Deep Geological Repository for Low and Intermediate Level Radioactive Wastes Project – Joint Panel Review
REGISTRY REFERENCE - 06-05-17520

Saugeen Ojibway Nation Information Request Package (Part 2)

July 3, 2012

IR#	EIS Guidelines Section	EIS Section or other technical document	Information Request	Context
SON 2.1	EIS Guidelines: Section 10, Existing Environment (10.1 Biophysical Environment)	Geosynthesis Report, March 2011 Prepared by Nuclear Waste Management Organization NWMO DGR-TR-2-11-11	Clearly identify and discuss fully the nature of the uncertainties, the parameters most affected, and the potential error in reported ion concentration due to the use of leachate analysis.	The discussion of geochemistry (pg. 160) indicates the interpretation of geochemical results is not actually based on the analysis of porewater samples but rather on the analysis of leachate samples. The text acknowledges that the use of leachate samples results in a number of uncertainties. The impact of these uncertainties on the interpretation of site geochemistry, including the origin of formation water, should be fully explored and discussed.
SON 2.2	EIS Guidelines: Section 10, Existing Environment (10.1 Biophysical Environment)	Geosynthesis Report, March 2011 Prepared by Nuclear Waste Management Organization NWMO DGR-TR-2-11-11	Provide a thorough analysis of potential groundwater flow through the Cambrian aquifer and the impact of this flow on the predicted performance of the repository.	The discussion of Cambrian fluid chemistry indicates that the fluid composition may represent a recent change. Although several possibilities are identified, the mechanism responsible for the re-supply of basin groundwater is not known. Given the high permeability of the Cambrian aquifer (six orders of magnitude greater than the overlying Middle Ordovician limestones), the impact of potential groundwater flow through the Cambrian aquifer on future repository performance must be clearly understood.
SON 2.3	EIS Guidelines: Section 10, Existing Environment (10.1 Biophysical Environment)	Hydrogeologic Modelling, March 2011 Prepared by Sykes, Normani, and Yin MWMO DGR-TR-2011-16	Provide a sensitivity analysis using higher (more permeable) hydraulic conductivity values more representative of regionally measured values. Identify and discuss the impact of assuming lower permeability values on the results and conclusions drawn from the regional modeling study.	The hydrogeologic modeling of the regional groundwater system provides a basis for understanding the flow regime within the region surrounding the proposed DGR. Many of the assumptions regarding groundwater flow and transport are based on this modeling. The uncertainties inherent in this modeling must be fully identified and analyzed. The hydrogeologic parameters applied to the

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				regional-scale model are based on the DGR borehole investigations rather than on the parameter values compiled from the larger regional data set. The hydraulic conductivities measured in the DGR boreholes are generally much lower than those values identified in the regional data set. While the lower values measured in the DGR boreholes may be the result of newer, more sensitive methodologies for measuring low permeability materials, these lower values may not be representative of the larger regional model area. Moreover, as indicated in the Hydrogeologic Modelling Report, the measurement made in the DGR boreholes are representative of only small area immediately adjacent to the borehole and may not be representative of regional flow characteristics. A sensitivity analysis using higher (more permeable) hydraulic conductivity values that are potentially more representative of regionally measured values to the regional model should be provided. This analysis should identify and discuss the impact of assuming lower permeability values on the results and conclusions drawn from the regional modeling study.
SON 2.4	EIS Guidelines: Section 13, Long-Term Safety of the DGR	Postclosure Safety Assessment: Analysis of Human Intrusion and Other Disruptive Scenarios, March 2011 Prepared by Quintessa	Demonstrate that the groundwater model used in the Severe Shaft Failure Scenario adequately accounts for the pressures generated internally within in the repository when evaluating groundwater flow in the shaft and adjacent geologic material.	The Severe Shaft Failure Scenario is an important element of the Postclosure Safety Assessment. The potential of migration of radionuclides to shallow ground strata and accessible groundwater through failure in the shaft seals must be fully understood and analyzed.

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		Ltd. And SENES Consultants NWMO DGR-TR-2011-27		The Severe Shaft Failure Scenario is evaluated using two models, one to simulate gas flow within the shaft and adjacent geologic material and a second to simulate groundwater flow within the shaft and adjacent geologic material. Analysis using the gas flow model indicates that with the entry of groundwater into the repository, significant generation of gas occurs. The pressures created in the gas phase are potentially capable of forcing gas phase nuclides up the shaft. The migration of groundwater within the shaft during this scenario appears to be evaluated using the separate groundwater flow model. It is not clear that this model is capable of accounting for the pressures created in the water phase in the shaft and repository as a result in the generation of gas in the repository due to the failure of the seals in the shaft.
SON 2.5	EIS Guidelines: Section 8.2, Site Preparation and Construction	Excavation Damage Zones Assessment, March 2011 Prepared by Fractured Systems Ltd. NWMO DGR-TR-2011-21	Provide an analysis and comparison with other potential construction technologies to verify that the drill and blast technology provides the best approach for limiting the extent of the EDZ and its impact on DGR performance.	The Excavation Damage Zone (EDZ) surrounding vertical shaft will likely play an important role in determining the adequacy of the shaft seals and the long-term integrity of the DGR. Reasonable efforts should be made to limit the extent and minimize adverse changes in physical properties in the area immediately surrounding the shaft. As indicated in the Excavation Damage Zones Assessment, the extent and effective permeability of the EDZ can be limited by appropriate excavation design choices. Currently, drill and blast technology is planned

