



Directorate of Environmental and
Radiation Protection and Assessment

File: 2.05
e-Doc: 5196816
ccm: 2017-000010

March 6, 2017

Ms. Robyn-Lynne Virtue
Panel Manager
Canadian Environmental Assessment Agency
160 Elgin Street, 22nd Floor
Ottawa, ON K1A 0H3

CEAA.DGR.Project-Projet.DGR.ACEE@ceaa-acee.gc.ca

SUBJECT: CNSC Technical Review of Ontario Power Generation's Response to the Request for Additional Information on the Environmental Assessment for the Deep Geologic Repository Project for Low and Intermediate-Level Radioactive Waste

Dear Ms. Virtue:

I am writing in response to your letter, dated January 18, 2017, which requested the Canadian Nuclear Safety Commission's (CNSC) advice in the technical review of Ontario Power Generation's (OPG) response to the request for additional information for the proposed Deep Geologic Repository Project (DGR Project) for low and intermediate-level radioactive waste.

CNSC staff's technical review of OPG's submissions focused on the areas within our mandate and technical expertise. As such, CNSC staff's technical review did not consider OPG's assessment of the economic feasibility of alternate locations and the cost estimates for the packaging and transportation of waste to alternate locations, as this aspect of the review is not within the CNSC's mandate.

CNSC staff reviewed OPG's submissions within the scope of the requests in the Minister's letter dated February 18, 2016, as well as the Canadian Environmental Assessment Agency's (the Agency) letter of September 7, 2016. Of particular importance for the reviews and in line with the Minister's direction is that the analysis of the environmental effects of alternate locations be provided as a narrative assessment.

CNSC staff also reviewed OPG's submissions against the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the DGR Project's Environmental Impact Statement (EIS) Guidelines, the Agency's guidance documents with respect to alternative means and cumulative environmental effects (i.e., *Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012, Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*), and other applicable Acts and regulations (i.e. CNSC's *Packaging*



and Transport of Nuclear Substances Regulations, 2015, CNSC's Radiation Protection Regulations, Transport Canada's Transportation of Dangerous Goods Regulations).

Based on CNSC staff's technical review of OPG's submissions, CNSC staff conclude that:

- Their original conclusion to the Panel, as documented in Panel Member Document (PMD) 13-P1.3 and PMD 14-P1.2, remains unchanged. That is, the proposed DGR project will not cause significant adverse environmental effects, taking into account the implementation of mitigation measures and OPG's commitments.
- The alternative locations assessment is consistent with the requirements of CEAA 2012, applicable Agency guidance documents and the project-specific EIS Guidelines, and its conclusions are adequately substantiated.
- The methodology and analysis regarding the risk estimates for the packaging and transport of waste to alternate locations are appropriate and comply with CNSC's *Packaging and Transport of Nuclear Substances Regulations, 2015*, CNSC's *Radiation Protection Regulations*, and Transport Canada's *Transportation of Dangerous Goods Regulations*. The conclusions of the risk estimates for the packaging and transport of waste to alternate locations are adequately substantiated.
- The updated cumulative effects assessment uses credible and appropriate sources of information and follows the methodology for identifying cumulative environmental effects consistent with the project-specific EIS Guidelines and the requirements of CEAA 2012. The conclusions of the updated cumulative effects assessment are adequately substantiated.
- The preliminary description of the Adaptive Phase Management (APM) DGR is consistent with CNSC's detailed knowledge of the project in connection with the ongoing pre-project review and the preliminary description is sufficient for a cumulative effects assessment in accordance with the requirements of CEAA 2012.
- The updated mitigation measures report is consistent with OPG's commitments list, the Joint Review Panel recommendations, and the Agency's potential conditions.
- Overall, OPG's conclusions are supported by a defensible rationale, and the Minister's request for additional information has been fulfilled.

CNSC staff have identified a few items where further clarification in OPG's submissions is warranted, and these are provided in the table attached to this letter. Please note, these clarifications are for transparency, completeness, and public interest purposes only and do not alter any of CNSC staff's technical review conclusions to the Agency. Several preliminary comments submitted during CNSC's conformity review have been addressed by CNSC staff, as the information requested was found, upon further review of existing information, OPG's submissions and referenced documents.

Taking into consideration OPG's additional information, CNSC staff reaffirm their conclusions that the proposed DGR Project at the Bruce nuclear site will not cause significant adverse environmental effects, taking into account the implementation of mitigation measures and OPG's commitments. OPG is

qualified and will make adequate provision for the protection of the environment, health and safety of persons, if the project proceeds.

