



Oral Presentation

Exposé oral

**Submission from
Swim Drink Fish /
Lake Ontario Waterkeeper**

**Mémoire de
Swim Drink Fish /
Lake Ontario Waterkeeper**

In the Matter of

À l'égard de

**Ontario Power Generation Inc.,
Pickering Nuclear Generating Station**

**Ontario Power Generation Inc.,
centrale nucléaire de Pickering**

Request for a ten-year renewal of its Nuclear Power Reactor Operating Licence for the Pickering Nuclear Generating Station

Demande de renouvellement, pour une période de dix ans, de son permis d'exploitation d'un réacteur nucléaire de puissance à la centrale nucléaire de Pickering

Commission Public Hearing – Part 2

**Audience publique de la Commission –
Partie 2**

June 2018

Juin 2018

Preliminary Submissions of Swim Drink Fish Canada/Lake Ontario Waterkeeper

Re: Relicensing hearing before the Canadian Nuclear
Safety Commission (CNSC) for the Pickering Nuclear
Generating Station

Notice of Public Hearing, Ref. 2018-H-03

May 7, 2018

Submitted to:
Participant Funding Program Administrators cpsc.pfp.ccsn@canada.ca and the CNSC
Secretariat cpsc.interventions.ccsn@canada.ca
CC: Adam Zenobi adam.zenobi@canada.ca

About Swim Drink Fish Canada/Lake Ontario Waterkeeper

Swim Drink Fish Canada/Lake Ontario Waterkeeper (“Waterkeeper”) is a grassroots environmental organization that uses research, education, and legal tools to protect and restore the public’s right to swim, drink, and fish in Lake Ontario. As a non-political registered charity, Waterkeeper focuses on research and justice issues in the public interest. It is dedicated to protecting and celebrating the Lake Ontario watershed, including the wetlands, streams, rivers, and creeks that flow into the lake.

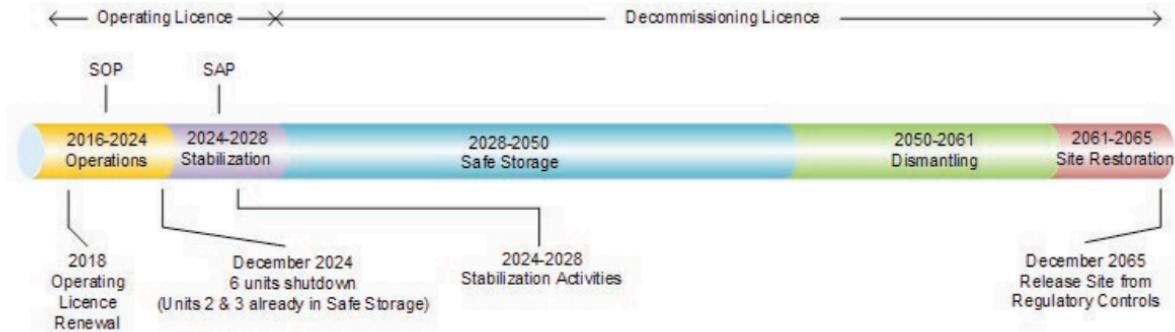
Waterkeeper also works with communities to facilitate the use of environmental laws to protect their rights to swim, drink, and fish. The organization participates in legal processes to help ensure that environmental decisions are made on the basis of sound and tested scientific evidence by independent decision-makers and in the public interest. Waterkeeper is participating in the current Pickering Nuclear Generating Station (PNGS) relicensing process in order to ensure the Commission Tribunal considers the public’s need for a swimmable, drinkable, fishable Lake Ontario when determining whether to renew the PNGS licence and add any additional licence terms.

About the Pickering Nuclear Generating Station and the current relicensing application

The current power reactor operating licence for the PNGS is set to expire in August 2018. Ontario Power Generation (OPG) is currently applying for a licence renewal that would include a new licence period of ten years, from 2018 to 2028. This requested licence term is at least two times longer than any past licence the PNGS has been granted to date.

OPG’s current relicensing application also includes a request that the power generation limit for PNGS Units 5-8, currently set at 247,000 Effective Full Power Hours (EFPH), be increased to 295,000 EFPH.