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				for construction of the shaft. Analysis of this technology and comparison with other potential construction technologies should be provided to verify that the drill and blast technology provides the best approach for limiting the extent of the EDZ and its impact on DGR performance.
SON 2.6	EIS Guidelines: Section 8.2, Site Preparation and Construction	Geoscientific Verification Plan, March 2011 Prepared by Nuclear Waste Management Organization MWMO DGR-TR-2011-38	Provide additional discussion and justification of the limited geophysical testing planned in the vertical shaft to identify and evaluate the EDZ.	The Post Closure Safety Assessment relies on an accurate assessment of the impact of the Excavation Damage Zone (EDZ) in the vertical shaft to the repository. The characteristics of this zone must be adequately represented in the Post Closure Safety Assessment. The Geoscientific Verification Plan (GVP) indicates that extent and physical/hydraulic characteristic of the EDZ in the vertical shaft will be investigated during the construction phase. However, the GVP only indicates geophysical measurements (ultrasonic velocity) will be conducted at the proposed seal locations. The rational for limiting the geophysical measurements to only the proposed seal locations is unclear. Due to the potential importance of the EDZ on repository performance, a more extensive program for investigating the EDZ would appear necessary.
SON 2.7	EIS Guidelines: Section 13, Long-Term Safety of the DGR	Geoscientific Verification Plan, March 2011 Prepared by Nuclear Waste Management Organization	Provide a detailed program of EDZ testing and measurement.	The Post Closure Safety Assessment relies on an accurate assessment of the impact of the Excavation Damage Zone (EDZ) in the vertical shaft to the repository. The characteristics of this zone must be adequately represented in the Post Closure Safety Assessment.

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		MWMO DGR-TR-2011-38		The Geoscientific Verification Plan (GVP) indicates that measurements will be conducted in dedicated boreholes to characterize changes in rock mass permeability resulting from EDZ formation. However, no further details regarding the number, location, and methods used for this permeability test of the EDZ has been provided.
SON 2.8	EIS Guidelines: Section 13, Long-Term Safety of the DGR	Geoscientific Verification Plan, March 2011 Prepared by Nuclear Waste Management Organization MWMO DGR-TR-2011-38	Provide a detailed program for the testing the performance of the various materials that will be used to seal the shaft.	The Post Closure Safety Assessment relies on an accurate assessment of the DGR sealing materials including those materials used to seal the vertical shaft from the surface to the repository. While the Geoscientific Verification Plan (GVP) outlines a program for evaluating sealing materials at the level of the repository in the Cobourg Formation, the GVP does appear to provide for a program to test the performance of the sealing materials that will be used to seal the vertical shaft. A program should be outlined for the testing the performance of the various materials that will be used to seal the shaft. This program should demonstrate the long-term performance of these sealing materials over the stratigraphic column in which they will be emplaced along the shaft. The adequacy of these materials to seal adjacent zones of EDZ should be clearly demonstrated.
SON 2.9	EIS Guidelines:	Malfunctions, Accidents	Provide an evaluation of necessary	As described in the EIS Guidelines, Section 14:

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	Section 12, Accidents, Malfunctions and Malevolent Acts	and Malevolent Acts, Technical Support Document, Section 5.5, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, March 2011 (Report 00216-REP-07701-00001 R000)	infrastructure measures to support response to accidents, malfunctions, and malevolent acts. Special attention is required to the notification and protection of adjacent communities, including the offshore fishing waters. Describe administrative measures and the organizational responsibilities for response and protection. Interface with local populations, including the SON communities, for notification and assistance in the event of accident conditions requires attention. Provide discussion of response measures, including an evaluation of notification means and evacuation time estimates and associated protective measures to minimize impact on the public.	"The description must include the safeguards that have been established by the proponent to protect against such occurrences and the contingency procedures in place. Accident management typically relies heavily on the evacuation of personnel and of the population, as required. … The proponent must demonstrate that the requirements for adequate infrastructure external to the DGR site are met. The need for any necessary administrative measures must also be identified together with the responsibilities of organizations other than the proponent." The EIS does not provide an evaluation of the adequacy of the site and surrounding community environment, including infrastructure, to address accident evaluation, response, and mitigation.
SON 2.10	EIS Guidelines: Section 12, Accidents, Malfunctions and Malevolent Acts	Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 5.5, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, March 2011, Section 8.2 (Report 00216-REP-07701-00001 R000)	Provide additional information regarding the planned response measures that will be put in-place to ensure adequate response to potential accident conditions, including beyond-design-basis events. Discuss coordination planned measures with surrounding populations, including SON communities. Should restricted access or clean-up measures be needed, describe measures that would be provided to minimize both	Section 4.4.2 of the Malfunctions, Accidents and Malevolent Acts TSD addresses Emergency Preparedness. This section appears to rely essentially exclusively on the Bruce EP capabilities with support from municipal fire departments, regional medical officers and Kincardine health and safety services. The need for an independent response capability for the DGR does not seem to have been evaluated or discussed. Competing demands during potentially concurrent events requires attention. Also, provisions following decommissioning of Bruce, when security may