CNSC's mandate to protect the health, safety, and security of persons and the environment is applied throughout the lifecycle of CNSC's regulatory oversight starting with the EA to the decommissioning of all CNSC-regulated facilities and activities, and includes the continued involvement of the public, Aboriginal groups and interested parties. Should a positive decision be made by the Minister of the Environment and Climate Change Canada on the EA and a licence issued by the Commission, the CNSC, as the regulator, will enforce and ensure safety over all the phases of licensing of the DGR project including rigorous supervision for all of the years that the DGR would be in operation until it is decommissioned and permanently closed. Monitoring of the facility would continue during the post closure period to ensure the long-term performance of the facility.

We thank you for the opportunity to provide input and we will be pleased to provide our continued support in this process.

Yours sincerely,

<Original signed by>

Caroline Ducros
Director, Environmental Assessment Division
Canadian Nuclear Safety Commission

Enclosure (1): CNSC Technical Review Comments Table, e-Doc: 5169486

c.c.: K. Glenn, C. Cianci, K. Lange (CNSC)

CNSC Staff's Technical Review of OPG's Response to the Request for Additional Information for the DGR Project

Note: CNSC staff's advice to the Agency, based on its technical review of the additional information, is that OPG's conclusions are supported by a defensible rationale, and the Minister's request for additional information has been fulfilled. In addition, CNSC staff have identified a few items that in the interest of transparency, public awareness and completeness of records, further clarification in OPG's submissions is warranted. The following items do not alter any of CNSC staff's technical review conclusions to the Agency. Preliminary comments CNSC-01, CNSC-09, and CNSC-10 that were submitted during the conformity review have been addressed by CNSC staff, and the information requested was found, upon further review of OPG's submissions and referenced documents.

Departmental number	Project Effects Link to CEAA 2012	Request Element	Reference to OPG's Response	Context and Rationale	Comments and Suggestions for Clarification
CNSC-01	<i>This preliminary comment submitted during the conformity review (in relation to referencing CNSC regulatory documents) has been addressed upon further review of existing information, OPG's submissions of additional information and referenced documentation, as the information requested has been found.</i>				
CNSC-02	All section 5(1) environmental effects of CEAA 2012	Alternate locations	<p>Study of Alternate Locations - Main Submission, sections 5.3.6 (p.44) and 5.4.6 (p.53)</p> <p>Environmental Effects of Alternate Locations, sections 4.3 (p.24) and 4.6.1 (p.36)</p> <p>Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations, section 2.6.1.2 (p.41)</p>	The incremental radiological risks to the population related to hypothetical accident conditions for the offsite transportation of nuclear waste were considered and described in OPG's submissions. However, the risk of environmental effects resulting from such hypothetical accident conditions is not mentioned in detail.	Provide explicit mention whether the radiological risk of environmental effects resulting from accidents for the offsite transportation of low and intermediate-level waste for all packages, and in particular for Type IP or Type A packages, can be mitigated in the same manner that has been considered and determined to be acceptable as the waste located at the Western Waste Management Facility has been transported safely from other sites.
CNSC-03	All section 5(1) environmental effects of CEAA 2012	Alternate locations	Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)	Post-closure safety of a DGR is assessed by considering normal evolution scenarios (the likely future evolution of the DGR) and disruptive scenarios. Normal evolution scenarios are the most probable ones and are applicable when the facility and its site would evolve within a range of expected conditions. Due to uncertainties associated mainly with the very long time of the post-closure period, disruptive scenarios that are considered to have a very low probability of occurrence are also considered in order to verify the robustness of the DGR. The comparison of alternate locations in the supplementary submission only discusses post-closure safety with respect to normal evolution scenarios. However, a discussion of any expected differences with the disruptive scenarios is not provided.	Provide a narrative description of the disruptive scenarios (including inadvertent human intrusion, undetected major fracture, and shaft failure) in relation to post-closure safety for both the sedimentary and crystalline alternate locations.

