From:	Thevenot, Aurelia (HC/SC)
To:	Virtue,Robyn-Lynne [CEAA]; Turcotte,Isabelle [CEAA]
Cc:	Ma, Kitty: HC; Kaminski, Gregory: HC; Leblanc, Debby: HC
Subject:	RE: OPG Response to IR Package
Date:	June 19, 2017 4:16:48 PM
Attachments:	20170619 DGR HC IR Responses Concordance Feedback.xlsx

Hello Robyn, Isabelle,

Please find attached feedback table with Health Canada's comments on OPG's responses to IRs regarding the additional information requested by the Minister for OPG's DGR. The purpose of the comments is more as input to the draft report the Agency is preparing, rather than as additional IRs.

Please contact us if you have any questions or comments. We look forward to reading the draft report when it becomes available.

Best regards,

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Health Canada - Feedback on OPG's response (May 26) to IRs (April 5)
June 19, 2017

IR # 1.5

Did you propose an IR on this topic?

Yes, 3

In your opinion, did the proponent provide sufficient information to address the IR?

Yes, information sufficient. No additional IR proposed.

Comments regarding the adequacy of the response

n/a

IR # 1.9

Did you propose an IR on this topic?

Yes, 4

In your opinion, did the proponent provide sufficient information to address the IR?

No; however, no additional IR proposed.

The remoteness of alternative sites, and thus number of potentially affected receptors, should be relevant to the magnitude of predicted effects.

However, even if effects of accidents or malfunctions at the Bruce site were the ""worst case"" scenario, it appears unlikely they would result in exposures greater than regulatory criteria (see comment to IR Response #2.3). Therefore, no additional information is requested from the proponent.

Comments regarding the adequacy of the response

The proponent's response is quite general and does not address the request originally proposed by Health Canada.

In addition, OPG states that ""From a human health perspective, remoteness also is not necessarily significant since the facility must meet the same regulatory criteria at any location.

Although the facility is predicted to meet the regulatory criteria, there always remains a certain level of uncertainty in environmental assessments, particularly with respect to malfunctions and accidents. In the case of perceived or measurable high risk impacts, the number of receptors potentially exposed to contamination has some relevance to the assessment (i.e., magnitude of the effect) and should not be dismissed without sound rationale.

IR # 2.3

In your opinion, did the proponent provide sufficient information to address the IR?

Yes, 1

In your opinion, did the proponent provide sufficient information to address the IR?

No; however, no additional IR proposed.

Although the "highest consequence" for the APM DGR would be inadvertent human intrusion, the "greatest risk" scenario may be one where, despite a lower consequence, remediation was more difficult or not possible (e.g., undetected leak towards Lake Huron) and impacts were not localized.

However, based on previous reports it seems unlikely that simultaneous exposure of maximum contamination from the ""greatest risk" scenario at each location would occur. Therefore, no additional information is requested from the proponent.

Comments regarding the adequacy of the response

Even if very unlikely disruptive scenarios leading to contamination of Lake Huron were to occur and were not readily remediated at both sites at the same time, it is further unlikely that a receptor would be simultaneously exposed to an undiluted cumulative dose greater than 1 mSv/year.

Even in the event of a Severe Shaft Seal Failure Scenario, with the entire shaft degrading by 4-5 orders of magnitude below design basis to a hydraulic conductivity of 10-7 m/s, leading to a peak dose of tens of mSv to someone living on top of the repository site (OPG 2011 Preliminary Safety Report), the immediate receptor would not be located at both sites, and other receptors along Lake Huron would be exposed to a lower dose due to dilution/dispersion.

Additional Notes

IR#	Original HC IR	Original HC Rationale	Final CEAA IR	Final CEAA Rationale
—	It is stated that less mitigation may be required to maintain compliance with air quality standards at the alternate locations due to likely lower background concentrations. However, air quality standards should not necessarily be regarded as "pollute up to" criteria.	Health risks for certain air quality indicator compounds (e.g. particulate matters – PM10, PM2.5) exist below ambient standards and objectives. Risk analysis should not be confined to meeting the standards, but should also be targeted towards reducing population exposure at whatever concentrations are found. Therefore it would be good practice to implement mitigation measures during construction and operations to reduce concentrations of these compounds to as low as possible to ensure human health is protected.	—	—
	The Canadian Ambient Air Quality Standards (CAAQS) principles of Keeping Clean Areas Clean and Continuous Improvements should be equally taken into account in designing mitigation measures, monitoring, and follow-up activities for the Bruce Nuclear site and alternate locations.			

