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

Dear Ms. Virtue:

I am writing in response to your letter, dated January 3, 2017, in which you requested the Canadian Nuclear Safety Commission's (CNSC) advice for the conformity 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 review of these documents focused on the aspects within our mandate and technical expertise. Based on this review, CNSC staff's determination and advice to the Agency, is that OPG's response contains sufficient information to proceed to technical review and public comment.

Given this determination, CNSC staff do not have any comments or suggestions to submit as conformity information requests, within table 1 of your letter's attached annexes.

Please find enclosed to this letter, CNSC staff's preliminary technical comments in table 2 of your letter's attached annexes. These preliminary technical comments are being provided as advice to the Agency and to be directed to OPG. These preliminary technical comments are early indications of comments that may arise during the subsequent technical review of OPG's



response. These comments are preliminary in nature; CNSC staff will further examine OPG's response during the technical review.

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

Enclosures (1): CNSC Conformity Review - Table 2, e-Doc: 5156750

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

CNSC Conformity Review of OPG’s Response to the Request for Additional Information for the DGR Project

Table 2: Additional Advice to the Agency - Preliminary Technical Comments on OPG’s Response

Note: CNSC’s advice to the Agency, based on its conformity review, is that OPG’s response contains sufficient information to proceed to technical review and public comment period. The following are CNSC staff’s preliminary technical comments, provided as advice to the Agency, and to be directed to OPG. These preliminary technical comments are early indications of comments that may arise during the subsequent technical review of OPG’s response.

Departmental number	Reference to OPG Response	Context and Rationale	Preliminary Technical Comments on OPG Response
CNSC-01	All submissions	With respect to CEEA’s question in the conformity review letter (January 2017) to CNSC staff about <i>whether OPG’s response has taken into account relevant guidance or policy documents that your department has published in relation to environmental assessments</i> , CNSC staff find that while OPG has taken into account relevant regulatory requirements and guidance, there is a lack of direct references to CNSC regulatory documents (e.g. radiation protection, general regulations, environmental monitoring, etc.) in all submitted documents. Although the originally submitted EIS (2011) and supporting documents contained appropriate CNSC references, the current documentation should be updated for consistency and to provide further clarification on regulatory standards to reviewers.	Include references to CNSC regulatory documents when referencing regulatory limits, licence conditions, monitoring programs, principles etc. For example, where it states, “doses to members of the public from the DGR would be well below the 1 mSv/a regulatory limit” – provide a supporting reference such as the CNSC <i>Radiation Protection Regulations</i> and/or additional guidance documents from CNSC.

Departmental number	Reference to OPG Response	Context and Rationale	Preliminary Technical Comments on OPG Response
CNSC-02	<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>	<p>The incremental radiological risks to the population related to hypothetical accident conditions for the off-site 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 discussed.</p>	<p>Provide clarification regarding the risk of environmental effects resulting from accidents for the off-site transportation of low and intermediate-level waste for all packages and in particular for Type IP or Type A packages.</p>
CNSC-03	<p>Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)</p>	<p>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 should also be 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.</p>	<p>Define post-closure disruptive scenarios (including inadvertent human intrusion, undetected major fracture, and shaft failure) for alternate locations. Also, compare the likelihood and consequences of those scenarios for the alternate locations being assessed.</p>
CNSC-04	<p>Description of Alternate Locations, section 3 (p.9-11)</p>	<p>The description of a DGR in crystalline rock needs to be further detailed in order to allow for a better comparison with the DGR site(s) in sedimentary rocks in terms of construction operations, and both pre-closure and post-closure safety.</p>	<p>Provide a more detailed description of the DGR in crystalline rock, with illustrations, that:</p> <ul style="list-style-type: none"> • identifies where backfill would be emplaced • clarifies whether the same types of containers would be used • clarifies how gas generation and migration would be mitigated • provides further details on the design of the shaft seals

