WR-1 Draft EIS and Supporting Documentation – Federal and Provincial Technical Review Comment Table
December 22, 2017

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
EIS					
General					
1.	Canadian Nuclear Safety Commission (CNSC)	All - General	N/A	**Comment:** The terminology in the Environmental Impact Statement (EIS) documentation to identify Indigenous peoples is not, in all cases, appropriately used. The use of the term "First Nations" is not interchangeable with the term "Indigenous peoples". When referring to both First Nation and Métis communities either indicate this explicitly or indicate "Indigenous communities". **Expectation to Address Comment:** Please review and revise the EIS documentation accordingly with the use of the appropriate terms.	
2.	CNSC	All - General	N/A	**Comment:** References in the EIS to the Métis [note: accent is required on the word 'Métis'] are often inaccurate and reflect a lack of understanding of the Métis history, the Métis Nation and its citizens. On p.xvii of the Executive Summary, for example, there is an erroneous statement: "The Project is located in the homeland of the Métis Nation, as represented by the Manitoba Métis Federation on Treaty 3 land." The numbered treaties were negotiated between the Crown and First Nations. Treaty 3 of 1873 was negotiated specifically between the Dominion of Canada and the Saulteaux Tribe of Ojibway Indians. **Expectation to Address Comment:** The EIS should clearly describe who the Métis people are, as a distinct peoples, and their history (i.e., in terms of not having a land base with the exception of northern Alberta). It may also be useful to provide some more detail and clarity regarding each pertinent treaty (i.e., Treaties 1, 3 and 5) and which First Nations are signatories to those treaties.	
3.	CNSC	All - General	N/A	**Comment:** While the EIS makes reference to technical supporting documentation and other detailed studies to support the analysis, and Canadian Nuclear Laboratories (CNL) is encouraged through cross-referencing to make use of existing information, a brief summary or narrative which explains the purpose of referencing each supporting document as well as any relevant information it contains (e.g., data, methodology, conclusions drawn) should be provided in the EIS. It was not always clear which sections of a referenced document were relevant to the discussion in the EIS. **Expectation to Address Comment:** The EIS should explain at a high level how the information is organized in the document as well as how it is supported by referenced documentation. Consistent with Section 3.3.3 of CNSC's *Generic EIS Guidelines* (p.6), where existing documents are	

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				referenced, the EIS should: • Specify which portion of the information or data in the document applies to the WR-1 project • Explain how it applies, and any assumptions, limitations or differences • Distinguish factual evidence from inference • Note any limitations on inferences or conclusions that can be made	
4.	CNSC	All - General	N/A	**Comment:** As required under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the EIS should describe the effects of any changes the project may cause to the environment, with respect to Aboriginal peoples, on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. While Section 6.8 Land and Resource Use of the EIS provides specific discussion and analysis of the effects on physical and cultural heritage sites and current use of lands and resources for traditional purposes as they pertain to Aboriginal peoples, there is no specific and distinct discussion in the EIS of any effects on the health and socio-economic conditions of Aboriginal peoples resulting from a change to the environment. In particular, there are no valued components (VCs) related to Aboriginal health identified in either Section 6.7 Human and Ecological Health nor Section 6.9 Socio-Economic Environment of the EIS. **Expectation to Address Comment:** Please include in the EIS, a stand-alone section, which provides a specific discussion of any effects on the health and socio-economic conditions of Aboriginal peoples resulting from a change in the environment. In situations where the EIS has identified changes to the environment, provide a description and analysis of how these changes could affect the health and socio-economic conditions of Aboriginal peoples.	
5.	Health Canada (HC)	All - General	N/A	**Comment:** Some citations for Ecometrix publications do not specify which 2017 publication is being referenced. **Expectation to Address Comment:** Specify which 2017 Ecometrix publication is being referenced throughout the EIS.	
6.	Environment and Climate Change Canada (ECCC)	All - General	N/A	**Comment**: The *Whiteshell Laboratories Decommissioning Project Comprehensive Study Report* (AECL, March 2001) is not appended to the EIS. The report is referenced in a number of sections of the EIS but not included in the appendices. **Expectation to Address Comment:** Provide the *Whiteshell Laboratories Decommissioning Project Comprehensive Study Report* as part of the EIS supporting documentation.	
7.	Manitoba Sustainable Development	Community and Aboriginal Traditional Knowledge	10-1	**Comment**: In comparison with a draft Table of Contents dated February 2017, the section Community and Aboriginal Traditional Knowledge on p.10-1 seems to be missing. The page features Section 11.0 (Assessment	

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				of Effects of the Environment on the Project) but is identified as Section 10.0. **Expectation to Address Comment:** Clarify whether this section has been removed or moved to another section.	
				Executive Summary	
8.	CNSC	Whiteshell Labs Site Background	ii	**Comment:** The following sentence of the Executive Summary indicates [emphasis added]: "CNL is an **enduring entity** that includes all the staff". The term "enduring entity" is not explained or defined. **Expectation to Address Comment:** Please define the term "enduring entity" in the documentation for clarity purposes.	
9.	CNSC	Aboriginal Engagement Activities	xii	**Comment:** While CNL has provided a summary of the actions taken to address feedback received from Indigenous communities, CNL has not included a complete summary of the responses provided to address the concerns and issues raised by the identified Indigenous groups (which is an information requirement of the Executive Summary as per CNSC's *Generic EIS Guidelines*, p.8). In particular, beyond the action of developing specific material for future presentations, information is missing regarding CNL's specific responses to Indigenous communities which address their questions or concerns (e.g., how any waste moved off-site would be transported, how the grout would maintain integrity over the long term). **Expectation to Address Comment:** Please provide a complete summary of CNL's responses to each of the concerns and issues raised by the identified Indigenous groups.	
10.	CNSC	Public and Stakeholder Engagement Activities	xiv	**Comment:** Although CNL has provided a summary of key issues and concerns raised, these are limited to those identified in open houses, rather than all public and stakeholder engagement activities carried out to date. In addition, CNL has not included a summary of the responses provided to address the issues raised (which is an information requirement of the Executive Summary as per CNSC's *Generic EIS Guidelines*, p.8). **Expectation to Address Comment:** Please provide a summary of key concerns and issues raised and CNL's responses to each of the concerns and issues raised during public and stakeholder engagement activities carried out to date.	
11.	CNSC	N/A	N/A	**Comment:** The Executive Summary does not provide sufficient detail for the reader to learn and understand the project's proposed follow-up and monitoring program (which is an information requirement of the Executive Summary as per CNSC's *Generic EIS Guidelines*, p.8). **Expectation to Address Comment:** Please provide a description, in the Executive Summary, of the project's proposed follow-up and monitoring program.	

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Main EIS					
1.0 Introduction					
12.	ECCC	Section 1.2 Project Overview	1-10, last paragraph	**Comment:** This section of the EIS states: "… total dismantling of the below-grade reactor systems exposes workers to many radiological and standard industrial hazards that are avoided through the in situ decommissioning (ISD) approach. Some examples include: • the reactor core contains high radiation dose rates that pose a significant hazard to workers during dismantling activities; • the reactor facility and systems contain large quantities of asbestos that would have to be abated." From the first bullet above, the statement implies that the project will dispose radioactive waste that have high radiation dose. CNL did not list these radioactive materials or their half-life. These may become a concern because they are proposed to be buried in shallow depths. **Expectation to Address Comment:** Explain how this proposed in situ method is adequate by disposing radioactive waste with high radiation levels in shallow ground (just below grade) which is used for the proposed low and intermediate level radioactive waste storage.	
13.	CNSC	Section 1.3 Project Location	1-11 1-12	**Comment:** As required by CNSC's *Generic EIS Guidelines* (p.8-9), the project location section should include a description of local and Aboriginal communities, and the traditional Aboriginal territories, treaty lands, and Indian reserves lands and Métis harvesting regions and/or settlements that are in the vicinity of the project. The locations of several First Nations communities are not described and no traditional Aboriginal territories are identified. **Expectation to Address Comment:** Please revise this section to include this information.	
14.	CNSC	Section 1.3 Project Location	1-12	**Comment:** The paragraph which describes other land uses in the regional area does not consider subsistence fishing carried out by Indigenous communities in the vicinity of the Whiteshell Laboratories (WL) site. **Expectation to Address Comment:** Please revise accordingly.	
15.	Manitoba Sustainable Development	Section 1.6.1 Federal Review Process	1-17, 2nd paragraph	**Comment**: With respect to the 2nd bullet which states the following: "Waste generator registration will be maintained through the Manitoba Conservation and Water Stewardship, and in compliance with the Dangerous Goods Handling and Transportation Act" **Expectation to Address Comment:** Please include "Hazardous" in front of "Waste generator registration". Also, please replace "Conservation and Water Stewardship" with "Sustainable Development".	
16.	Manitoba Sustainable Development	Section 1.6.1 Federal Review Process	1-17, 3rd paragraph	**Comment**: This section of the EIS indicates the following: "The Project is located on Federal lands and is regulated by the CNSC, therefore, it is anticipated that provincial permits, licences or other authorizations are	