IR#	Original HC IR	Original HC Rationale	Final CEAA IR	Final CEAA Rationale
1.5	Provide a discussion on the changes, if any, to the magnitude, frequency or extent of effects at the alternate locations relative to the DGR Project at the Bruce Nuclear site, due to increased duration and extent of construction activities for the additional surface facilities.	"According to Table 3-1 and the text in Section 4.1.3, additional activities will be required for the construction of surface facilities over 40 ha at the alternate locations. Incremental effects on air quality were deemed unlikely as "peak hourly activity was used to predict a bounding emission rate" for the Bruce Nuclear site.	"Provide a discussion to supplement the analysis for the potential environmental effects on air quality at the alternate locations and the applicable mitigation measures, addressing: • Emissions of acrolein; • Incremental GHGs emissions from the use of fossil fuels for power generation; • Incremental air emissions related to the requirement to excavate a higher volume of rock at the crystalline location; and • Identify assumptions, including applicable calculations, data or references.	Table 3-1 of OPG's "Environmental Effects of Alternative Locations" report (page 7) outlines the incremental works and activities for the Project at alternative locations which may cause temporary increases in emissions of combustion products, dust, and other compounds such as volatile organic compounds and acrolein. As a baseline, the report provides the predicted peak increases in ambient air quality indicators for activities at the Bruce site (NO2, SO2, CO, SPM, PM10, PM2.5). However, the report does not discuss whether incremental activities will result in increases in magnitude, frequency, and duration of potential effects on air quality using these indicators.
	—	—		The Agency notes that while acrolein is used in the EIS (section 7.11) as an indicator for air quality and human health, it is not presented as an air quality indicator in the environmental effects assessment of alternate locations.

IR#	Original HC IR	Original HC Rationale	Final CEAA IR	Final CEAA Rationale
	However, additional construction activities would lead to an increase in frequency of effects, which is not discussed."			In addition, Table 3-1 of OPG's "Environmental Effects of Alternative Locations" report states that site preparation activities will include works related to the supply of power to the site. Accordingly, it is expected that all activities would need to make use of temporary power generation until the time that the site is connected to the power grid. However, the Report does not discuss the need for the use of fossil fuels for incremental works and activities at alternate locations, or the potential for environmental effects from additional emissions, including GHGs.
	—	—		The "Environmental Effects of Alternative Locations" report also identifies the difference in rock density at the crystalline location versus the sedimentary location due to the granite formations of the Canadian Shield. The Report predicts that an increased volume of rock will need to be excavated in the crystalline location to account for additional engineered barriers that will be required due to vault design versus the sedimentary location. These factors are expected to require additional effort during site preparation, excavation and construction activities. However, the report does not indicate how these factors were taken into account in the assessment of the potential environmental effects on air quality.

IR#	Original HC IR	Original HC Rationale	Final CEAA IR	Final CEAA Rationale
1.9	Include a discussion on risks to human health from radiation and radioactivity in the event of an accident or malfunction.	The effects on human health from malfunctions and accidents are dependent on the distance to and sensitivity of receptors. Also, given that crystalline rock is "likely to be more permeable than the […] sedimentary rock", the risk of exposure due to accidents and malfunctions should be discussed for the crystalline rock alternative, and compared with that of the Bruce Nuclear site.	Provide a discussion with respect to malfunctions and accidents to inform the comparative analysis among alternate locations. The discussion should include the following: • Describe the differences among disruptive scenarios; • Discuss the potential environmental effects from accidents and malfunctions during all phases of the project on-site and during off-site waste transportation; and • Provide a description of the disruptive scenarios (including inadvertent human intrusion, undetected major fracture, and shaft failure) in relation to post-closure safety for both sedimentary and crystalline location	The Agency notes that the "Environmental Effects of Alternate Locations" report does not discuss malfunctions and accidents beyond the consideration of risks related to offsite transportation on human health.
2.3	Should failure of both repositories due to some common cause occur earlier than the glaciation timeframe provided, the "longer-term release of other radionuclides via water" should be considered in the effects on human health.	"Disruptive scenarios (what-ifs) are reported to be very unlikely to occur, so it was concluded the risk (probability and consequence) remain low. Although the probability may be low, the assessment of consequence does not appear to acknowledge the long-	Provide a risk assessment that discusses the severity (catastrophic, severe, moderate, low, minor, none) and the probability of occurrence (very unlikely, unlikely, possible, very possible, certain) of accidents, malfunctions and malevolent acts.	"OPG states on page 36 of the "Updated Analysis Cumulative Environmental Effects" report that several disruptive or "what if" scenarios (i.e., inadvertent human intrusion, shaft seal failure, poorly sealed borehole, and vertical fault) are unlikely to occur, so the risk of occurrence remains low for those locations. Although the

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		term release of contaminants should remediation not occur in a timely fashion (e.g., staff no longer on site, resources no longer available, etc.)"	Discuss the potential effects on the environment and human health of a possible long-term release of other radionuclides via water sources if the failure of both the APM DGR project and the Project at the Bruce site occurs, due to a common or unrelated cause(s).	probability of occurrence of a hazardous event may be low, the magnitude of the impact on the environment or human health can still be high. A risk assessment should include the magnitude of the event and the probability of occurrence in order to understand the overall risk. The Agency also notes there is a limited discussion on the potential long-term release of contaminants should remediation or emergency response not occur in a timely manner (e.g staff no longer on site, resource not available, etc.)."