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CNSC-05	<p>Study of Alternate Locations - Main Submission, section 4 (p.29-34)</p> <p>Description of Alternate Locations, sections 3 and 4 (p.9-22)</p> <p>Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)</p>	<p>Commercially viable mineral or hydrocarbon resources at both alternate sedimentary and crystalline rock locations and their impacts on the DGR safety case are not identified and discussed in the submissions. The existence of economically viable natural resources at an alternate location could have significant implications on the likelihood of inadvertent human intrusion in the post-closure period.</p>	<p>Provide a narrative description of natural resources at alternate locations and their potential impacts on the DGR's post-closure safety or justify why this information is not included.</p>
CNSC-06	<p>Environmental Effects of Alternate Locations, sections 4 and 5 (p.12-61)</p>	<p>It is not clear from the high-level description provided 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 determine 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.</p>	<p>Clarify whether or not 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 different from that used in the original EIS submission [OPG 2011]. If the methodology and assumptions are different, please provide additional qualitative details on these topics for both the sedimentary and crystalline alternate locations.</p>

Departmental number	Reference to OPG Response	Context and Rationale	Preliminary Technical Comments on OPG Response
CNSC-07	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 Environmental Impact Statement (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 increases in ambient acrolein as a result of locating the project in an alternate location. Placing the proposed DGR at an alternate location would result in additional increases in ambient levels of acrolein due to proposed project activities such as increased releases due to transportation of low- and intermediate-level waste. The potential increases in acrolein levels should be included as part of the assessment as it is one of the indicator for air quality.</p>	Provide a narrative description regarding the potential increase in acrolein emissions as a result of locating the proposed DGR in an alternate sedimentary or crystalline location.
CNSC-08	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 clear how the U.S. DOE scenarios apply to the DGR context.	Provide a 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. Also, please provide all the assumptions made in estimating the dose rates for OPG DGR shipments, for e.g., time exposed, distance from conveyance, any shielding considered, etc. For each shipment, please provide the dose received by the receptor, including the dose received by an average individual and the highest dose to a person in normal transport conditions.

Departmental number	Reference to OPG Response	Context and Rationale	Preliminary Technical Comments on OPG Response
CNSC-09	Updated Analysis of Cumulative Environmental Effects, section 6.1.1 (p.36)	<p>OPG states that several disruptive or “what if” scenarios (i.e., inadvertent human intrusion, shaft seal failure, poorly sealed borehole, and vertical fault) were unlikely to occur, so the risk (probability and consequence) remained low. The cumulative effects of these scenarios were therefore not assessed in OPG’s submission. CNSC staff do not agree with OPG’s assessment of the vertical fracture scenario. The vertical fracture scenario consists of the hypothetical case where an undetected or new transmissive fault cuts through both the OPG DGR and the potential APM DGR sites in sedimentary rock. Such a scenario needs to be verified through the proposed Geoscience Verification Program for the OPG DGR and the potential site characterization at the APM DGR. This scenario should be assessed and information on the cumulative effects should be provided in the submission.</p>	Provide a narrative description of the likelihood and potential effects for the scenario of an undetected or new transmissive fault that cuts through both the OPG DGR and the proposed APM DGR sites in sedimentary rock, and consider these effects within the cumulative effects assessment.
CNSC-10	<p>Study of Alternate Locations - Main Submission, section 5.4.2 (p.47 and p.53)</p> <p>Description of Alternate Locations, section 3.6 (p.12)</p> <p>Environmental Effects of Alternate Locations, section 5.2.1 (p.46, last paragraph)</p> <p>DGR APM Preliminary Description, sections 3.1, 3.1.2 and 3.3.3</p>	<p>Excavation of crystalline rock and stockpiling on the surface may increase the risk of acidic drainage, depending on the rock type encountered.</p> <p>It is not clear from the narrative and figures in the sections identified, for the crystalline alternate location, whether the risk of acidic drainage was considered and how the waste rock would be managed (e.g. additional needs for water treatment).</p>	Provide clarification with respect to the consideration of risk of acidic drainage and management of waste rock at a crystalline alternate location.

Departmental number	Reference to OPG Response	Context and Rationale	Preliminary Technical Comments on OPG Response
CNSC-11	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 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 additional information on potential environmental effects on sediment quality due to the discharge from the stormwater management system at the crystalline alternate location to support the conclusion that the effect would be the same as constructing a DGR at a sedimentary alternate location.