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				not required." Although the project is located on Federal lands, hazardous non-radiological wastes generated during the decommissioning need to be removed and shipped offsite for appropriate disposal. **Expectation to Address Comment:** Revise this statement accordingly and indicate the relevant provincial and municipal authorizations that are required for the management of hazardous non-radiological wastes.	
17.	CNSC	Section 1.6.1 Federal Review Process	1-17	**Comment:** The following sentence in the EIS is not applicable to a CNSC EA process under CEAA 2012: "Under Section 8 of CEAA, 2012, a Project Description is required to initiate the screening process through which the Canadian Environmental Assessment Agency (the Agency) will determine if a federal environmental assessment is required for all designated projects." Section 8 of CEAA 2012 does not apply to designated projects that are regulated by the CNSC. **Expectation to Address Comment:** Please remove this statement.	
18.	CNSC	Section 1.6.1 Federal Review Process	1-17	**Comment:** Please update this section to indicate the list of federal authorities that are providing their expertise during the EA process for this project, which are as follows: Environment and Climate Change Canada, Health Canada and Natural Resources Canada. In addition, please update this section to indicate that the province of Manitoba is participating as a member of the federal and provincial review team during the EA process for this project. **Expectation to Address Comment:** Please revise accordingly.	
19.	CNSC	Section 1.6.2 Relevant Standards, Codes and Guidelines	1-17	**Comment:** It is not clear why CNL has not included in their list of standards CSA N292.3, *Management of low and intermediate level waste*. This standard is in the current WL decommissioning licence and is relevant for the site. **Expectation to Address Comment:** Please clarify why CSA N292.3 is not included in this list.	
20.	CNSC	Section 1.6.2 Relevant Standards, Codes and Guidelines	1-18	**Comment:** The title of REGDOC-3.2.2, as reflected on this page, is incorrect. The title is REGDOC-3.2.2, *Aboriginal Engagement*. In addition, the list of relevant standards and codes is missing reference to RD/GD-99.3, *Public Information and Disclosure*. **Expectation to Address Comment:** Please revise accordingly.	
2.0 Purpose of the Project and Alternatives to the Project					
21.	CNSC	Section 2.3 Purpose of the Project	2-2	**Comment:** The three main objectives for ISD as listed in this section are not consistent with other descriptions for this new proposed approach. In Section 1.1, Project Context on p.1-7, the ISD approach is proposed to reduce the need for interim storage of radioactive waste, but this objective is not identified in this section.	

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				Expectation to Address Comment: As per the information requirements of CNSC's *Generic EIS Guidelines* with respect to the purpose of the project (p.9), please provide a clear and consistent description of the purpose of the project including stated objectives.	
22.	CNSC	Section 2.3 Purpose of the Project Section 2.4.2 Design Principles from External Sources	2-2 2-5	**Comment:** In Section 2.3 of the EIS, it is stated that CNL has evaluated other decommissioning options that allow the WR-1 Building to be decommissioned with greater safety and that ISD is the proposed approach. CNL also indicates that one of its main objectives includes the application of "international best practices to safely decommission the WR-1 Building while ensuring protection to the environment (i.e., human and ecological)". In Section 2.4.2 of the EIS, it is stated that "in addition to CNL's design principles, the design and implementation of the Project will also use Canadian and international best practices and safety fundamentals, including those from the International Atomic Energy Agency (IAEA) and the CNSC." **Expectation to Address Comment:** Please clarify/elaborate as to whether/how the proposed decommissioning approach aligns with IAEA's 2014 *Safety Standard, Decommissioning of Facilities - General Safety Requirements* (GSR) Part 6.	
23.	CNSC	Section 2.4.2 Design Principles from External Sources	2-5	**Comment:** This section of the EIS refers to IAEA SSG-29, *Near Surface Disposal Facilities for Radioactive Waste*. In particular, Section 1.11 of SSG-29 states: "This Safety Guide does not apply to intermediate level waste (ILW) that will not decay to safe levels over a period of a few hundred years or to high level waste (HLW), as both are unsuitable for near surface disposal." **Expectation to Address Comment:** Clarify the applicability of SSG-29 to the WR-1 ISD project.	
24.	CNSC ECCC	Section 2.5, Alternative Means for Carrying out the Project	2-7 to 2-31	**Comment:** The information provided in the EIS does not provide sufficient detail to substantiate the conclusion that Alternative #3 is the preferred option based on the alternative means assessment. The methodology presented in this section of the EIS to assess the alternative means does not describe in sufficient detail how the criteria were used to assess the technical and economic feasibility of the alternative means, particularly, how these criteria were systematically evaluated to identify the preferred alternative. **Expectation to Address Comment:** Provide a systematic evaluation of alternatives which identifies and describes, in sufficient detail, how the different criteria were used to identify technically and economically feasible alternative means. Explain how the preferred alternative was identified based on the relative consideration of the safety, environmental, economic and technical criteria. In particular, provide an explanation of how the categories and criteria in Table 2.5.1-2 were defined, evaluated and combined to determine the	

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				overall ratings. All feasible alternatives should be considered and discussed at a comparable level of detail to avoid any indication of a bias towards a particular alternative(s). Consider carrying out a sensitivity or risk analysis to eliminate potential bias and subjectivity which is inherent in the evaluation process. Sufficient rationale and detail must be provided to enable the reader to understand how the preferred alternative was chosen.	
25.	CNSC	Section 2.5.1 Evaluation Approach	2-7	**Comment:** This section of the EIS indicates: "The decommissioning strategy for WR-1 draws upon the experiences and lessons learned from the decommissioning of similar reactors". No evidence or information is provided in this section to support this statement. **Expectation to Address Comment:** Please identify the reactors and provide in sufficient detail which experiences and lessons learned from the decommissioning of similar reactors were taken into consideration, and how this informed the options considered in the alternative means assessment.	
26.	CNSC	Table 2.5.1-1	2-8	**Comment:** Consistent with the Agency's Operational Policy Statement entitled, "Addressing "Purpose of" and "Alternative Means" under CEAA 2012" and CNSC's *Generic EIS Guidelines*, the alternative means assessment must explain and justify the methodologies that were used to identify technically and economically feasible alternative means. This section of the EIS is silent on whether other alternative means were considered, but determined not to be technically and economically feasible. **Expectation to Address Comment:** Any alternative means that were considered, but determined not to be technically and economically feasible, should be identified and described, and the rationale as to why they were determined not to be feasible should be documented in this section. Please identify whether any other options were considered, particularly those that may have been suggested by stakeholders and the public, and provide a rationale as to why they were determined not to be feasible.	

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27.	CNSC	Section 2.5.1 Evaluation Approach	2-8	**Comment:** This section of the EIS indicates: "Public and Aboriginal engagement is also an important aspect of the decision-making process. A summary of the alternative means being considered was made available to the public at open houses and meetings with First Nations communities, and input received is documented in Section 4.0 Aboriginal Engagement and Section 5.0 Public Engagement". CNL indicates that public input was received on the alternative means however neither in this section nor Section 5.0 Public Engagement, is there information on how public feedback was taken into consideration in the alternative means assessment. In particular, CNSC staff are aware that members of the public have inquired why other options were not considered in the alternative means assessment, such as, disposal of waste below bedrock. **Expectation to Address Comment:** Please provide in sufficient detail how public feedback was considered in and/or informed the alternative means assessment. If the input received was not considered in the alternative means assessment, please explain why, as well as indicate in the EIS the responses that were provided to the public in response to the issues and concerns that were raised.	
28.	CNSC	Section 2.5.1 Evaluation Approach	2-8	**Comment:** This section of the EIS indicates: "Public and Aboriginal engagement is also an important aspect of the decision-making process. A summary of the alternative means being considered was made available to the public at open houses and meetings with First Nations communities, and input received is documented in Section 4.0 Aboriginal Engagement and Section 5.0 Public Engagement". CNL indicates that Aboriginal communities' input was received on the alternative means however neither in this section nor Section 4.0 Aboriginal Engagement, is there information on how Aboriginal communities' feedback was taken into consideration in the alternative means assessment. **Expectation to Address Comment:** Please provide in sufficient detail how Aboriginal communities' feedback was considered in and/or informed the alternative means assessment. If the input received was not considered in the alternative means assessment, please explain why, as well as indicate in the EIS the responses that were provided to the Aboriginal communities' in response to the issues and concerns that were raised.	
29.	CNSC	Table 2.5.1-2	2-8	**Comment:** In the alternative means assessment, the criteria identified for worker safety are focused on minimizing the mitigation required to ensure that radiological dose limits are not exceeded during decommissioning. In contrast, for other VCs under "Environmental Effects", the criteria consider how the likely effects compare. The criteria for various VCs in the alternatives assessment appear to be inconsistent.	