As the figure below shows, OPG is currently planning to end the facility’s commercial operations in 2024. Between 2024 and 2028, OPG plans to ‘stabilize’ the site, removing fuel bundles and reactor components for cooling in irradiated fuel bays and removing heavy water from the reactors. Then, from 2028, OPG is planning to transition the facility to a ‘safe storage’ state until approximately 2050, at which time it hopes to dismantle and restore the Pickering site.



The current long-term operating and decommissioning plan for the PNGS. Source: OPG CMD at p 8.

However, OPG has been incrementally extending its commercial operating period, pushing its design limit, and increasing its power generation limit over the last decade. Thus, while it asserts it will soon wind down its operations, this may not in fact be the case.

The currently proposed new licence for the facility requires the Canadian Nuclear Safety Commission (CNSC) to be notified by December 2022 of any intention by OPG to extend the PNGS operating life past 2024, thus leaving open the possibility of further extending the commercial operations of the facility. Should OPG apply to extend the site’s commercial operations past 2024, a decision would be rendered at that time by the CNSC, based primarily on a safety assessment of the reactors.¹ It is uncertain whether that decision would automatically require public input via written or oral hearing, or whether it would only proceed to be considered by CNSC staff internally. Either way, the extent to which public participation and considerations of environmental factors during that future decision-making process remains unclear.

Given the potential for the current hearing to be the last PNGS-specific opportunity for public input into the facility’s operations and environmental impacts for a decade – and given the fact that the PNGS operations may be extended over that time – the CNSC must ensure a rigorous review of all relevant evidence concerning the PNGS’ safety and environmental performance.

¹ Pickering Nuclear Generating Station Relicensing “Day 1” Hearing, April 4, 2018, Official transcripts, at 61, online: <<http://www.nuclearsafety.gc.ca/eng/the-commission/pdf/TranscriptofPickeringHearing-April4,2018.pdf>>.

Waterkeeper's current preliminary submissions

Waterkeeper has received participant funding to intervene in this matter, which requires the organization to prepare and deliver both written and oral submissions concerning the impacts of the PNGS to local water quality and aquatic ecosystems, as well as the adequacy of OPG's public information policies and practices for the facility.

Waterkeeper was provided with participant funding from the CNSC in order to retain three experts to examine the PNGS and make recommendations for improvements to its operations:

- **Pippa Feinstein, JD**, counsel and case manager for Waterkeeper. Ms. Feinstein was retained to assess and make recommendations concerning the PNGS' regulatory compliance as well as the adequacy of its public information-sharing policies and practices;
- **Peter Henderson, BCs, PhD**, an experienced fisheries biologist and international leading expert on the impacts of nuclear cooling water systems. Dr. Henderson was retained to assess the PNGS cooling water system and make recommendations for its improvement; and
- **Wilf Ruland, P. Geo.**, an experienced hydrogeologist and recognized leading expert on the impacts of industrial facilities on local groundwater and surface water. Mr. Ruland was retained to assess the PNGS' impacts on groundwater and surface water and make recommendations for improvements.

Ultimately, the Commission can only renew the PNGS licence, if it finds the legal test in section 24(4) of the *Nuclear Safety and Control Act (NSCA)* is met. This section specifies:

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.

Section 24(5) of the *NSCA* also provides the Commission with the authority to impose any conditions on licence approvals it considers necessary:

A licence may contain any term or condition that the Commission considers necessary for the purposes of this Act, including a condition that the applicant provide a financial guarantee in a form that is acceptable to the Commission.

With the assistance of its three experts, Waterkeeper had planned to provide evidence and arguments concerning the extent to which this legal test had been met. Waterkeeper had also planned to submit recommendations for the Commission Tribunal to consider when determining the need for additional licence conditions to better ensure the facility's safe operations and protection of the local environment.

However, when Waterkeeper's experts began their reviews, they found that there was insufficient publicly available information to inform their work. As such, Waterkeeper requested additional information from CNSC staff and OPG, and requested a site visit of the PNGS. Despite these requests, there is still insufficient information for Waterkeeper's experts to do the work they have been retained to do, and no site visit has proven possible. The persisting information deficit and lack of a site visit has prevented Waterkeeper from being able to fulfil its obligations under its funding agreement with the CNSC.

A week ago, Waterkeeper requested, and was subsequently granted, an extension by the CNSC Secretariat. The Secretariat required Waterkeeper to submit preliminary written submissions to meet the May 7th deadline, and permitted Waterkeeper to submit more fulsome submissions by May 18, 2018. Hopefully by that time, OPG will have provided Waterkeeper with additional information and facilitated a site visit.

