



Supplementary Information

Renseignements supplémentaires

Presentation from the Canadian Environmental Law Association

Présentation de l'Association Canadienne du droit de L'environnement

In the Matter of the

À l'égard d'

Ontario Power Generation Inc.

Ontario Power Generation Inc.

Application for a licence to construct one BWRX-300 reactor at the Darlington New Nuclear Project Site (DNNP)

Demande visant à construire 1 réacteur BWRX-300 sur le site du projet de nouvelle centrale nucléaire de Darlington (PNCND)

Commission Public Hearing Part-2

Audience publique de la Commission Partie-2

January 8-10 and 13-14, 2025

8-10 et 13-14 janvier 2025

Comments on Ontario Power Generation's Application for a Licence to Construct a Small Modular Reactor for the Darlington New Nuclear Project



CNSC Hearing Reference 2024-H-03

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Canadian
Environmental Law
Association
EQUITY. JUSTICE. HEALTH.

Photo: Sara Libman

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Canadian Environmental Law Association (CELA)



Photo: Sara Libman

- Specialty legal aid clinic dedicated to environmental equity, justice, and health
- Founded in 1970, funded by Legal Aid Ontario since 1978
- CELA provides free legal services relating to environmental justice in Ontario, including representing qualifying low-income and vulnerable communities in the courts and before tribunals. CELA also provides free summary advice to the public and engages in legal education and law reform initiatives.



I. Interest and Expertise of the Intervenors

Durham Nuclear Awareness (DNA) is a citizens' group with a longstanding interest in the Darlington Nuclear Generating Station. DNA was first organized in 1986 in the wake of the Chernobyl disaster and born out of a need for people in Durham Region to come together, learn & empower themselves. As a volunteer group of concerned citizens, DNA dedicates themselves to raising public awareness about nuclear issues facing Durham Region, and fostering greater public involvement in the nuclear decision-making process.

Slovenian Home Association (SHA) is a non-profit cultural organization dedicated to the preservation of Slovenian culture language, heritage and identity in Canada. Many Slovenians reside in the vicinity of the Pickering and Darlington nuclear plants and are concerned about the proposed plans to expand nuclear power generation within the region, particularly with OPG proposing novel reactor technology at the Darlington site. Much of these concerns stem from emergency planning for nuclear accidents.

Expert Retained for Technical Review:

Dr. M.V. Ramana is a Professor and the Simons Chair in Disarmament, Global and Human Security at the School of Public Policy and Global Affairs (SPPGA), University of British Columbia. M. V. Ramana has published several peer-reviewed papers and reports on SMRs and has expertise in analyzing the multiple risks associated with these and accompanying adverse environmental effects.

II. Scope of Review



Photo: Sara Libman

- This submission builds on our previous submissions associated with the entirety of the DNNP's legacy, while focusing on:
 - documents published by OPG & the CNSC for the Licence to Construct application;
 - CNSC REGDOCS;
 - International nuclear standards documents; and
 - Academic studies regarding nuclear power and SMRs



III. Preliminary Concerns: Preserving Public Trust in Requests for Confidentiality

- September 5, 2024: Notice of Request for Confidentiality was published, inviting public comments on 4 requests for confidentiality.
 - The public only had 15 days from the notice's posting to provide comments on the requests, which consisted of over 4000 pages.
- We commend the Commission for opening up the process of assessing requests for confidentiality to allow comments from the public, as opposed to the process occurring in a private manner between the CNSC and the proponent.
 - **However**, there **must** be increased notice for public review of these requests, to allow for adequate review and comment.
- We reiterate CELA's confidentiality review recommendation that in the interest of effectively disseminating objective scientific, technical, and regulatory information to the public for this application for a licence to construct, the Commission should stringently assess these requests with a lens of upholding public transparency. Rather than excluding entire documents, redacting content may be more appropriate, and that technical information, especially information related to safety and emergency planning, should not be made confidential.