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				Expectation to Address Comment: Please justify the selection of criteria for the alternatives means assessment, and include in this justification, the reason why the criteria for the VC of worker health is defined differently than for other VCs.	
30.	CNSC ECCC	Table 2.5.1-2 Criteria for Evaluating Alternative Means of Carrying Out the Project	2-9	**Comment:** Based on the criteria identified, it is unclear whether CNL has assessed the alternatives based on effects during both the closure and post-closure phases in all cases. The evaluation criteria for 'Environmental Effects' includes the question: "Can it be decommissioned in a manner that provides long-term protection of ecological and human health?" Although this question/criteria does attempt to examine the issue of long-term effects, more specific time periods in the evolution of each of the alternative means would be more appropriate since there are very specific time periods with respect to institutional control. These periods are the closure period, post-closure with institutional control and post-closure without institutional control. Potential ecological effects during active decommissioning activities will be markedly different from the post-closure near term. As well, the potential environmental effects between post-closure near term will likely be very different from the post-closure long term especially when geologic timescales are considered. **Expectation to Address Comment:** Expand the temporal evaluation of the environmental effects of the alternative means to the closure period, the post-closure with institutional control period and the post-closure beyond/without institutional control period. In particular, it seems Alternative #3 has a higher risk for the environment in the long-term than completely or partially removing the core from the site. Please clarify and compare each alternative's effects to human health and the environment in the short-term and long-term.	
31.	ECCC	Table 2.5.1-2 Criteria for Evaluating Alternative Means of Carrying Out the Project	2-9	**Comment:** In the 'Technical Feasibility' evaluation of the alternatives, a reasonable assessment of the similarities and differences between the proposed alternative and the past experience example(s) should be presented for the evaluation. The description of the technical feasibility for the ISD alternative includes references to the experience in the United States. At the Hallam Nuclear Power Facility, "only low-level waste was included" for the entombment structure [1] such that the decommissioned end state was similar to that of a near surface disposal facility for low-level waste which is consistent with the IAEA guidance. This ensured that all three entombed reactor sites in the US could meet unrestricted use standards in about a hundred years. It should also be noted that the US-List of Decommissioned Reactors shows that the majority of decommissioned reactors have been through decommissioning which is effectively complete dismantling and	

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				decontamination. The footnote for entombment states: “radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombment structure is appropriately maintained, and continued surveillance is carried out until the radioactivity decays to a level permitting unrestricted release of the property.” [2] The post-closure status of the ISD will be that of a near surface disposal facility under IAEA guidelines. Therefore, the evaluation of ‘Technical Feasibility’ should include the extent which the end-state will be similar to a near surface disposal facility as defined by the IAEA. **Expectation to Address Comment:** All alternatives should be clearly analyzed for alignment with the IAEA guidelines for decommissioning nuclear reactors or its equivalent, that is, that decommissioned nuclear reactor sites should be releasable for unrestricted public use. **References:** [1] Birk, S.M., R.G. Hanson and D.K Vernon Jr. 2000. Entombment: It is Time to Reconsider This Technology. Proceedings of the Idaho International Engineering and Environmental Laboratory. INEEL/CON-2000-00597 PREPRINT. [2] NEI. 2016. Decommissioning Status of Shut-Down US Nuclear Power Reactors. https://www.nei.org/Knowledge-Center/Nuclear-Statistics/US-Nuclear-Power-Plants/Decommissioning-Status-for-Shut-Down-US-Nuclear-Po	
32.	Manitoba Sustainable Development	Section 2.5 Alternative Means of Carrying out the Project	2-10	**Comment**: With respect to the paragraph on “Waste Handling”, there is mention of interim storage of waste but the location is not provided. **Expectation to Address Comment:** Clarify where the interim storage would be located. Would it be located on the WL site? If so, provide a specific location and indicate if any site monitoring will be conducted during the time it is in use.	
33.	ECCC	Section 2.5.4.3 Technical	2-23	**Comment**: This section of the EIS states that: “Alternative #3 will require the transport and disposal of small quantities of radioactive wastes offsite, although it is anticipated that the majority of wastes will be contained with the WR-1 ISD structure.” **Expectation to Address Comment:** Provide the volume and type of waste, as well as the number of trips to deliver off-site. Estimate the release of radiological and non-radiological contaminants (e.g., lead, cadmium) for this operation.	
34.	Manitoba Sustainable Development	Section 2.6 Summary	2-27	**Comment**: The first paragraph in the Summary refers to a table numbered Table 2.6-1, but this is missing from this section of the EIS. Is the text in this section referring to Table 2.7-1? **Expectation to Address Comment:** Update this section of the EIS accordingly.	

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35.	Manitoba Sustainable Development	Section 2.7 Conclusion	2-31	**Comment**: The concluding remarks state that [emphasis added]: "In Situ Decommissioning is the safest technique, dramatically reducing the risk to workers compared to dismantling, and provides **long-term safety to the public and the environment**." The summary of the evaluation of alternatives in Table 2.7-1 does not substantiate the long-term safety to the public and environment by the Alternative #3. **Expectation to Address Comment:** Revise the statement in Section 2.7 to reflect the summary of evaluation of alternatives in Table 2.7.1.	
3.0 Project Description					
36.	CNSC ECCC	Section 3.1.1 Project Overview	3-1	**Comment:** The Project activities assessed in the EIS are limited to the ISD of the WR-1 Building. The EIS indicates that the removal of the east wing (also referred to as east extension or east annex) and service wings of the WR-1 complex were assessed as part of the *Comprehensive Study Report* (CSR) (AECL 2001) and are covered under CNL's existing decommissioning licence for the WL site. However, air emission estimates, air dispersion modeling and cumulative effects for criteria air contaminants (CACs) only consider the ISD of WR-1 Building. **Expectation to Address Comment:** Clarify what project activities are included in the air emission estimates, dispersion modeling results and cumulative effects analysis for air quality and greenhouse gases (GHG). Clarify whether there will be any other decommissioning and demolition activities done in the Site Study Area (SSA) during the ISD of the WR-1 complex? If so, determine the cumulative effects of these activities on air quality and GHG emissions.	
37.	ECCC	Table 3.5-1	3-28	**Comment:** It is not clear what is meant by the following statement in the EIS: "Pipes and conduits penetrating out walls to be cut to provide an air gap". Does this mean that it is possible that air will escape from the encapsulated portion of the entombment that is below grade? Will the escaping air be monitored to ensure that no radioactive material is emitted into the atmosphere from the entombment with the air? **Expectation to Address Comment:** Provide clarification on what the air gaps mean and their purpose.	
38.	ECCC	Section 3.5.1.1.3 Create Grout Flow Paths	3-32	**Comment**: This section of the EIS indicates that: "In order to permit grout to fully encapsulate the below grade systems, it may be necessary to penetrate interior walls, piping systems, or tanks. For interior walls, pathways may be created between rooms to allow flow of grout into, and air and grout curing heat out of, all areas of the below grade structure. For piping systems and tanks, penetrations may be made at strategic locations to allow grout to further penetrate into tanks and piping systems for a two-fold purpose:	

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				1) Reduce buoyancy loads from empty tanks and large pipes surrounded by liquid grout. 2) Provide additional barriers to release of contamination, above and beyond that already accounted for by the planned macro-encapsulation." The statement "encapsulate in grout" was included in places (tables) and then the above statement refers to grout flow path. However, it is not specified whether the grout will be injected with pressure or allowed to flow by gravity. If the grout is to flow by gravity, it is likely that void spaces will not be filled with grout, especially in tight spots or places where gravity would not be sufficient to force grout in such spaces. Also, CNL states that "penetrations may be made at strategic locations to allow grout to further penetrate into tanks and piping systems". Given that there are several pipes below grade of various sizes, the statement does not specify that all the pipes will be cut open to allow the grout to fill them up. This may then mean that a number of the pipes below grade, especially horizontal pipes and a good number of the narrow pipes, will not be filled with grout. **Expectation to Address Comment:** Explain the rationale for relying on gravity instead of pressure to apply the grout, what the plans are to get grout into all the pipes, all the small spaces, and the implications of not filling the pipes and spaces with grout.	
39.	CNSC	Section 3.5.1.2 Grouting of Below Grade Structures and Systems	3-32	**Comment:** This section of the EIS indicates that: "The grout will be designed to achieve the required physical properties to provide adequate resistance to damage, and release of contamination. There is limited information on the grout design in the EIS which would allow for establishing and verifying efficient grout performance. **Expectation to Address Comment:** Provide sufficient detail with respect to the development of the grout mix design, grout production (batch plant) and grout placement technology with their respective QA/QC requirements (including testing).	
40.	ECCC	Section 3.5.1.2 Grouting of Below Grade Structures and Systems	3-32	**Comment**: This section of the EIS indicates that: "The grout will be designed to achieve the required physical properties to provide adequate resistance to damage, and release of contamination. The design will take into account the effects of using local fill materials (e.g., sand and gravel) and the materials the grout will interact within the WR-1 below grade structure (e.g., aluminium). Multiple grout formulations may be necessary to achieve complete filling of the below grade structure, but all formulations will adhere to the same minimum requirements to ensure the final end state performs as expected. Grouting of the below grade structure will be carried out in stages. The structure will be filled to eliminate as many void spaces as is reasonably achievable. The placement of the grout will be completed using an	