Waterkeeper's submissions on May 18th will include the expert testimony of Dr. Henderson and Mr. Ruland, as well as Ms. Feinstein's legal arguments concerning the regulatory compliance of the PNGS with regard to its impacts on the swimmability, drinkability, and fishability of Lake Ontario. Waterkeeper's May 18th submissions will also contain an assessment of the PNGS public information sharing policies and practices and include recommendations from all three experts for their improvement.

To ensure these submissions are as helpful as possible to the Commission Tribunal, Waterkeeper requests CNSC staff assistance in obtaining sufficient information from OPG to inform its May 18th submissions.

The lack of Information-sharing during the current hearing process

OPG's application, which is 376 pages long, contains fewer than five pages concerning the PNGS' impacts on local surface water, groundwater, and the impacts of its cooling water system on aquatic biota.² The Commission Member Document (CMD) provided by CNSC staff fails to

² Approximately one page of information (on pp 48 and 89) concerns fish impingement at the PNGS, though no data is included or referenced in this discussion. Virtually no discussion of fish entrainment is included in the document. One paragraph on p 90 concerns thermal impacts of the PNGS cooling water

do much better, devoting fewer than 25 of its 472 pages to assessments of the PNGS' impacts on the health and wellbeing of local aquatic ecosystems, surface and groundwater.³ Additional sources of information, including the Independent Environmental Monitoring Program (IEMP), the 2014 and 2017 Environmental Risk Assessments (ERAs), and quarterly or annual compliance reports from OPG, similarly fail to provide sufficiently detailed or consistent information to allow for Waterkeeper's experts to fully understand and assess the PNGS' environmental performance.

While it may appear upon first glance that the abovementioned sources provide several publicly accessible platforms for information-sharing, this is not the case. Closer examination shows that all of these sources repeat assertions that the PNGS is operating within its licence conditions and that any exceedances are not environmentally significant. However, insufficient data is provided to demonstrate the veracity of these claims. These documents include virtually no disaggregated data concerning any environmental monitoring on the PNGS site itself. What limited data is reported concerning impacts of the PNGS site on its surroundings, is often provided in annual or quarterly averages, and even then, it is not consistently reported from year to year. Further, the monitoring methodologies OPG uses are not comprehensively explained, frustrating attempts to assess the significance and adequacy of any provided sampling results.

After thoroughly researching all the information that was available on the public record, Waterkeeper's experts made additional information requests of OPG. These information requests concerned the need for clarity concerning aspects of PNGS operations and included requests for access to monitoring reports and sampling methodologies and results to support the assertions being made in OPG's publicly available sources. These requests are included as Appendix A to these preliminary submissions.

There have been significant delays in receiving any requested information from OPG and the amount and quality of information received so far falls far short of the amount required to

system, again unaccompanied by any data or references to publicly available data. Approximately one and a half pages of information concern groundwater quality below the PNGS (pp 47, 72, and 84), again unaccompanied by any data or references to publicly available data – despite the fact that Units 5-8 irradiated fuel bay areas were found to have been leaking. Surface water impacts of the PNGS are discussed in a single page (pp 91-92) generally lacking any data or references to data: stormwater is not mentioned once, one sentence is devoted to all liquid effluent from the site, simply asserting all effluent streams met regulatory and licence conditions (p 83). Written submission from Ontario Power Generation Inc., CMD 18-H6.1.

³ This information is included in pp 37-37, 94-5, 128-9 of the main document, and pp 19, 29, and 37-47 of CNSC staff's Environmental Assessment Report (EAR). However, the discussions of PNGS impacts on aquatic biota and local surface and groundwater are not accompanied by sufficient data. Only annual impingement averages are provided and no entrainment data is provided. Virtually no data is provided concerning groundwater, stormwater, thermal, or effluent discharges. Written submission from CNSC staff, CMD 18-H6.

produce the kind of high-quality reports Waterkeeper is committed to providing to the Commission Tribunal. OPG is denying all requests for monitoring and event reports, and is refusing to provide more detailed information than that which is already available in publicly posted materials.

Waterkeeper also requested a site visit of the PNGS, and the opportunity to meet with OPG staff to further discuss and better understand the facility's ecological footprint. However, OPG refused to provide a site visit before May 7th, which was when written submissions in this matter were due. Waterkeeper has since proposed several dates for a site visit after the 7th, and has yet to receive a response from OPG.