IV. Summary of Findings



Photo: Sara Libman

- There is too much uncertainty surrounding the BWRX-300 reactor design for a licence to construct to be granted.
- There are inadequacies surrounding the siting of the proposed nuclear facility, emergency planning measures, and climate change mitigation and adaptation strategies.
- We reiterate from our previous submissions that the selected technology is ‘fundamentally different’ from the variety of technologies captured in the original EIS and PPE.
 - The risks and uncertainties surrounding the BWRX-300 reactor technology are too great for the Commission to issue a licence to OPG to construct one BWRX-300 reactor.



V. Detailed Findings



A. Nuclear Waste Storage Facilities

- A **primary concern** for citizens living in close proximity to this site is the storage of the radioactive waste that would be produced by the reactor(s). In particular, members of the public are concerned about the placement of dry storage containers near Lake Ontario, as well as more details about the dry storage container design.
 - However, decisions related to the location of interim storage of used fuel for this project will be made during future licensing phases, i.e., the licence to operate phase, meaning that the final position of the storage containers in relation to Lake Ontario has not been determined, nor has a specific spent fuel storage technology been selected.
- We **object** to the regulatory process advancing with waste management being scoped out of the Licence to Construct application.
 - **REGDOC-1.1.2, Licence Application Guide: Licence to Construct a Reactor Facility**, states “The description of structures that house nuclear material (such as new and spent fuel or tritiated light or heavy water) should include the design considerations (for example, applied loads, codes and standards, analytical tools and material properties), the structural stability, the relative displacements, and the means of protection against internal and external events that were considered.” (section 4.5.5)
- The LTC application should include a discussion of the design considerations for storing spent fuel for the DNNP. Including the nuclear waste storage facilities in the Licence to Construct phase is a logical step to ensure OPG’s plans for constructing all of the required facilities associated with the BWRX-300 reactor will not be detrimental to the health and safety of the public and the environment.
- The waste from the proposed BWRX-300 facility is different from other CANDU waste, and therefore there are additional and different risks associated with these.
- We **recommend** that the Commission refrain from issuing a Licence to Construct until OPG provides specifics on the siting and design of the dry waste storage facilities associated with the proposed BWRX-300 technology and these details are shared with the public for their comment.

B. The BWRX-300 Design is Incomplete

- The design of the BWRX-300 reactor as submitted to CNSC is incomplete and various aspects of the design that are relevant to evaluate the safety of the reactor do not appear to be ready—this is explicitly acknowledged by both CNSC staff and OPG.
- The probabilistic safety assessment does not take into account the inevitable uncertainties in any project, especially one involving a nuclear reactor design that has never been built or operated anywhere in the world.
 - Without any assessment of uncertainty, the reliability of the initial PSA results is *questionable*, and that it is not possible to know how these results might change when the design is updated. As a result, we **submit** that any approval to construct would be premature and OPG’s proposal should only be considered when the design has been finalized.
- In addition to questions about the safety of the reactor if and when it is constructed and operated, the incompleteness of the design also raises the possibility of problems during construction.
 - This danger was clearly demonstrated during the construction of the AP1000 reactor in the United States. For background, it may be remembered that Westinghouse submitted the AP1000 design to the U. S. Nuclear Regulatory Commission for review in March 2002, and this design was built on the basis of the earlier experience of the AP600 that was certified in 1999.
 - The initial application from Westinghouse submitted in 2002 was approved in September 2004, but then Westinghouse revised its design, and NRC published a revised safety evaluation in December 2005. Westinghouse revised its design again and this new design was certified in September 2011. Despite the long review process the AP1000 went through before construction started in South Carolina (V. C. Summer plant) and Georgia (Vogtle plant), **Westinghouse made “several thousand” technical and design changes during the construction of the plant.** This led to major delays in construction and the eventual **cancellation** of the V.C. Summer project after over 9 billion USD was spent on it.
- We **submit** that approving projects, especially ones that start being constructed, is inefficient. Changes to the design will require the regulator to work through the safety implications of these changes and approve, or not, these changes. It is therefore important that an incomplete design not be approved for construction.