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				engineered fill schedule (i.e., grouting plan). Multiple lifts of grout will be executed to systematically encapsulate the reactor systems and the entire below grade structure. The maximum lift size (depth of fresh grout) will be determined for each room based on the structural properties of the room, and the presence of equipment that could be crushed, filled or dislodged if grout is poured too quickly. Each lift of grout will be given sufficient time to cure before additional grout is poured. Smaller lifts may be used in specific areas, for example to fill targeted voids. Quality control measures on grouting operations will be implemented to ensure all requirements for the grout are met and the final product will perform as expected." With respect to these statements, how does CNL ensure that the grout layers/lifts are sufficiently bonded or bound together in order to avoid interface that could create potential pathways for water? **Expectation to Address Comment:** Explain how the grout lifts are bonded together and how long the grout is expected to last and be effective – what is the life of the grout? Clarify whether grout is cement or epoxy based. If the grout is epoxy based, how would the heat that might be generated below grade be managed?	
41.	ECCC	Section 3.5.1.3 Removal of Above-grade WR-1 Building Structures	3-33	**Comment**: This section of the EIS indicates that: "Soil surrounding the foundation will be segregated and radiological clearance surveys will be performed, and subsequent remediation will be completed as required." It is not clear how this will affect air emissions during the decommissioning phase of the project and during the post-closure phase. **Expectation to Address Comment:** Provide criteria for soil segregation, how the segregation will most likely be performed (e.g., in an open or enclosed space, estimated volumes, concentrations of contaminants, etc.)	
42.	CNSC ECCC	Section 3.5.1.4 Installation of Engineered Cover	3-33	**Comment:** This section of the EIS with respect to the installation of engineered cover does not describe its limiting effect on gas (e.g. tritium, radon) effusion during post-decommissioning phase. **Expectation to Address Comment:** Include in the estimate of air emissions releases from soil related to tritium, as well as releases of gases due to radioactive decay. Provide an estimate of the gases likely to be released through the engineered cover during the post-ISD phase (e.g., through the radioactive decay). This is necessary to fully assess long-term impacts on air quality.	
43.	Manitoba Sustainable Development	Section 3.5.1.4 Installation of Engineered Cover	3-33	**Comment**: This section of the EIS proposes the installation of an engineered cover over the former footprint of the WR-1 Building site. Will federal and provincial agencies involved in this EA have an opportunity to review design specifications for the engineered cover prior to the approval of the ISD project?	

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				Expectation to Address Comment: Please clarify.	
44.	Manitoba Sustainable Development	Section 3.5.3 Waste Generation and Management	3-35	**Comment**: This section of the EIS indicates there is nothing available at this time for off-site waste disposal. Waste may include nuclear, radioactive, polychlorinated biphenyl compounds (PCBs), asbestos and lead materials. **Expectation to Address Comment:** Manitoba Sustainable Development recommends that once an offsite disposal location has been determined, CNL are to contact the facility owner to obtain approval to accept the waste in advance and to notify both the federal and provincial governments of the disposal locations.	
45.	Manitoba Sustainable Development	Section 3.5.3.2 Hazardous Non-Radiological Wastes	3-35	**Comment**: Details provided in this section are very vague. What are small quantities? Are CNL's waste management practices (CNL 2017b, c) & Environmental Protection Program (CNL 2017d) part of this EIS? **Expectation to Address Comment:** The following sentence needs further clarification: "The wastes will be shipped offsite to an appropriate hazardous waste facility, or encapsulated in the same manner as radiological wastes where it is demonstrated safe to do so." What are the deciding factors? (not all hazardous non-radiological wastes may be suitable for in-situ disposal). CNL is already registered with the Manitoba Sustainable Development as a generator of hazardous wastes. Waste generator registration needs to be reviewed prior to the beginning of the decommissioning project to ensure that all of the wastes that will be generated / and transported offsite are registered. Appropriate waste disposal facilities for hazardous non-radiological wastes and non-hazardous wastes need to be identified prior to decommissioning. Transportation of hazardous waste will be in accordance with provincial/federal regulations. Movement documents will be prepared and transmitted as required by the provincial regulations.	
46.	Manitoba Sustainable Development	Section 3.5.4 End-State and Post-Closure Activities	3-36	**Comment**: What is the anticipated closure and post-closure for the existing landfill on the property? Any closure and post-closure work should be submitted for review and approval by the appropriate governing authority. **Expectation to Address Comment:** Please clarify.	
47.	CNSC	Section 3.5.4.1 Multilayered In Situ Decommissioning System	3-36	**Comment:** CNL acknowledges that barriers will degrade over time; however, CNL has not established a specific time period(s) and performance requirements for the barriers commensurate with the characteristics of the waste that are to be confined. REGDOC-2.9.1 requires design, maintenance and monitoring of barriers. There is no information in the EIS about the barriers that can establish and support, with sufficient detail, their performance over time. **Expectation to Address Comment:** For the existing barriers (reactor	

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				system components, internal walls/bioshield, building foundation): • At this time, does CNL have a current condition assessment where the condition of the above barriers against the original design requirements and against its function is established (e.g., presence of defects, permeability, cracks, corrosion, water ingress, required repairs, maintenance, etc.)? If yes, please provide a reference. If no, please explain why not. • At this time, does CNL have an assessment for the confinement function in the disposal project of the existing barriers? This includes consideration of: – Original design; – Current condition; – Assessment of degradation mechanisms that the barrier may experience during the life of the facility and the ability of the barrier to perform its function. This is presumably up to the point where clearance level for the waste will be reached (as in CSA N292.3), unless CNL provides justification for an alternate duration; and, – Demonstration of the ability of the barrier to perform efficiently its function. For the new barriers (grout and engineered cover), please provide additional information with respect to: • Design requirements; • Assessment of degradation mechanisms that the barrier may experience during the life of the facility and the ability of the barrier to perform its function. This is presumably up to the point where clearance level for the waste will be reached (as in CSA N292.3), unless CNL provides justification for an alternate duration; and, • Demonstration of the ability of the barrier to perform efficiently its function. •	
48.	CNSC	Section 3.5.4.1 Multilayered In Situ Decommissioning System	3-36	**Comment:** CNSC staff could not identify research (both existing and new specific to the project) that will be used to support the argument for barrier performance (this includes, but not limited to, the following topics: durability/deterioration/degradation, defects, permeability, corrosion) CNL has not provided the basis for barrier performance in terms of technical justification for their performance. As part of this it is expected that it will include the following building blocks: • literature review for, and analysis of, available information that is used in justifying the performance of the barriers; • identification of any gaps where there may not be sufficient technical basis to support the performance of a barrier; and, • plan for bridging those gaps, as needed.	

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				Expectation to Address Comment: Provide information on the technical information/research from academia and existing projects with similar challenges (maybe nuclear or non-nuclear) that are being used to justify barrier performance.	
49.	ECCC	Section 3.5.4.1.2 Grout	3-36	**Comment**: Insufficient information is provided in the EIS to be able to estimate air emissions from grout production and backfilling operations. **Expectation to Address Comment:** Provide physical properties of the grout proposed to be used (including particle size distribution) and mixing conditions.	
50.	CNSC	Section 3.5.4.1.5 Local Geosphere	3-37	**Comment**: The baseline geological environment is inadequately characterized in the EIS (and supporting documents); it falls short of what is needed to assess the submission in light of the reliance of the project on the enclosing geological environment (for long-term safety). The compilation of existing geological information is limited; there is no geological history of the region, no description of the tectonic setting, no three-dimensional framework models of geology and structural geology, seismic hazard assessment (linked to regional geology and tectonics), limited geomorphology and quaternary geology. CNL's proposal for ISD of the WR-1 involves permanently entombing the facility. Whether the geosphere can be considered as an important barrier depends on its physical, chemical, hydrogeological, and mechanical properties and the site evolution within the defined timeframe. Section 6.3.1.4.2.2 states that geological formations consist of bedrock and surficial soils. The upper bedrock contains numerous fractures and is relatively permeable. The surficial overburden soils consist of (from bottom to top) basal sand, clay till, clay, and a thin deposit of interbedded silt and clay. The upper bedrock and basal sand consist of a shallow groundwater aquifer. If the engineered barriers fail and lose their containment functions, the contaminants in the ISD facility would migrate faster along the bedrock and basal sand aquifer to reach the receiving environment. Also, within the defined timeframe, the evolution of the site and the Winnipeg River might remove at least some surficial soils if not all of them, which will impact the safety of the disposal facility (see related comment on Section 6.3.1 below). The importance of the geosphere as a natural barrier for long-term safety is also discussed in the Decommissioning Safety Assessment Report (e.g., p.45, Section 2.3.1.5 "The surrounding geosphere provides natural barriers for long-term safety during post-closure as the WR-1 ISD structure will be located below-grade."). This highlights the need for the inclusion of geological data, which needs both to be integrated with the safety assessment, and forms an additional component in the safety case. **Expectation to Address Comment:** Provide a synthesis of the complete geosphere characteristics that are relevant for this project, so that CNSC staff can evaluate this important component of the safety case.	