The lack of OPG cooperation during this hearing process is almost unprecedented. The company has not denied site visits to Waterkeeper in the past, and while obtaining information from the company can often be challenging, Waterkeeper has never experienced this degree of obfuscation before.

Public access to information during the 2017 Pickering Waste Management Facility relicensing hearing

It is important to note that the amount of information available during this current hearing process is more than it would have been were it not for Waterkeeper's intervention in last year's Pickering Waste Management Facility's (PWMF) hearing.

In the Commission Tribunal's written decision to relicense the PWMF it expressed concern over the lack of public access to environmental data during the hearing process. In its decision, the Commission Tribunal addressed deficiencies in both CNSC staff and OPG's lack of transparency during the hearing process.

Commissioners expressed concerns over CNSC staff's use of "ambiguous terminology: such as 'very minor percentages' in reference to contaminant releases", and supported Waterkeeper's recommendations that CNSC characterizations of environmental effects be supported by publicly available data in order to ensure greater transparency.⁴ Further, the Commission Tribunal supported a more active role by CNSC staff in the future should intervenors find it difficult to acquire information from regulated facilities.⁵

⁴ Record of Decision in the Matter of Ontario Power Generation Application to Renew the Waste Facility Operating Licence for the Pickering Waste Management Facility, at para 169.

⁵ *Ibid* at para 234.

In its decision, the Commission Tribunal also encouraged OPG to publicly release more information about its contaminants of primary concern in future annual CNSC facility compliance reports,⁶ and expressed dissatisfaction that ERAs for the Pickering site were not made publicly available for the PWF hearing.⁷ In fact, the Commission extended the hearing from April to July 2017 to allow for OPG's disclosure of its ERAs and to facilitate Waterkeeper's comments on them.

Thus, it is due to Waterkeeper's intervention last year that OPG's ERAs are even a part of the public record in the present PNGS relicensing hearing, assisting Waterkeeper and the other intervenors during the current process. At the same time, as Waterkeeper's submissions during the PWF hearing demonstrated, ERAs are still a significantly limited source of disaggregated data or environmental monitoring methodologies.⁸

Ultimately, in its PWF decision, the Commission Tribunal recognized there could be instances in which the need for future public information disclosure may be broader than the reporting requirements specified in CNSC RD/GD-99.3 (the Commission's policy concerning public information and disclosure).⁹ Waterkeeper submits that the current PNGS hearing constitutes such a circumstance.

Troublingly, during the current hearing process, when Waterkeeper notified CNSC staff of its difficulties in obtaining information or arranging a site visit with OPG, staff explained that they require OPG's consent before sharing any information in their files concerning the PNGS operations. CNSC staff subsequently directed Waterkeeper to focus instead on obtaining information from OPG directly. It is unclear to date whether (or to what extent) CNSC staff have been discussing this issue of minimal disclosure with OPG, or encouraging further disclosure.

Waterkeeper is deeply concerned over CNSC staff's deference to OPG (the regulatee) in these circumstances, and their approach to data concerning the local swimmability, drinkability, and fishability of Lake Ontario, treating it as the private property of this company. Such an approach infringes on members of public's right to know about the quality of their environment, and appears to be inconsistent with the legislated role of the CNSC to protect the public interest.

Section 9(b) of the NSCA specifies that the CNSC's objectives include:

⁶ *Ibid* at para 15.

⁷ *Ibid* at para 167.

⁸ Lake Ontario Waterkeeper comments on the 2014 and 2017 Environmental Risk Assessments for the Pickering Nuclear Generating Station and Pickering Waste Management Facility, July 21, 2017, online: <<http://www.waterkeeper.ca/blog/2017/7/31/waterkeeper-comments-on-environmental-risk-assessment-for-pickering-waste-management-facility?rq=pickering>>.

⁹ *Supra* note 4 at para 71.

disseminat[ing] objective scientific, technical and regulatory information to the public concerning the activities of the Commission and the effects, on the environment and on the health and safety of persons, of the development, production, possession and use [of nuclear substances].

To date, the lack of public disclosure of objective scientific and technical information is glaring. This constitutes a deeply problematic failure of the CNSC to use its authority to protect the integrity of the current hearing process and ensure intervenors are able to perform the analysis they were provided Commission funding to undertake.