C. The Reactor's Shutdown Systems are Not Separate

- The BWRX-300 design does not have two separate shutdown systems and this makes it harder to ensure that the reactor will be shut down under all circumstances.
- The BWRX-300 design uses a hydraulic drive-in system and a fast motor run-in of the control rods as its shutdown systems. But as CNSC staff have observed, on page 51 of CMD24-H3-1, these **cannot** be “considered as truly independent since they share the only credited negative reactivity insertion devices”. CNSC staff further explained the significance of this lack of independence by referring to the potential for unacceptable consequences in the event of “a complete failure-to-insert of all control rods”.
 - This problem was observed in the case of some VVER reactors, where control rods have failed to get inserted even when there was a shutdown attempt of the reactor.
- Another safety concern highlighted in the CMD concerns the “**reliability and RIV response times**” (“RIV”= Reactor Isolation Valves). This problem exacerbates the concern about lack of truly independent shutdown systems.
- We submit that these safety lacunae and concerns should be addressed before construction is approved.

D. Site Location

Siting is Adjacent to Existing Buildings

- The intervenors reiterate that the *NSCA* requires the CNSC to limit risk to Canadian society, and the existence of the aging Darlington Nuclear Generation reactors on the site make this selected site unsuitable for this project.
- Any consequences and risks from accidents would be *magnified* by their **proximity** to multiple sources of material which can achieve critical chain reactions, both in reactor cores and in used fuel storage.
- Our concerns surrounding the approach to storing radioactive waste that would be produced by the BWRX-300 reactor are further **compounded** by the risks associated with DNGS and its own wet and dry storage facilities for radioactive waste.
- The intervenors **submit** that the hazard analysis for the BWRX-300 needs to be updated to fully consider and address the severe risk of a multi-unit or multi-facility accident involving the DNGS. Without a consideration of the existing, aging nuclear reactors on the site, the safety analysis for this project is incomplete.

D. Site Location, *continued*

IAEA Guidance on Siting

- According to the International Atomic Energy Agency (“IAEA”), population density and population characteristics should be important considerations in decisions about siting nuclear power plants and emergency planning.
 - Continuing to use the Darlington site as the prospective location to construct up to four BWRX-300 reactors is not in compliance with the IAEA guidelines for siting nuclear facilities.
 - IAEA safety standards note: The presence of large populations in the region or the proximity of a city to the nuclear power plant site may diminish the effectiveness and viability of an emergency plan.
 - Emergency plans **must** account for the characteristics of the population around the site.
 - **There should be no adverse site conditions** which could hinder sheltering or evacuation of the population. The Safety Guide identified factors that may diminish the effectiveness and viability of emergency plans, including population density and distribution in the region, distance of the site from population centres and special groups of the population who are difficult to evacuate or shelter. Site related factors must be reviewed periodically.
 - We **submit** that there has been considerable population growth and urban development in the region surrounding the selected site, and the population density would negatively affect the feasibility of planning effective emergency response actions, indicating that this site is not suitable for the construction of a new nuclear facility.
 - We **submit** there must be a reassessment of the suitability of this site in accordance with the safety standards set out by the IAEA.
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D. Site Location, *continued*

Accident Planning Zones are Insufficient

- When reviewing the most recent OPG's submissions for this application, there is very little mention of expanding the emergency planning zone to accommodate the population growth and urban development.
- In the contrary, OPG's Application for a Licence to Construct briefly states: "*As a result of that increased safety as well as simplicity of design, the BWRX-300 can have a much smaller emergency planning zone (EPZ),*" completely disregarding the increased risk of siting multiple nuclear reactors in the same area, surrounded by rapid population growth and increasingly dense urban development.
- In line with our previous submissions, we once again **recommend** that the Commission require OPG to provide more information on how emergency planning for BWRX-300 deployment will encompass a larger range of the population in the event of a severe nuclear incident.