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		Preliminary Safety Report, Section 6.9, March 2011 (Report 00216-SR-01320-00001 R000)	short term and long term impacts.	be less robust, have not been described. Emergency Response, as addressed in PSR Section 6.9, fails to provide sufficient supporting information and is inadequate in addressing emergency response needs and capabilities that are required. As specified in the EIS Guidelines, Section 14: "The description must include the safeguards that have been established by the proponent to protect against such occurrences and the contingency procedures in place. Accident management typically relies heavily on the evacuation of personnel and of the population, as required. … The proponent must provide a description of any contingency, clean-up or restoration work in the surrounding environment that would be required during, or immediately following, the postulated malfunctions and accidents."
SON 2.11	EIS Guidelines: Section 12, Accidents, Malfunctions and Malevolent Acts	Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 3.2, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, Section 8.1 and 8.2, March 2011, (Report 00216-REP-	Provide a discussion and justification for the screening criteria used for identifying initiating events, including bases for excluding events occurring with an annual frequency of less than 10^{-7}. Consideration of events with less than 10^{-7} frequency should be considered where potential consequences could be significant.	The analysis for potential accidents was based on a screening where those with an annual frequency of less than 10^{-7} were excluded. The identified event frequencies are not discussed (or referenced) with sufficient detail to support conclusions. Little to no bases are provided for the identification of initiating events and assigned occurrence frequencies. Descriptions for resulting accident conditions are insufficient to support conclusions. References are made to the Preliminary Safety Report for many supporting analyses or bases; however, this

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		07701-00001 R000)		categorical method of reference provides for an inadequate and incomplete discussion as required for the EIS.
SON 2.12	EIS Guidelines: Section 12, Accidents, Malfunctions and Malevolent Acts	Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 3.2, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, Section 8.2, March 2011 (Report 00216-REP-07701-00001 R000)	Provide a comprehensive discussion and evaluation of beyond-design-basis events, such as tornados and airplane impact with particular attention to any event that could have significant environmental impact even if frequency of occurrence is considered "non-credible."	As recognized by the Fukushima accident, it is not realistic to believe that the identification and design can account for all possible circumstances and accidents. Therefore, it is imperative to have contingency measures covering both design and operations to provide defense-in-depth for occurrences/accidents that could occur even though the initiating event may be considered "non-credible" or even unknown.
SON 2.13	EIS Guidelines: Section 12, Accidents, Malfunctions and Malevolent Acts	Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 4.3 and 4.4, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, Section 8.2, March 2011 (Report 00216-REP-07701-00001 R000)	Provide an identification of both design and operational measures that are needed to provide adequate defense in depth protection against accident and malevolent acts. Consideration of events beyond design basis shall be included, such as an event causing loss of all offsite and onsite power sources. Address design measures that provide the necessary back-up and support services needed for addressing adequate response during such events.	The Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 4.3.1.3, states: "… in the unlikely event of a radiological accident involving the DGR Project, unplanned releases will be controlled." It further states: "Also, the design includes measures to control accidental releases." And, "Accidents would be cleaned up as soon as possible." These statements are not substantiated by any specific design or operational specifications.

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SON 2.14	EIS Guidelines: Section 12, Accidents, Malfunctions and Malevolent Acts	Malfunctions, Accidents and Malevolent Acts, Technical Support Document, Section 4.4 and 5.5, March 2011 (Prepared by: AMES NSS Ltd.; NWMO DGR-TR-2011-07) Environmental Impact Statement, Section 8, March 2011 (Report 00216-REP-07701-00001 R000)	Provide an evaluation of the potential effect on DGR operations and safety should an accident occur at the Bruce Nuclear Power Plant and the WWMF. Events causing concurrent accident conditions at all three facilities should be considered. Evaluation should also consider the concurrent operation of the WWMF, a HLW storage facility, as well as a HLW DGR facility. Accidents beyond design-basis and affecting multiple units should be considered. The EIS should describe the design features and measures needed at the DGR facility should an accident occur either at the DGR or the Bruce Nuclear Plant.	Increasing the types and number of nuclear facilities (and associated radioactive inventories) on a single site also brings with it the increased potential for cumulative effects should an event occur. The EIS and PSR provides little to no discussion on potential impact on the continued safe operation of each facility from catastrophic events or accidents that could occur at the other facility. In the case for the DGR, it needs to be demonstrated that should an accident occur at Bruce Nuclear Plant, involving more than a single unit, the impact on the continued safe operation for the DGR would not be affected. The vice-versa also applies. Issues, such as personnel access/egress, worker safety and access for securing waste and placing the DGR in a safe condition, long-term access, and redundancy in support systems (power, water) all require design and operating considerations. The EIG Guidance specifies: “The proponent must identify and describe the probability of possible malfunctions or accidents associated with the project, and the potential adverse environmental effects of these events.”