Ultimately, Waterkeeper hopes to have sufficient information to help ensure a hearing on the merits of OPG's application, rather than the deficiencies of the current regulatory process.

Summary of information requests from Waterkeeper in its intervention before the CNSC concerning the Pickering Nuclear Generating Station Licence Renewal

Below is a record of the interactions between Waterkeeper, OPG, and CNSC staff concerning information requests to date.

March 7, 2018

Waterkeeper requested the current Licence Conditions Handbook from CNSC staff.

March 7, 2018

Waterkeeper requested from OPG:

- the current Licence Conditions Handbook for the PNGS;
- the current *Fisheries Act* authorization to operate the PNGS' once-through cooling water system;
- any plans concerning how the once through cooling water system will be managed during the PNGS' decommissioning process; and
- more information concerning the installation of appropriate emissions monitoring equipment at the facility since 2013 (it appears as though OPG was required to improve its emissions sampling for the site sometime between 2008 and 2010, and that improvements were yet to be implemented by 2013 when Waterkeeper intervened in the last licence renewal hearing for the facility).

March 8, 2018

Waterkeeper received confirmation of receipt from OPG, and a note that should further clarification be required they would be in touch.

March 8, 2018

Waterkeeper received the Licence Conditions Handbook from CNSC staff.

March 26, 2018

Waterkeeper sent a follow up email to OPG, noting no responses had been received to date, inquiring about the delay, and offering to provide any further assistance that may be helpful.

March 26, 2018

OPG sent the DFO permit and an attachment with the PNGS current Licence Condition Handbook.

March 26, 2018

Waterkeeper inquired about whether there had been any other DFO permits.

March 26, 2018

OPG confirmed the sent permit was the facility's first and only one.

March 28, 2018

OPG requested clarification concerning Waterkeeper's request concerning the installation of additional monitoring equipment at the facility since 2013.

March 29, 2018

Waterkeeper undertook to provide clarification the following week.

April 6, 2018

Waterkeeper clarified that additional sampling seemed to have been required by the CNSC after 2008, namely: reactor service water monitoring through radiological and non-radiological samplers (which were expected to be installed in 2013), as well as stack monitors for air emissions, and tritium samplers. Waterkeeper requested whether any of these additional types of monitoring equipment been installed at the PNGS since 2013, explaining the question was a follow-up item from the organization's last intervention during the 2013 PNGS licence renewal hearing.

April 10, 2018

OPG requested CNSC or OPG pinpoint references to support Waterkeeper's request.

April 10, 2018

Waterkeeper undertook to look into finding pinpoint references.

April 16, 2018

Waterkeeper requested:

- a map showing all stormwater outfalls to the lake
- a list of those outfalls, indicating which are being sampled for water quality and results (or reference to where results may be found)
- a map showing all lines carrying liquid discharges of any kind to the lake (be it for cooling water or other liquid discharges)
- a list of those liquid discharge lines, indicating which are being sampled for water quality and results (or reference to where results may be found)
- annual groundwater quality monitoring reports for the 2 most recent years available

Waterkeeper also requested a site visit of the PNGS for the 24th or 25th of April.

April 16, 2018

OPG asked which parts of the site Waterkeeper would want to see.

April 18, 2018

Waterkeeper noted it was hard to say exactly where on the site Ms. Feinstein and Mr. Ruland needed to go, as Waterkeeper had not yet received the maps requested on the 16th. However, as the organization was interested in groundwater, surface water and storm water flows, and all liquid discharge flows to the lake, they would want to see:

- general lay of the land around the facility and in particular closest to the lake;
- locations of the monitoring groundwater monitoring wells closest to the lake;
- locations of all storm sewer outfalls;
- locations of all liquid discharge pipes (eg. cooling water and anything else) leading toward or into the lake;
- any waste management facilities on the PNGS property.

April 19, 2018

Waterkeeper requested:

- 1) More information concerning events when the barrier net has failed. In particular, whether the net is becoming fouled with algae and then getting pulled underwater so fish swim over the top. Please share any event or monitoring reports or other sources containing this information;
- 2) More information, including any event or monitoring reports. concerning the frequency of events when cooling water flow is reduced resulting in a spike in discharge temperatures; and

3) Copies of, or at least more detailed information concerning, chlorination and other biofouling prevention procedures for the cooling water system at the PNGS.