E. Emergency Planning

Expanding KI Pill Distribution

- The intervenors submit that the distribution of potassium iodide pills (“KI pills”) are an important element of emergency preparedness for all nuclear power generating sites, and that while most of the focus of this licensing application revolves around the design and construction plans for this project, it is crucial that the Commission ensures there are adequate emergency planning measures linked with this project.
- The intervenors **recommend** expanding the delivery of KI pills to a pre-distribution area of 50 km, rather than the current 10 km pre-distribution area. This measure is especially critical for vulnerable populations, such as children.

The Need for Expanding Detailed Evacuation Planning

- Use planning and site suitability previously mentioned have a direct correlation with effective emergency preparedness—a central factor in the CNSC fulfilling its obligations to limit harm to Canadian society. The intervenors have repeatedly expressed concerns about the emergency planning measures for this project.
- Effective emergency planning needs to factor in population growth—including in the Ingestion Planning Zone and not just the 10-km radius of a nuclear power site.
- The intervenors reiterate that updated population projections are essential in determining whether OPG’s emergency plans are adequate and Site Evacuation Time Estimates are accurate.
- We further **submit** that before a Licence to Construct can be issued for this project, at minimum, the updated Darlington Site Evacuation Time Estimate and emergency planning models based on the 2021 Census data must be made available to the Commissioners and the Intervenors, and explicitly considered during this hearing.

E. Emergency Planning, *continued*

More Comprehensive Public Education on Emergency Response is Required

- Public awareness is a key factor in effective emergency planning, yet most citizens in the Greater Toronto Area are not aware that they live within the Ingestion Planning Zone—extending 50 km from nuclear facilities—of not one but two very large nuclear generating stations each with multiple existing large units. Even fewer are aware of the SMRs developments proposed in Durham Region.
- With the lack of public awareness surrounding nuclear safety and emergency preparedness, groups such as CELA, DNA, and SHA find themselves trying to fill the gaps in public education on the subject matter: “according to a poll conducted in 2018, 54 percent of respondents were unaware of any emergency response plans in case of a nuclear accident, a clear indication of the need for stronger awareness efforts.”
- The intervenors **submit** that to ensure there is effective nuclear safety awareness and emergency preparedness in the region surrounding the DNNP, more comprehensive public education on emergency response is required. The intervenors **recommend** that the CNSC and OPG collaborate with community groups and intervenors to develop a strategy to better inform the public on what to do in case of emergency.

F. “Beyond Design Basis” Accidents



Photo: Sara Libman

- With the design of the BWRX-300 reactor not being finalized, and CNSC staff making note throughout their CMD that more details or information is required to support OPG’s determinations on various safety measures, the intervenors are skeptical as to whether the assessment of “beyond design basis” accidents is sufficiently robust and note that the likelihood of severe offsite accidents may well be much higher than their stated “one in a million operating years.”
- We would like **clarification and in-depth evidence** as to whether OPG’s assessment of “beyond design basis” accidents is sufficiently robust and note that the likelihood of severe offsite accidents may well be much higher than their stated “one in a million operating years.”



G. Climate Change Mitigation and Adaptation



Photo: Sara Libman

- During Part 1 of this public hearing, David Tyndall, the Vice President of New Nuclear Engineering of OPG, discussed OPG’s assessments of extreme weather events for climate change adaptation, making the bold statement that OPG “concluded that there are no nuclear safety impacts as a result of climate change, given the way that the plant has been designed.”
- The impact of climate change and extreme weather events need not be just through any “influence” on “physical structures or systems of the DNNP”. Such events could also affect the institutional response to any unusual events at the nuclear plant during such an extreme event for a variety of reasons.
- Therefore, we **disagree** with the statement that there are no nuclear safety impacts as a result of climate change, as extreme weather events and other impacts of climate change may not necessarily touch the reactor’s operations directly.
- We **submit** that it is **necessary** to carefully study how severe weather events and other climate change related physical impacts will affect the capacity of OPG and plant operators to respond to unusual events or accident precursors and to evaluate climate risks on the proposed plant in this specific location and with the current context of other facilities on the site, before concluding that the proposed project fits within the PPE of the prior EA.