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				This information is required to support the statement that local soils provide a barrier to contaminant release to the environment. One specific request includes providing a cross-section showing the relationship between the geology and the WR-1 facility to demonstrate and justify the importance of the geosphere barrier.	
51.	ECCC	Section 3.5.4. 2 Post-Closure Activities	3-38	**Comment**: This section of the EIS states that: "The monitoring program will focus on groundwater quality and the functioning of the containment." However, it is not clear whether emissions of radiological and non-radiological contaminants through the processes of migration to the surface (including uptake by plants) and wind erosion during post-closure have been considered. Lead and strontium-90 are examples of contaminants that could reach the surface through plant uptake. If judged to be significant, Table 1 in Appendix 6.1-1 should be updated accordingly. **Expectation to Address Comment:** Clarify whether emissions of radiological and non-radiological contaminants through the processes of migration to the surface (including uptake by plants) and wind erosion during post-closure have been considered. If contaminants are assessed to be significant, update Table 1 in Appendix 6.1-1 accordingly.	
4.0 Aboriginal Engagement					
52.	CNSC	All – General	N/A	**Comment:** The final EIS and supporting documentation (*Aboriginal Engagement Report*) should include a schedule of proposed engagement activities and meetings with First Nation and Métis groups as per the requirements of REGDOC-3.2.2.	
53.	CNSC	All – General	N/A	**Comment:** The final EIS and supporting documentation (*Aboriginal Engagement Report*) should include an update on the development of engagement work plans with identified First Nation and Métis groups, as per the requirements of REGDOC-3.2.2.	
54.	CNSC	All – General	N/A	**Comment:** The final EIS and supporting documentation (*Aboriginal Engagement Report*) should provide an updated list of engagement activities, communications and meetings with identified First Nation and Métis groups (the current list is up to July 2017), as per the requirements of REGDOC-3.2.2. **Expectation to Address Comment:** In the final EIS, provide an updated list and description of First Nation and Métis engagement activities, including any discussions CNL has had with identified First Nation and Métis groups regarding potential impacts to potential or established Aboriginal and/or treaty rights.	
55.	CNSC	All – General	N/A	**Comment:** The final EIS and supporting documentation (Appendix 4.0-1 Contact Tracker) should provide an updated list of important correspondence from First Nation and Métis groups (the current list is up to July 2017). Please indicate, for example, whether any groups have indicated that they are not interested in further engagement on the project,	

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				have raised specific concerns or requests in correspondence, etc.	
56.	CNSC	All – General	N/A	**Comment:** It is not clear from this section of the EIS and the *Aboriginal Engagement Report*, whether or not CNL provided Aboriginal groups the opportunity to participate in the development, implementation and review of mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC's *Generic EIS Guidelines*. **Expectation to Address Comment:** Please indicate in the EIS whether CNL sought the views of Aboriginal groups on the development, implementation and review of mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC's *Generic EIS Guidelines*.	
57.	CNSC	Section 4.1 Introduction	4-1	**Comment:** The introduction of this section should indicate that this is an interim status update on CNL's Aboriginal engagement plan that was submitted to the CNSC as part of its *Aboriginal Engagement Report*, as per the requirements of REGDOC-3.2.2. **Expectation to Address Comment:** Please revise accordingly.	
58.	CNSC	Section 4.3.2 Summary of First Nation and Métis Engagement Activities	N/A	**Comment:** The final EIS and supporting documentation (*Aboriginal Engagement Report*) should include further details on the concerns and questions raised by First Nation and Métis groups, and how CNL is addressing them (e.g., mitigation measures) as per the requirements of REGDOC-3.2.2 and CNSC's *Generic EIS Guidelines*. Particularly, those related to impacts on any potential or established Aboriginal and/or treaty rights. Although key interests and concerns for each Aboriginal group are identified in this section of the EIS, how CNL has responded to or addressed these concerns is not provided. **Expectation to Address Comment:** As per the requirements of REGDOC-3.2.2 and CNSC's *Generic EIS Guidelines*, update this section to include all comments, specific issues and concerns raised by Aboriginal groups and how these were responded to or addressed.	
5.0 Public Engagement					
59.	CNSC	General	5-1 to 5-16	**Comment:** The EIS should indicate the public concerns raised and the extent to which this information was incorporated in the design of the project (which is an information requirement of Section 6 as per CNSC's *Generic EIS Guidelines*, p.14). There is limited information related to this in the EIS. **Expectation to Address Comment:** Provide additional details on how public concerns were considered as part of the EA process.	
60.	CNSC	Section 5.2.2.2 Media Coverage Section 5.3.3.2 Media Coverage	5-7 5-14	**Comment:** CNL provided copies of media coverage, but there is no analysis of the coverage. **Expectation to Address Comment:** Provide further information about the general nature and tone of the articles, and whether media coverage has increased over the life of this project	

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61.	CNSC	Section 5.3 Project-specific Public Engagement	5-8 to 5-16	**Comment:** In this section, CNL has provided a summary of public questions and concerns raised about the project during outreach activities. They have also provided a dispositioning table in their supporting documentation in response to those questions. However, there is no clear indication of strategy used to respond to the public and ensure follow-up on outstanding questions. CNSC staff heard from some members of the public that CNL had either not responded to their information requests or not responded in a timely manner. **Expectation to Address Comment:** Provide details on the strategy for responding to information requests, and/or evidence of tracking and responding to all public requests for information (e.g., received by phone, email, or in-person).	
62.	CNSC	Section 5.3.4 Future Engagement Activities Planned	5-16	**Comment:** Since the submission of the EIS, CNL has participated in various municipal meetings and meetings with elected officials. The CNSC would like further information on those meetings. **Expectation to Address Comment:** Provide further details on the municipal meetings CNL has attended, and a summary of the discussions had, as well as the outcomes.	
6.0 Environmental Effects					
6.1 Environmental Assessment Approach					
63.	ECCC	Section 6.1.2 Valued Components Section 6.6.2 Valued Components	6-5 6-234	**Comment**: The EIS does not discuss potential effects to aquatic and breeding terrestrial migratory birds in the project area. For example, there are trees surrounding the building to be decommissioned and there is a high likelihood that birds may nest in those trees, such as American Robin and Black-Capped Chickadee. The EIS only discusses potential effects to the VC Barn Swallow and Golden Winged Warbler, which are not likely to nest on the site. **Expectation to Address Comment:** It is recommended that the EIS identify appropriate VCs for terrestrial and aquatic migratory birds, and discuss how the project will not destroy eggs and active nests of migratory birds, whether trees will be destroyed during the nesting season, whether there will there be disturbance (noise, machinery, demolition) of active nests in those trees during the nesting season, and what measures will be put in place to avoid impacts to terrestrial and aquatic migratory birds (including their eggs and active nests).	
64.	CNSC	Section 6.1.3.2 Temporal Boundaries	6-15	**Comment:** This section of the EIS indicates that: “CNL plans to start decommissioning activities related to the WR-1 Building in 2019. The Project site will be turned over to Institutional Control in 2024, which is assumed to last for 300 years, with active controls (e.g., ground water monitoring and site inspection) only required for the first 100 years. This timeframe is consistent with that required for other near surface disposal projects (ranging from 100 to 300 years), including similar projects under CNSC jurisdiction (e.g., Ontario Power Generation’s Deep Geological Repository project)”.	