Waterkeeper also inquired about when it could expect responses to these and the information requests sent on April 16.

April 23, 2018

OPG notified Waterkeeper the PNGS environmental group could not accommodate Waterkeeper's dates and would propose alternative dates

April 23, 2018

Waterkeeper explained the importance of the site visit and requested information, noting both were crucial to ensure its intervention was as helpful as possible to the CNSC, OPG, and general public and requested a site visit later that week or the next

April 25, 2018

Waterkeeper wrote to follow up with OPG as it had not received alternative dates. Waterkeeper proposed its own additional dates to assist with the process. Waterkeeper also reminded OPG of our May 7th deadline, requesting information before this date.

April 26, 2018

Waterkeeper wrote to the CNSC Secretariat expressing concern at not receiving any information from OPG to date and asking whether staff had any of the requested information in their files that they may be able to share.

April 26, 2018

OPG undertook to provide responses to "as many of [Waterkeeper's] questions as possible" by May 2, 2018.

May 2, 2018

OPG provided responses to some of Waterkeeper's information requests.

May 2, 2018

Waterkeeper submitted its request for an extension of the deadline for written submissions.

May 3, 2018

The CNSC Secretariat approved Waterkeeper's request.

May 4, 2018

Waterkeeper wrote to follow up with OPG about their responses received on May 2, and to inquire about a future site visit.

May 7, 2018

OPG undertook to provide additional responses to Waterkeeper's remaining information requests and confirm a date for a site visit.

Information requests from Peter Henderson, BSc PhD to OPG

Following is a list of information requests from Dr. Henderson to OPG. The original information requests are presented in bold type, the OPG response is below in *italics*, and Dr. Henderson's response is presented below that - again in plain type, and indented. This document only addresses the first three information requests as subsequent requests were sent from another expert (Mr. Ruland) in this matter.

1) More information concerning events when the barrier net has failed. In particular, whether the net is becoming fouled with algae and then getting pulled underwater so fish swim over the top. Please share any event or monitoring reports or other sources containing this information

OPG annually monitors and reports fish impingement at PNGS to the CNSC. Since 2010, a fish diversion system (FDS) is installed for approximately half the year, from early May to late October, to deter fish from entering the intake and becoming impinged. When deployed, the FDS is highly effective at mitigating fish impingement. The nets that comprise the FDS are cleaned multiple times per week by OPG divers, and the FDS design incorporates a secondary skirt that remains at the surface even if the primary net becomes fouled with algae and begins to sink. One impingement event occurred in May 2015 while the FDS was installed during which approximately 6,000 kg of Alewife were impinged. The cause was a break in the seams between two net panels, which was immediately repaired. A second event occurred in November 2017 after the FDS was removed. During the event, approximately 24,000 kg (1,476 kg of Age-1 equivalent) Alewife were impinged. OPG is investigating the cause of the event.

This response appears to be denying access to the requested information (namely any monitoring reports or raw data concerning identified types of net failure), merely restating broad and general information than is already provided in the CMDs.

2) More information, including any event or monitoring reports. concerning the frequency of events when cooling water flow is reduced resulting in a spike in discharge temperatures

Section 4.1.3.11.2 in the Environmental Risk Assessment (ERA) outlines discharge limits for cooling water that are regulated by the station's Environmental Compliance Approval (ECA) issued by the Ministry of Environment and Climate Change. Events causing exceedances of the ECA temperature limits occurred due to algae/debris runs, equipment failure and frazil ice. During the period of 2013 to 2015, there were 10 events resulting in the exceedance of ECA temperature limits. In order to minimize the impact and frequency of thermal events, OPG has implemented mitigation and preventative actions as outlined in Section 4.1.3.11.2 of the ERA. As a result, the number of events have declined to one event in 2015 and none occurring in 2016, 2017, or 2018 to date. Reference: Environmental Risk Assessment Report for Pickering Nuclear <https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>

This response also appears to be denying access to the requested information (namely more detailed event or monitoring reports, or any results, i.e. data, concerning the results of the monitoring program), merely restating broad and general information than is already provided in the ECAs and ERAs.

3) Copies of, or at least more detailed information concerning, chlorination and other biofouling prevention procedures for the cooling water system at the PNGS.