Departmental number	Project Effects Link to CEAA 2012	Request Element	Reference to OPG's Response	Context and Rationale	Requests for Clarification
CNSC-04	N/A	Alternate locations	Description of Alternate Locations, section 3 (p.9-11)	The description of a DGR in crystalline rock should be further detailed in order to allow for a better comparison with the DGR site(s) in sedimentary rock in terms of construction operations, and both pre-closure and post-closure safety. Specifically, OPG's submission indicates the higher potential for gas migration in crystalline rock relative to sedimentary rock and the possible need for backfill in order to mitigate that potential. This is different from the description in CEAR Reference Document #1838 [<i>Ontario Power Generation Response to the Joint Review Panel's Information Request Package #12 - EIS-12-513 (see CEARIS Reference Document Number 1806)</i>], where it is assumed that the conceptual design for both rock types is similar.	<p>Provide further clarification regarding the additional mitigation measures required for the DGR crystalline rock location on the following:</p> <ul style="list-style-type: none"> • where backfill would need to be emplaced; and, • whether the same types of containers would be used.
CNSC-05	<i>This preliminary comment submitted during the conformity review (in relation to natural resources) has been addressed upon further review of existing information, OPG's submissions of additional information and referenced documentation, as the information requested has been found.</i>				
CNSC-06	All section 5(1) environmental effects of CEAA 2012	Alternate locations	Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)	It is not clear from the description provided in OPG's submission how the methodology and assumptions used in the assessment of environmental effects for the two alternate locations compare to the methodology and assumptions used in the original EIS submission. This information is required to understand how the environmental effects for the alternate locations were determined and if it is appropriate to compare the results of the two alternate locations to each other as well as to the results obtained for the Bruce nuclear site.	Provide confirmation whether the methodology and assumptions, used in the environmental effects assessment of alternate locations for the atmospheric, surface water, aquatic and terrestrial environments as well as soil quality are the same or different from that used in the original EIS submission. If the methodology and assumptions are different, please provide additional qualitative details on these topics for both the sedimentary and crystalline alternate locations.

Departmental number	Project Effects Link to CEAA 2012	Request Element	Reference to OPG's Response	Context and Rationale	Requests for Clarification
CNSC-07	N/A	Alternate locations	Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)	<p>Acrolein was identified as an indicator for air quality and human health as part of the public review period for the EIS for the proposed DGR Project for low- and intermediate-level waste.</p> <p>OPG's submission on the environmental effects of alternate locations does not include an evaluation of potential changes in ambient acrolein as a result of locating the project in an alternate location. The potential changes in acrolein levels should be included as part of the assessment as it is an indicator for air quality.</p>	Provide a narrative description of the effects of increased transportation on releases of acrolein and describe whether the effects would result in an increase or decrease in ambient levels of acrolein from placing the DGR at an alternate location relative to ambient levels of acrolein at the proposed location.
CNSC-08	N/A	Alternate locations	Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations, section 2.6.1 (p.38)	The transportation radiological risk assessment considers annual individual and collective doses resulting from normal routine transportation. These doses are adapted from a study by the U.S. Department of Energy (U.S. DOE). It is not explicit how the U.S. DOE scenarios apply to the DGR context.	Provide a narrative description of the U.S. DOE study, specifying which receptors and exposure pathways apply to the DGR/alternate locations context, and how the U.S. DOE doses have been scaled to OPG DGR shipments of low and intermediate-level waste.
CNSC-09	<i>This preliminary comment submitted during the conformity review (in relation to a transmissive fault disruptive scenario) has been addressed upon further review of existing information, OPG's submissions of additional information and referenced documentation, as the information requested has been found.</i>				
CNSC-10	<i>This preliminary comment submitted during the conformity review (in relation to acidic rock drainage) has been addressed upon further review of existing information, OPG's submissions of additional information and referenced documentation, as the information requested has been found.</i>				
CNSC-11	5(1)(a)(i) Fish and Fish Habitat 5(1)(a)(ii) Aquatic Species	Alternate locations	Study of Alternate Locations - Main Submission, sections 4.2, 4.3, 5.2 and 5.3	Environmental effects on surface water were discussed in sections 4.2 and 5.2 and environmental effects on the aquatic environment were discussed in sections 4.3 and 5.3. The discharge from stormwater management system may also adversely affect the sediment quality in the receiving water, especially in small water bodies such as small rivers, streams or lakes, and subsequently affect the aquatic biota using the aquatic habitat. The potential effects on sediment quality were not discussed in OPG's submission.	Provide a comparison with respect to the assessment of potential environmental effects on sediment quality and aquatic biota from stormwater releases between a crystalline alternate location and the sedimentary location.

Departmental number	Project Effects Link to CEAA 2012	Request Element	Reference to OPG's Response	Context and Rationale	Requests for Clarification
CNSC-12	N/A	Alternate locations	<p>Study of Alternate Locations - Main Submission, section 2.1.1 (p.18)</p> <p>Description of Alternate Locations, section 2.1 (p.3)</p>	<p>One of the important criteria used to determine the minimum depth of a DGR is that the overburden stress must be higher than the anticipated maximum gas pressure generated in the DGR. If the maximum gas pressure is higher than the overburden pressure, the DGR host rock would be damaged leading to enhanced gas migration from the DGR.</p>	<p>Provide further clarification on the selection of a depth of 200m for the alternate location and whether this depth is sufficient to provide a safe design by considering the anticipated maximum gas pressure generated in the DGR.</p>