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				CNSC staff note that DGR project is not yet approved and as such it may not be appropriate to make reference to it. It also may not be appropriate to borrow values from the DGR project as, for example, the DGR project is planned to have engineered barriers which will be accessible for inspection for a relatively long period of time allowing to acquire data on their performance. The design life should be based on the specific waste that is to be in the Whiteshell disposal facility and the design used to confine it. Current estimates of waste activity show periods significantly longer than the 300 years mentioned by CNL. **Expectation to Address Comment:** Provide information on the target design life (in terms of number of years) and the rationale behind it for the following barriers: reactor system components, internal walls/bioshield, grout, building foundation, and engineered cover.	
65.	CNSC	Section 6.1.3.2 Temporal Boundaries	6-15	**Comment:** This section of the EIS indicates that: "During active Institutional Control, long-term performance monitoring and maintenance activities will continue through to 2124 to demonstrate compliance with the safety case assumptions." There is no further information on what the performance monitoring and maintenance activities will consist of. It is important to understand the performance monitoring in light of ensuring efficient barrier performance. **Expectation to Address Comment:** Provide additional information on what the performance monitoring and maintenance activities will consist of.	
6.2 Atmospheric Environment					
66.	CNSC ECCC	Section 6.2 Atmospheric Environment	6-27 to 6-59	**Comment:** This section of the EIS does not meet the following information requirements of CNSC's *Generic EIS Guidelines* (Part 1: Section 3 Preparation and Presentation of the EIS; 3.2 Study Strategy and Methodology (p.4)): • effects that are likely to arise from the project • methods used to predict impacts of the project, in this case impacts on air quality arising from decontamination and demolition activities **Expectation to Address Comment:** Present and estimate in this section, the emission of radiological and non-radiological air contaminants resulting from the demolition of above-ground structures and decommissioning of WR-1, including the handling of potentially contaminated soils. Updates should be carried forward into the remainder of the assessment, including the residual effects analysis and determination of significance.	
67.	CNSC ECCC	Section 6.2 Atmospheric Environment	6-27 to 6-59	**Comment**: Refer to comment above (#66) regarding environmental effects. The EIS should refer to studies, where possible, that estimate the radiological and non-radiological contaminants likely to be remaining in WR-1 Building following decontamination, and the specific mitigation measures to be taken to minimize the fugitive emissions of these	

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				contaminants during the application phase of the project. **Expectation to Address Comment:** Please revise accordingly.	
68.	CNSC ECCC	Section 6.2.1.1 Scope of the Assessment Section 6.2.1.2 Valued Components	6-27 6-29	**Comment:** The proposed project includes construction of temporary structures, demolition, transportation and power generation. In addition to the indicator compounds identified in the assessment there is the potential for increased levels of other fuel-combustion products such as polycyclic aromatic hydrocarbons, volatile organic compounds (VOCs) and metals (e.g., lead and cadmium). Further, the EIS states that VOCs are not expected to be emitted from decommissioning activities with the exception of VOCs from fuel combustion. However, there is residual organic coolant that is in piping in tanks that may be emitted from project activities. VOCs are a precursor to ground-level ozone generation. Radiological contaminants are discussed in Section 6.7 Human and Ecological Health of the EIS. Non-radiological contaminants of potential concern (COPCs) are also discussed in this section. Both types of contaminants relate to air quality, however, are not presented in this section. **Expectation to Address Comment:** Provide justification for not including other products of fuel combustion (i.e., polycyclic aromatic hydrocarbons, volatile organic compounds and metals) as indicator compounds for the assessment. Consider presenting and discussing radiological and non-radiological contaminants in this section.	
69.	ECCC	Section 6.2.1.2 Valued Components Section 6.2.1.6 Residual Effects Analysis Section 6.2.1.8 Residual Effects Classification and Determination of Significance Section 6.2.2 Greenhouse Gases. Section 6.2.2.2 Valued Components	6-29 to 6-30 6-44 to 6-50 6-53 to 6-55 6-61	**Comment**: With respect to the comment above (#68), VOCs as well as radiological and non-radiological contaminants should be included as VCs in this assessment. Updates should be carried forward into the remainder of the assessment, including the residual effects analysis and determination of significance. **Expectation to Address Comment:** Please revise accordingly.	

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70.	CNSC ECCC	Section 6.2.1.3.1 Spatial Boundaries Appendix 6.2-1 Baseline Air Quality and Meteorology	6-30 1	**Comment**: The Local Study Area (LSA) and Regional Study Area (RSA) for the atmospheric environment appear limited. The area selected for the RSA seems too limited to assess the cumulative air quality effects of the project. For example, Figure 6.2.1-1 on p.6-31 shows local surrounding population centers (for example, Pinawa and Lac du Bonnet) and National Pollutant Release Inventory (NPRI) point source facilities that are not included in the RSA. In addition, the nearby communities of the Village of Lac Du Bonnet and the Local Government District of Pinawa are not included as part of the LSA. Very little justification is provided for the spatial boundaries used in the assessment. **Expectation to Address Comment:** Provide additional justification or rationale for the spatial boundaries for the atmospheric environment.	
71.	CNSC ECCC	Section 6.2.1.3.2 Temporal Boundaries Appendix 6.2-2 Emissions Estimates	6-33 3	**Comment:** Air emissions, including Greenhouse Gases (GHG) emissions, associated with the different steps in the closure phase of the project are missing. **Expectation to Address Comment:** Include non-road vehicle nuisance dust as well as any stationary combustion sources (e.g., space heating) in emissions estimates (see Table 1: Activities and Non-Radiological Indicator Compounds Released/Expected During the Closure Phase, Appendix 6.2-2 Emissions Estimates (p.3)). Include air emissions from offsite transportation, either as upstream emissions for the delivery of grout and other materials or as direct emissions for the hauling of disposal material offsite, in total emissions for the project.	
72.	CNSC	Section 6.2.1.3.2 Temporal Boundaries	6-33	**Comment:** Appendix C of REGDOC-2.9.1, *Environmental Protection: Environmental Principles, Assessments and Protection Measures* (REGDOC-2.9.1) states that "the licensee should identify and characterize all atmospheric emissions expected to be generated for all phases of the lifecycle of the facility or activity". The assessment currently bounds stages 1-3 as those stages of the closure period which are likely to result in the most emissions. Additional supporting evidence should be provided to justify why emissions during the other stages of the closure period and the stages of the project were not further assessed. **Expectation to Address Comment:** Demonstrate with additional supporting evidence why the emissions from the other stages of the closure period and phases of the project are adequately bounded by the stages 1-3 of the closure period.	
73.	CNSC ECCC	Section 6.2.1.4 Description of the Environment Section 6.2.2.4 Description of the Environment	6-34 to 6-39 6-62 to 6-63	**Comment:** It is possible that the air monitoring station located at 65 Ellen Street in Winnipeg may not completely represent baseline air quality conditions in the LSA and RSA, given the relative remoteness of these areas. **Expectation to Address Comment:** Include the measurements of air quality parameters in the LSA and RSA for comparison with measurements recorded at the Winnipeg station.	

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74.	CNSC	Section 6.2.1.4 Description of the Environment	6-37	**Comment**: The EIS includes a thorough discussion regarding the selection of the Winnipeg (65 Ellen Street) ECCC monitoring station as the source of background air quality data. The EIS acknowledges that the monitoring stations closest to the project are quite different geographically and that site-specific data would be more representative. However, absent from this discussion is the uncertainty associated with not having site-specific information from the project location. **Expectation to Address Comment:** Provide a discussion of the uncertainty and limitations of not having site-specific background air quality data for the assessment.	
75.	CNSC	Section 6.2.1.5 Project Interactions and Mitigation	6-40 to 6-42	**Comment**: The EIS identifies non-radiological contaminants including asbestos, insulating material and organic coolant that may remain in the WR-1 Building. These contaminants may be a source of fugitive emissions to the environment. How were these non-dust fugitive emissions considered in the assessment? **Expectation to Address Comment:** An explanation should be provided outlining how fugitive emissions were considered in the assessment. Mitigation measures to minimize fugitive emissions should be identified, if appropriate.	
76.	ECCC	Table 6.2.1-9	6-41 to 6-42	**Comment:** In the "Effects Pathways" column, the disturbance of possibly-contaminated soil around reactor building B100 is not included in the closure phase effects. In the CSR (AECL 2001), volume 1 (p. ES-11) it is stated that: "HEPA filters used during decontamination will remove a high level of radioactively contaminated dust (99.97%). As a result virtually no radioactivity will be released during the decontamination process." Is this mitigation measure still valid for radiological and non-radiological contaminants for this project? **Expectation to Address Comment:** Include rationale for not including the effect of potentially-contaminated soil disturbance around B100 as either a primary or secondary pathway. Confirm validity of mitigation measures described in the 2001 CSR - such as the use of HEPA filters and portable enclosures - for the minimization of radiological and non-radiological emissions in the form of dust. If necessary, provide more detail on mitigation measures in Table 6.2.1-9.	
77.	CNSC ECCC	Section 6.2.1.5.2.2 Secondary Pathways	6-43	**Comment:** Reference in this section of the EIS is made to the CSR (AECL 2001), Section 6.3.1 Air Quality (pages 6 to 9), stating that the conclusions regarding air quality effects are still valid. In the CSR, non-radioactive emissions are erroneously referred to as solely particulates and do not include combustion emissions. Also, radioactive emissions are also considered solely as particulates whereas tritium is a gas.	