PNGS uses station intake water from Lake Ontario for operating purposes, including the cooling of nuclear reactors, irradiated fuel bays, steam condensers and heat exchangers, fire and emergency water systems and other service water systems. Within the service water systems Dreissenids (Zebra and Quagga mussels) can settle, attach to OPG infrastructure, grow to later life stages and colonize. Accumulations of Dreissenid colonies can cause flow reductions or blockages, particularly in water-bearing pipes, that negatively impact the safe operation of the OPGN reactors, reduce station thermal performance and degrade service water systems. Dreissenid controls are implemented, to reduce and preferably eliminate colonization and protect vulnerable systems, structures and components. The primary control to deter colonization is chemical treatment of vulnerable service water systems using sodium hypochlorite (i.e. chlorination).

Chlorination controls for Dreissenids are performed in a manner compliant with our Ministry of the Environment and Climate Change (MOECC) Certificate of Approval Industrial Sewage Works (ECA) for Pickering GS (ECA# 4881-5MHQ9F) including ECA specified effluent limits, effluent objectives and the ECA intent. More specific monitoring and control methods, including the timing of applying controls, are contained in OPG environmental, operational and engineering procedures (Control of Dreissenid Mussels N-ED- 07015.061-10000- R006). These procedures are intended to ensure the safety of OPG cooling water systems, protect our workers, deter Dreissenid mussel settlement, monitor treatment effectiveness, and minimize sodium hypochlorite use.

It appears there is a total residual chlorine standard for the discharge canal of 0.002 mg/l maximum concentration. However, this concentration appears to be effectively impossible to actually measure in practice. As no procedures have been shared in response to the original question, the response above is extremely limited. It would be important to know if OPG has some method for actually measuring chlorine concentration, or whether they are instead not able to detect total residual chlorine in the discharge, and thus assume it complies with regulatory/licence/permit limits.

All these three responses are significantly lacking in the disclosure of data and methodology, making expert review especially difficult.

Information requests from Wilf Ruland (P. Geo.) to OPG

Following is a list of information requests from Mr. Ruland to OPG. The original information requests are presented in bold type, the OPG response is below in *italics*, and Mr. Ruland's response is presented below that - again in plain type, and indented. The numbering starts with four, as the first three information requests were sent from another expert (Dr. Henderson) in this matter.

4) A map showing all stormwater outfalls to the lake.

Stormwater runoff from the PN site is collected by the stormwater drainage system and directed through drainage pathways south to Lake Ontario. A map of the catchment areas is available in the ERA report (see Figure 2-17). Section 3.1.2.2.3 of the ERA has more details provided on the drainage pattern and the sampling program results. Sample locations are also shown on Figure 2-17 of the ERA.

*Reference: Environmental Risk Assessment Report for Pickering Nuclear
<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>*

I am well aware of the overview catchment areas map on Figure 2.17 of the 2017 ERA Report. That is not what I requested. I am trying to get an overview of how many outfalls there are, where they are situated, and how many of them have been sampled.

I am also seeking all water quality data for outfall sampling for the PNGS. If there is more information available than is provided in Appendix F of the 2017 ERA Report then please provide it forthwith.

5) A list of those outfalls, indicating which are being sampled for water quality and results (or reference to where results may be found).

See answer for item 4 above.

The response to 4 above was an unsatisfactory response. Please see my further information request above on this issue.

6) A map showing all lines carrying liquid discharges of any kind to the lake (be it for cooling water or other liquid discharges).

Figure 2-5 in the ERA shows the liquid discharge lines. A simplified flow diagram of the radioactive liquid waste management system (RLWMS) is also shown in Figure 2-6 of the ERA. See section 2.2.1.1 of the ERA for more descriptive details of PN Site Drainage and Waterborne Discharge.

*Reference: Environmental Risk Assessment Report for Pickering Nuclear
<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>*

Figure 2-5 is useful, but the information is not complete. For example, stormwater runoff catchments are shown on Figure 2.17 of the same report. A total of 17 catchments are shown. Figure 2.5 has three boxes showing stormwater runoffs (with average flows). Please indicate which individual catchments are represented by each of the 3 boxes.

Please also confirm how the average flows were calculated. Are these estimates, or averages of measured flows? How many of the stormwater flows from the site are measured on an ongoing basis with flow meters, and if any of the stormwater outfalls.

Similar questions apply to the other flows shown in Figure 2.5. Which of the other average flows shown are based on measurements, and which are based on estimates.