VI. Order Requested



Order Requested

For the foregoing reasons provided in this intervention, DNA, SHA, and CELA submit the uncertainties in the technology's design and the inappropriate siting of this project bring cause for concern that allowing this project to proceed would bring unreasonable risk to the health and safety of the public and the environment, and therefore recommend the CNSC issue an order:

- Making a determination that a licence to construct should **not** be granted to OPG on the grounds that allowing OPG to commence construction of a BWRX-300 reactor while there are many uncertainties surrounding the reactor design, issues with the siting of this reactor, and emergency planning shortfalls would pose a risk to the health and safety of the public and the environment;
- *In the alternative*, before a licence to construct can be granted, OPG must provide specifics on the siting and design of the dry waste storage facilities associated with the proposed BWRX-300 technology.

Appendix A: Summary of Recommendations

- **Recommendation 1:** The public should be afforded more time to adequately review and comment on any requests for confidentiality filed by a proponent. This supports judicial fairness and transparency in the public record for matters before the Commission.
- **Recommendation 2:** In the interest of effectively disseminating objective scientific, technical, and regulatory information to the public for this application for a licence to construct, the Commission should stringently assess these requests with a lens of upholding public transparency. Rather than excluding entire documents, redacting content may be more appropriate, and that technical information, especially information related to safety and emergency planning, should **not** be made confidential.
- **Recommendation 3:** The Commission must refrain from issuing a Licence to Construct until OPG provides specifics on the siting and design of the dry waste storage facilities associated with the proposed BWRX-300 technology.
- **Recommendation 4:** The CNSC should amend the regulatory process to ensure that the Licence to Construct phase for Nuclear Facilities encompasses an assessment of the radioactive waste storage facilities and their placement at a site.
- **Recommendation 5:** The CNSC should not approve an application featuring an incomplete design and should require OPG to submit a new application based on a finalized design and a complete probabilistic safety assessment of this design, using standard importance measures.
- **Recommendation 6:** The CNSC should not approve a design without two truly independent shutdown systems.

- **Recommendation 7:** The intervenors seek clarification on how the DNGS fits within the safety analysis for this project.
- **Recommendation 8:** The hazard analysis for the BWRX-300 needs to be updated to consider and address the severe risk of a multi-unit or multi-facility accident involving the DNGS. Without a consideration of the existing, aging nuclear reactors on the site, the safety analysis for this project is incomplete.
- **Recommendation 9:** There must be a reassessment of the suitability of this site in accordance with the safety standards set out by the IAEA.
- **Recommendation 10:** The Commission should require OPG to provide more information on how emergency planning for BWRX-300 deployment will encompass a larger range of the population in the event of a severe nuclear incident.
- **Recommendation 11:** 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.
- **Recommendation 12:** Before a Licence to Construct can be issued for this project, at minimum, the updated Darlington Site Evacuation Time Estimate and emergency planning models based on the 2021 Census data must be made available to the Commissioners and the Intervenors, and explicitly considered during the hearing in January, 2025.

- **Recommendation 13:** Any decision to issue a Licence to Construct for this project should be delayed until after the PNERP is updated, as to ensure the most current information is available to develop accurate and detailed evacuation planning measures.
- **Recommendation 14:** To ensure there is effective nuclear safety awareness and emergency preparedness in the region surrounding the DNNP, more comprehensive public education on emergency response is required. The CNSC and OPG should collaborate with community groups and intervenors to develop a strategy to better inform the public on what to do in case of emergency.
- **Recommendation 15:** The intervenors would like clarification and in depth evidence as to whether OPG’s assessment of “beyond design basis” accidents is sufficiently robust and note that the likelihood of severe offsite accidents may well be much higher than their stated “one in a million operating years.”
- **Recommendation 16:** The application from OPG should not be approved until it is accompanied by a carefully conducted study on how severe weather events and other climate change related physical impacts will affect the capacity of OPG and plant operators to respond to unusual events or accident precursors and to evaluate climate risks on the proposed plant in this specific location and with the current context of other facilities on the site.