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				In Section 6.3.1.2 Likely Environmental Effects of the CSR (pages 6 to 12), it is questionable whether "area affected by nuisance dust is expected to be small." "Nuisance dust" as total suspended particules (TSP) includes PM_{10} and $PM_{2.5}$ (and associated emissions of radiological and non-radiological contaminants). Even if, as the study states, the impaction with trees will capture a portion of the nuisance dust, this will most likely be primarily the non-inhalable fraction, and the re-emission of settled dust is likely in any event. In Section 6.3.1.3 Identified Mitigation Measures of the CSR (pages 6 to 12) dust suppression methods are described for both radiological and non-radiological particulate matter. HEPA filters are to be used during radioactive decontamination to prevent air emissions, in addition to portable enclosures used to limit non-radioactive emissions during in situ decommissioning and above-grade demolition. But the first level of B100 may contain radioactive material in the form of activation products, particularly in the primary heat transport (PHT) system and embedded in walls as activation products, or accidentally spilled in surrounding soil, etc. Section 4.4.1 Decontaminating of the CSR (pages 4 to 36) states that most contamination originates inside the building and occasionally works its way through to the exterior walls. How does this relate to B100, the building housing WR-1? **Expectation to Address Comment:** All air emissions, in addition to particulates (e.g., combustion emissions), need to be listed here. Redefine the affected area, given the higher potential toxicity (compared with nuisance dust) of radiological and non-radiological contaminants potentially present in the inhalable fraction of the dust. Provide more detail on the mitigation measures to limit non-radiological air emissions, which may actually also contain radioactive substances. Clarify whether portable enclosures will be used during procedures such as CO_2 blasting, with or without the use of HEPA filters to remove fine particulates.	
78.	CNSC ECCC	Section 6.2.1.6 Residual Effects Analysis Appendix 6.2-3 Dispersion Modeling	6-44 to 6-45	**Comment:** Other radiological and non-radiological air contaminants will be emitted in the ISD or WR-1 and the demolition of the WR-1 complex. Given the possible toxicity of these contaminants when dispersed in small amounts during demolition – and the possible re-deposition and emission of these contaminants as road dust – it is possible that more sophisticated models for air dispersion may apply in this case than SCREEN3 and CAL3QHC, such as AERMOD or CALPUFF. The EIS provided justification for the use of SCREEN3 as the dispersion model for the emission sources other than from paved roads. In	

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				particular it was stated the model was appropriate for use because: • The terrain surrounding the Project is relative simple • Long-range transport of compounds is not anticipated In WLDP-26000-REPT-006-REPT-006 *Environmental Risk Assessment* (CNL 2017), Section 4.2.5.1 Atmospheric Dispersion (p.4.18), mentions the use of IMPACT, an environmental pathways and exposure modelling tool. **Expectation to Address Comment:** Further explanation should be provided regarding the assumptions made regarding the terrain in the LSA and RSA and the decision to use SCREEN3 instead of a more complex dispersion model, such as AERMOD or CALPUFF. Estimate the validity of dispersion modeling for radiological and non-radiological air emissions conducted in 2001 to the present case. Include the IMPACT modelling results in the EIS. Since the air emission modelling results provided by CNL only includes CACs, CNL should include the results of the IMPACT modelling if they are representative of the emissions of radiological and non-radiological contaminants in this project.	
79.	CNSC ECCC	Section 6.2.1.9 Monitoring and Follow-up	6-56 to 6-57	**Comment:** Verification of adequacy baseline data through field monitoring is necessary. Monitoring of potential radiological and non-radiological (e.g., lead) air contaminants to validate mitigation measures is required. The technical supporting documents (TSDs), *Environmental Risk Assessment* (ERA) (CNL, August 2017) and *WR-1 Reactor Radiological Characterization Summary and Radionuclide Inventory Estimates* (CNL, August 2016) list radionuclides possibly emitted during the decommissioning and demolition activities of the project (these can be embedded in concrete, notably Cs-137 that can chemically bind to bare concrete). The latter document also mentions the presence of non-radiological contaminants such as PCBs in ballasts and lead in paint. Contaminated concrete structures could include those above-grade slated for demolition. Although the *WR-1 Reactor Radiological Characterization Summary and Radionuclide Inventory Estimates* document predicts negligible air release of radionuclides during the application phase of the project, in keeping with the precautionary principle, it is recommended that follow-up monitoring be conducted during the application phase of the project to confirm this statement. **Expectation to Address Comment:** Verify adequacy of baseline data through field monitoring. Include monitoring of potential radiological and non-radiological air contaminants.	

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				Although the *WR-1 Reactor Radiological Characterization Summary and Radionuclide Inventory Estimates* document predicts negligible air release of radionuclides during the application phase of the project, in keeping with the precautionary principle, consider conducting follow-up monitoring during the application phase of the project to confirm this statement. If follow-up monitoring will be carried out, revise Section 6.2.1.9 accordingly.	
80.	CNSC ECCC	Section 6.2.2 Greenhouse Gases Appendix 6.2-2 Emissions Estimates, Section 5.2 Greenhouse Gas Assessment	6-60 to 6-69 36 to 37	**Comment:** This section of the EIS does not meet the following information requirement of CNSC's *Generic EIS Guidelines* (Part 1: Section 2 Guiding Principles; 2.1 Government of Canada Interim Measures (p.2)): • details regarding the estimation of direct GHG emissions linked to the Project **Expectation to Address Comment:** Include in the direct GHG emissions estimates of all stationary combustion sources, including space heating.	
81.	CNSC	Section 6.2.2 Greenhouse Gases	6-60 to 6-69	**Comment**: CNSC's *Proposed Path Forward for Assessing Total GHG Production from Nuclear Facilities* recommends that the assessment of total GHG production be completed for EAs under CEAA 2012. The methodology for this assessment was through the use of a lifecycle assessment although no specific guidance was provided regarding waste disposal facilities. It is CNSC staff's expectation that a similar lifecycle assessment be completed or justification be provided for why such an assessment was not completed. The assessment of GHG emissions for the proposed decommissioning of WR-1 did not consider indirect emissions. The indirect emissions from the production of cement and grout may be large contributors to GHG emissions for the project. However, these sources of emissions were not considered in the assessment. This omission may underestimate GHG emissions and result in an assessment which is not adequately conservative. **Expectation to Address Comment:** It is recommended that indirect GHG emissions be considered in the assessment or additional justification should be provided for their omission along with a discussion or related uncertainty in the assessment.	
6.3 Geological and Hydrogeological Environment					
82.	CNSC	6.3.1 Geology	6-71 to 6-106	**Comment:** The geomorphology of the area, and its future evolution, requires characterization and assessment – especially with respect to erosion. Geomorphology is an important component of the environment that may affect or be affected by the project. Geomorphologic evolution of the ground surface (e.g., erosion), in particular, the evolution of the Winnipeg River, is an unavoidable natural process. The Winnipeg River shoreline is ~500m from the WR-1 structures. The overburden soils between the shoreline and those structures are glacial deposits, which are	

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				vulnerable to shoreline erosion. What are the estimated river erosion rates? Is shoreline migration expected over the time frames considered in safety assessments? The evolution of the Winnipeg River, as a significant feature that can impact the project between now and the next glacial period, should be evaluated and assessed in the normal evolution scenario. **Expectation to Address Comment:** Describe the geomorphology of the site and its evolution, in particular, the potential impact of erosion of the site, and the evolution of the Winnipeg River. Assess the impact(s) on the safety of the disposal facility.	
83.	CNSC	6.3.1 Geology	6-71 to 6-106	**Comment:** There is an absence of tectonic setting, structural geology information in this section of the EIS. This aspect of geosphere characterization is used to assess the stability and suitability of the site. There have been numerous reports and papers published about the characteristics of the Lac du Bonnet batholith, which forms the bedrock upon which WR-1 structures were built. A cursory review of the literature by CNSC staff reveals several structural features and characteristics (which includes, but is not limited to, studies carried out at the Whiteshell Underground Research Laboratory (URL)) that at a minimum require documentation and synthesis – so that their impact on the project safety, if any, can be properly evaluated. Some examples of features that have been documented in references cited below: the nature, location, orientation of regional strike slip faults; the existence of fracture-filling dykes; nature of batholith contacts; brittle deformation and displacement on m-scale thrust faults (most of which are concealed by overburden in linear valley); reactivation of fracture discontinuities; lineaments visible on satellite imagery; subvertical fractures that are common on bedrock outcrops. **Expectation to Address Comment**: Structural information about the site, as indicated in REGDOC-2.9.1, should be included in order to assess site suitability. This information can be used to assess whether the scenario of an undiscovered fault (for example) be included in the safety assessment. This information is relevant for the time frame of safety assessment scenarios that are proposed in the *Decommissioning Safety Assessment Report* (DSAR), to assess the site's future evolution. **References:** Brown A, Soonawal NM, Everitt RA, Kamineni DC. 1988 Geology and geophysicas of the Underground Research Laboratory site, Lac du Bonnet Batholith, Manitoba. Canadian Journal of Earth Science. Volume	

