2019 Feb 05

Directorate of Nuclear Fuel Cycle and Facilities Regulation
Canadian Nuclear Safety Commission
P.O. Box 1046 Station B
280 Slater Street
Ottawa, Ontario
K1P 5S9

Re: Consultation on draft REGDOC-1.2.1, Guidance on Deep Geological Repository Site Characterization

Dear Sir or Madam,

Thank you for this opportunity to comment on this draft REGDOC. My comments are provided in the attached table. I would be happy to discuss this with you further should you have any questions.

Regards,

Brian M. Ikeda, PhD

Associate Professor
Faculty of Energy Systems and Nuclear Science
University of Ontario Institute of Technology
Oshawa, Ontario L1G 0C5

	Section	Item	Comment
1	section 1.2, p. 2, paragraph 2	"... with a time frame of tens of thousands of years or more"	This statement is overly restrictive and not necessarily pertinent to site characterization. The isolation time frame is related to the hazard of the waste and it is this hazard that should define the timescale for which site post-closure characteristics need to be examined. This time-frame would be shorter for low level waste (as the OPG DGR project) than for high level waste (the NWMO DGR). A statement of time must be included as guidance for site characterisation, but it should be related the hazard of the waste to be isolated and not be a blanket statement for low, intermediate, and high levels of waste.
2	section 1.4, p. 3, paragraph 1	Management systems	The requirement for N286 is unnecessary, even if it was meant as an example, because it suggests a need to follow that standard. The standard is not appropriate, and it is not appropriate for the CNSC to indicate that an "informal inspections and assessments" would use the N286 standard. For the purposes of site characterisation, any acceptable QA system, even ISO9001, should be acceptable. The activities associated with site characterisation will, generally, not be nuclear in nature (the exception would be radiological studies of fractures and hydrogeology), so implying a need to follow a nuclear QA management structure is unreasonably onerous and may not be possible.
3	section 2, pp. 3-5	Overview of siting process	This is an important section that should provide context to the site characterization process. However, the section appears to be more of a cut-and-paste of a guidance document on siting, not site characterization. The main point of this section should be to provide the reader with the context for the site characterization process and data, an indication of the end-use of the characterization data. For example, in the conceptual and planning stage, section 2.1, the last sentence is with regard to establishing criteria, but you have not stated what characteristics are needed. In terms of site characterization, the identification of desirable site characteristics *within the context of a desired generic facility* should be the point of the planning stage. Similarly, the survey and characterisation stages (sections 2.2 and 2.4) should inform the reader of the increasing rigor in the characterization program and the use of site characterization data in decision making.

	Section	Item	Comment
			In terms of an overall waste management facility, the overview is helpful and informative, but in terms of the site characterization, it is vague and does not add guidance to conducting the characterization program.
4	section 3, p 5. last paragraph	pre and post closure periods	This is a useful definition, but it is out of place in this section. It does not close the section, and it does not introduce sections 3.1 and 3.2. This paragraph would probably be better in section 2, the overview section. Section 3.1 and 3.2 are not introduced. It would be useful to have a sentence/paragraph here that points out 1) 3.1 will discuss geological siting characteristics, and 2) 3.2 will discuss surface siting characteristics.
5	section 3.1, p. 7, bullet 2 top of page	key characterization factors	"site characteristics that would allow..." This is vague. The section is "key characteristics" not a comprehensive list of characteristics. Subsequent wording in this section allows the user to develop other characteristics that would be useful for the case. If other authorities (e.g., EMR) have identified these "other" characteristics that can be investigated, then they should be listed. This bullet should be removed.
6	section 3.1, p. 7, bullets 4 & 5 top of page	key characterization factors	Characteristics "favorable" for... The favorable should not be a factor in characterization – the program should characterize features regardless of their favorable or unfavorable properties. Similarly, "low" potential for... The characterization for human intrusion should be independent of the probability for the event.
7	section 3.1, p. 7, Note	NSAC licensing	This note is vague. What quantitative information should be provided? What point are you making that will help guide the reader to develop a robust characterization program?
8	section 3.1.1, p. 7	Geological setting	The opening sentence is written as a design statement, not as a guidance statement. The statement establishes that the information <u>is</u> to support the engineering design, but the guidance should be to develop the program to <u>provide</u> the data and setting to characterize the site. The data could either prove or disprove the suitability of the site. This is an important point of the characterization program.

