage Container (DSC) into the Pickering Generating Station's irradiated fuel bay has been assessed in the station's Safety Report. There is also a drop of a DSC scenario assessed within the PWMF Safety Report. Both assessments found that with the robust design of the DSC, no significant off-site or occupational dose consequences are expected to result from a drop of a DSC.

In the PWMF Safety Report, fires have been assessed along the transporter route, in the DSC Processing Building and in the DSC Storage Buildings. The effect of a fire would be to increase the temperature in the proximity of the DSC. Given the large thermal inertia of the DSC and the limited duration of the event, it is expected that a fire would not cause fuel overheating or fuel damage. Consequently, no significant off-site or occupational dose consequences are expected to result from a fire.

5.0 CONCLUSIONS

OPG values the interventions submitted on the 2014 and 2017 PN site ERAs and appreciates the time the intervenors took to review these documents.

The PN site ERA has been written in accordance with CSA Standard N288.6-12, *Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mill* using approved methodologies and published science. The ERA reaffirms that OPG has made and will continue to make adequate provision for the protection of the environment and the health of persons.

OPG therefore respectfully reaffirms our request for a licence to operate the Pickering Waste Management Facility until August 31, 2028.

References

- [R1] CMD 17-H5.1B
- [R2] OPG Letter, L. Morton to M. Leblanc, “*Notice of Participation for the CNSC Public Hearing – Pickering Waste Management Facility Licence Renewal Application – April 2017*”, February 10, 2017, CD# 92896-CORR-00531-01063.
- [R3] Ontario Hydro, *Pickering Used Fuel Dry Storage Facility – Stage II Screening Environmental Assessment*, 92896-REP-00531-0025042 R000, September 1998.
- [R4] CNSC Letter, S. Locatelli to K. Nash, “Record of Proceedings – Ontario Power Generation,” May 28, 2004, CD# 92896-CORR-00531-00233.
- [R5] CNSC Letter, L. Levert to D.P. McNeil, “Record of Proceedings – Ontario Power Generation Inc.,” January 26, 2009, CD# NK30-CORR-00531-05083.
- [R6] CNSC Letter, S. Locatelli to K. Nash, “Record of Proceedings – Ontario Power Generation Inc.,” November 7, 2003, CD# 00044-CORR-00531-00034.
- [R7] AECB (now known as CNSC) Letter, D. Howard to K. Johansen, “Comprehensive Study,” September 15, 1998, CD# 01098-REP-00531-326614.
- [R8] *Canadian Nuclear Safety Commission Public Meeting*, August 18, 2016, Retrieved from: <http://nuclearsafety.gc.ca/eng/the-commission/pdf/2016-08-18%20-%20Transcript%20of%20Commission%20Meeting-e.pdf>