7) A list of those liquid discharge lines, indicating which are being sampled for water quality and results (or reference to where results may be found).

Figure 2-5 in the ERA shows the liquid discharge lines. Aqueous liquid effluent, except for domestic sewage and some stormwater drainage, from PN is discharged into the CCW discharge duct, the outfall structures or the forebay.

The majority of stormwater drainage is directed to Lake Ontario, and domestic sewage is directed to the York-Durham Water Pollution Control Plant. Non-radioactive liquid emissions are controlled in accordance with the provincial Environmental Compliance Approval (ECA) requirements (formerly Certificate of Approval), and with the Municipal Industrial Strategy for Abatement (MISA) program under O. Reg. 215/95 (Effluent Monitoring and Effluent Limits – Electric Power Generation Sector). Under O. Reg 215/95, PN monitors the control points in use for MISA Compliance monitoring. The control points and the parameters monitored at each point are presented in Table 2.4 of the ERA. The locations and parameters monitored for ECA compliance are presented in Table 2.5 of the ERA. Table 3.3 of the ERA shows the radioactive emissions data from PN which included waterborne emissions.

*Reference: Environmental Risk Assessment Report for Pickering Nuclear
<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>*

I am familiar with the MISA control points. Where are the water quality testing results for those MISA control points?

I am familiar with the ECA - where are the results for the ECA-required testing?

Is there any other discharge water quality testing done (besides that required by the MISA program and the ECA), and if so where are the results?

8) Annual groundwater quality monitoring reports for the 2 most recent years available.

OPG is unable to provide you with the Annual Groundwater Monitoring Reports, However data for our perimeter wells are posted on our public website.

https://www.opg.com/news-and-media/Reports/PN_EmissionsDataReport_2017Q3.pdf

Page 51 of the 2016 Annual Report for Environmental Monitoring Programs indicates that there are 190 groundwater sampling locations on-site.

The data on the link to the quarterly report on the website are for tritium only, for 28 perimeter wells only, and for 2016 only.

Where is other groundwater quality monitoring data to be found, or was the only groundwater quality testing (done in 2015 and 2016) done for tritium only, in 2016?

Also please provide any hydrogeological investigations which have been done for the PNGS. For example, I have seen repeated references to a 2007 report by Golder Associates Ltd. "Geology,

Hydrogeology and Seismicity Technical Support Document Refurbishment and Continued Operation of Pickering B Nuclear Generating Station Environmental Assessment. Report No. NK30-REP-07701-00006.” Please provide this report.

9) General lay of the land around the facility and in particular closest to the lake.

See figures below in the ERA:

- *Figure 2-1: PN Site Location and Vicinity*
- *Figure 2-2: Pickering Nuclear Generating Station*
- *Figure 2-16: PN Site Plan*

Reference: Environmental Risk Assessment Report for Pickering Nuclear

<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>

These figures are useful, but the information is not complete.

I am seeking a topographic map of the site - the topographic contours provided on such maps give the “lay of the land”.

10) Locations of the monitoring groundwater monitoring wells closest to the lake.

See figure 4-6 in the ERA as well as attachment.

Reference: Environmental Risk Assessment Report for Pickering Nuclear

<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>

This is not helpful. Figure 4.6 shows noise receptors around the site.

The attached figure shows the locations of 6 wells near the lake. Is it OPG’s position that of its 190 groundwater monitoring locations, only 6 are located near the lake?

11) Locations of all storm sewer outfalls.

See answer for item 4 above.

The response to item 4 above was an unsatisfactory response. Please see my further information request on item 4 above on this issue.

12) Locations of all liquid discharge pipes (eg. cooling water and anything else) leading toward or into the lake.

See Figure 2-5 in the ERA.

Reference: Environmental Risk Assessment Report for Pickering Nuclear

<https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-REP-07701-00001.pdf>

This has been covered previously in information requests 4, 6, and 7.

13) Any waste management facilities on the PNGS property.

OPG operates the Pickering Waste Management Facility on the same site as the Pickering Nuclear Generating Station.

I understand that the Pickering WMF is a very tightly controlled facility, for storage of used nuclear fuel. I am not anticipating any water-related impacts from this facility, but I am nonetheless interested in water quality sampling which confirms this.

And what about the Eastern Landfill? Please provide any available historic data or reports on groundwater and/or surface water monitoring done at any point in the past at that facility.