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9	section 3.1.3, p. 7, bullet items 3 & 4	physical chemistry	The specific limitation of diffusion, speciation, solubility, and retardation of radionuclides is unnecessarily restrictive. The movement of other non-radioactive species should also be considered in the site characterisation, e.g., Pb, As, Cr, Cu. I would suggest that this statement be generic without examples.
10	section 3.1.3, p.7, bullet list	missing environmental condition	The redox environment and chemistry of the prospective site should also be considered, and in particular, the ability of the site environment to return to pre-excavation redox conditions. Microbiological potential has not been included in the list of possible factors. "Buffering" the effects of engineered barrier components – the resiliency of the geochemistry to contact with grouts, cements, etc.
11	section 3.1.5, p. 8 bullet list	missing factor	The impact resistance, and brittle and micro-fracture behaviour of the rock, particularly as a result of excavation damage should also be considered.
12	section 3.2, p. 8, 2nd sentence	Introduction	This is a vague statement that does not provide any clarification as an example. What "potential interactions" and "potential... associated effects"? This should be specific if you are using it as an example.
13	section 3.2, p. 8, last sentence	Introduction	"during pre-closure"; are the surface environment conditions pertinent for safe operation during *any* stage of the DGR facility lifetime? Restricting it to the pre-closure stage seems unnecessary.
14	section 3.2.2, p. 9, bullet items 1 and 3	aquatic characteristics	The quality of the surface water and sediment should not be assessed in the characterisation program, but the general characteristics should be enumerated. The evaluation should be specific and include the physical properties, chemical properties, and biological properties of the water and sediment.
15	section 3.2.4 p. 10, second bullet list	characterization methods.	This list of methodologies is not consistent with the rest of the document. You have not provided similar lists of methods. For consistency, this should be deleted and the choices left to the reader.
16	section 5.1, p. 11, paragraph 1	management system	This appears to be boiler-plate text for nuclear facility management. Since the characterization program may not (and if the site is rejected, never will) be performed as part of a licensed activity, the management restriction is unnecessary. It is important to require a QA program and the possibility of

	Section	Item	Comment
			needing the information for a nuclear license submission should be explained, but the text does not help guide a site characterization program. This would be better if rewritten to reflect the non-nuclear nature of the site-characterization program.
17	section 5.1, p. 11, paragraph 2	CSA N286	See previous comments (2&16) – N286 does not apply.
18	section 5.3, p. 12, bullet list	site characterization information	Either the section is incorrectly named, or the information is not complete. Environmental characterization records have not been included in this section – climate, flood, etc. that are part of section 3.2 have not been included in this section. It is important that this information is also catalogued correctly.
19	section 5.3, p. 13, bullet list	chemical records	Recording field chemistry information is appropriate, but it is also important to record the types of analysis performed, the analytical instrumentation used to perform the analysis, and the time between sampling and analysis.
20	section 5.4, p. 13, paragraph 2	contribution to models	This paragraph is not suitable for a characterisation program. It specifically refers to consistency of models. If the point is that characterization data may be used in more than one model, that should be stated, but it should not point to the result of the model, but the need for consistency in the input, or the consistency in verifying model output with characterization data.
21	section 5.4, p. 13, paragraph 3	Models	This paragraph has no link to characterization. It does not show how the characterization data could be used. If this is desired, it could be incorporated into a single paragraph (see comment 20). As it is, this paragraph has no place in this document.
22	section 6, p.14, p. 14	URL	This section is largely a narrative on the benefits of and difficulties with underground research labs, but does not provide guidance on using the URL for site characterization. The last paragraph is useful in the context of guidance and regulatory approval, but the preceding three paragraphs are not helpful in developing a characterization program to gather new information and verify other programmatic data necessary to justify site selection.