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				26, pages 404 to 425. Everrit R, McMurray J, Brown A, Davison C. 1996 Geology of the Lac du Bonnet Batholith, Inside and Out: AECL's underground research laboratory, Southeastern Manitoba – Field Trip Guidebook 85, Geological Association of Canada / Mineralogical Association of Canada Annual Meeting, Winnipeg, Manitoba.	
84.	CNSC	6.3.1 Geology	6-71 to 6-106	**Comment:** Geological data is missing or too descriptive, without evidence/observations to support statements made in the text, which are at times confusing or contradictory. For example: WN-series boreholes: • P.6-77: baseline geological data were "collected from the results of recent drilling" described in Dillon 2017. The locations of the boreholes (names WN-1 and WN-2) are provided on Figure 6.3.1-3 (the scale is such that they are located in the same place) and the results very generally summarized on page 6-85. Where is the data for the WN series bedrock boreholes? It is not located in either the EIS or in the *Hydrogeological Study Report*. • P.18 of the *Hydrogeological Study Report* describes two depth related zones in the bedrock, with "increased open-fractures in the upper 100m of bedrock", and goes on to describe an overlying (upper?) 10m competent zone of less fractured rock overlying a zone with "increased fracture frequency approximately 30m into bedrock". Then refers to the WN-series deep bedrock boreholes stating that the upper bedrock was relatively unfractured. It also states that these features are consistent with deeper bedrock characteristics at the URL to the northeast of the WL site. Where is the data for the WN-series boreholes? What are the actual fracture frequencies? What evidence / publications document the bedrock characteristics at the URL? This information should be synthesized and referenced. Geology: • There is no reference for the geological information provided on the maps. The bedrock geology map (Figure 6.3.1-3) appears to be taken from the regional bedrock geology map for all of Manitoba, which was compiled at a scale of 1:1,000,000 (and so, not detailed). • The southeastern quadrant (regional bedrock geology map EIS Figure 6.3.1-3) of the R shows the contact between the lac du bonnet batholith (unlabeled granite 12) and tonalite gneiss. This	

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				is the only bedrock feature that is illustrated in the RSA, and yet the nature of this contact is not described. Is it faulted? Intrusive? Ancient? Is this a potential zone of weakness that could affect the project? **Expectation to Address Comment:** As described above, provide additional geological information and data source(s).	
85.	CNSC	6.3.1.4 Description of the Environment	6-77 to 6-102	**Comment:** The overburden soils require further characterization. In particular, their physical properties must be assessed. The sufficient physical properties of the surficial soils would help understand their other properties such as hydrogeological properties, erosion resistance, and mechanical behavior under dynamic loading (from, for example, earthquakes). **Expectation to Address Comment:** Include physical properties of the overburden soils such as, but not limited to granulometry, density, moisture content, grain size distribution curve for coarse-grained soils and consistency indices for fine-grained soils.	
86.	CNSC	Section 6.3.1.6 Monitoring and Follow-up Section 6.3.2.8 Monitoring and Follow-up	6-106 6-140	**Comment:** For all new and existing barriers, please explain how CNL plans to monitor the effectiveness of the barriers. It is understood that this is through environmental monitoring program (e.g., sampling of the monitoring wells at site as the barriers themselves will be inaccessible). (CNL to please confirm). Provide confirmation if CNL have established limits/acceptable levels for the sampling results from the environmental monitoring that would indirectly demonstrate satisfactory performance of the barriers. In establishing the ability for migration of waste from its original position of immobilization inside the building structure towards the environment CNL should use, in addition to analytical modelling, site-specific data and site-specific studies that support the models. This should be established in a verifiable and traceable way. In case limits/acceptable levels for the sampling results from the environmental monitoring are exceeded, CNL should also provide information if they have contingency planning and mitigation measures in place and provide the documentation for those. Also, please clarify if CNL intends to use remote sensing technology to monitor the structural health of the barriers.	
87.	ECCC	6.3.2.3.3 Assessment Cases	6-113	**Comment**: This section of the EIS states that: “Base Case – This scenario represents existing conditions and characterizes combined effects from previous and existing developments and activities. The Base Case reflects the effects of existing disturbances, such as forestry, transportation, agricultural, and residential and recreational development. Current effects from the existing WL facilities and operations, for example, are considered part of the Base Case. In addition, effects from the decommissioning and reclamation activities already completed at the WL site are also considered as part of the Base Case.”	

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				ECCC notes that in each case of the assessment cases, 6.1.3.3; 6.2.1.3.3; 6.3.1.3.3, etc. in the base case assessment, CNL consistently states that: "Current effects from the existing WL facilities and operations, for example, are considered part of the Base Case. In addition, effects from the decommissioning and reclamation activities already completed at the WL site are also considered as part of the Base Case". In addition to the Base Case that characterizes the existing conditions that includes the impacts of site influences and past activities, there should also be a Reference Case that represents background values not influenced by WR-1 or other related activities at the WL site. The base reference case should be based on an undisturbed natural base state before the activities that required remediation. As such, the reference case data or information should be beyond the Whiteshell study area but environmentally analogous and reference case should not have been contaminated, remediated or disturbed by the WL site or other significant anthropogenic activities. Once the WR-1 is decommissioned it should not be a continued source of contaminants to the Winnipeg River in perpetuity. Therefore, while it may be useful to use the Base Case (as defined in the EIS) conditions to show change as a result of the project, it is inappropriate to compare post-closure phase assessment to the Base Case conditions, rather it should be compared to appropriate reference conditions. **Expectation to Address Comment:** Provide rationale for using a remediated environment as the base level or baseline data. A Reference Case should be developed based on reference site conditions that are not influenced by the past operations of WR-1 or WR-1 associated activities at the WL site and where other anthropogenic influences do not exist or are insignificant.	
88.	CNSC	Section 6.3.2.6.1.2 Contaminant Release	6-138	**Comment:** This section of the EIS indicates that: "The assumption is that these materials will experience an increase in hydraulic conductivity as they degrade over time." This is generally true, but the rate at which this is assumed to occur has to be realistic and has to be supported by data/studies. This rate and its supporting information is not present in the EIS and supporting documentation. **Expectation to Address Comment:** Provide additional information which shows that the transportation model and its assumption(s) is well correlated with barrier degradation, where barrier degradation evolution itself is a well-established and supported model.	
				6.4 Surface Water Environment	
89.	ECCC	Section 6.4 Surface Water Environment Section 6.5 Aquatic	6-145 6-207	**Comment**: Although there is some description of the presence of a significant wetland area along the eastern boundary of the WL complex, there is little detailed description of the biological or the physical characteristics of this habitat. The EIS states that the expected	

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		Environment		contaminant exposure pathway during the closure phase of the project is via atmosphere and deposition of both radionuclides and conventional contaminants onto the terrestrial environment. However, the potential effects on the wetlands during the closure phase have been omitted from the ecological risk assessment. Wetlands and connecting drainage pathways are typically highly productive, biologically diverse habitats that may sustain a diverse variety of sensitive species. **Expectation to Address Comment:** It is recommended that a full characterization of the wetland area near the WL complex is provided along with an updated ecological risk assessment which includes both radiological and conventional contaminants that the wetland area may be exposed to during the closure and post-closure phases.	
90.	ECCC	Section 6.4.1.3.1 Spatial Boundaries	6-147	**Comment:** The spatial boundary for the LSA does not include the Winnipeg River adjacent to the SSA on the justification that there are no direct effects expected on the river as a result of the project. It has been described that there are cooling water intake/discharge pipelines that currently connect the WR-1 to the river (Section 3.2.2.2). The intake and the discharge point occur in the river. Also, Section 3.2.2.5 describes that Active Drainage Sump 1 may receive much of the water collected in the drainage systems within the WR-1. It is not clear where the water collected in Sump1 might be released – one possibility is that it might be discharged along with the cooling water discharge. This section also describes that the sub-surface drainage sump that collects groundwater outside of the WR-1 is discharged to the storm drainage system. It is understood that the stormwater is ultimately discharged to the river. Based on the above, under existing conditions and during closure and post-closure, the river may be directly and indirectly impacted by the WR-1. **Expectation to Address Comment:** Include in the LSA a reasonable portion of the river that is influenced (plume) by all significant outfalls associated with the WR-1 including the Whiteshell stormwater system. Identify the outfalls which may be considered as point discharges on the river in a map. Also, include the locations of the water sampling stations on the map.	
91.	ECCC	Table 6.4.2-4	6-175	**Comment:** It is not clear what the frequency of the sampling was or how many stations were sampled or what the locations of these stations were or where the maximum and the minimum shown in the table were measured. Pine Falls is at the mouth of the Winnipeg River far downstream from the WL site, however, this far-field data seems to have been combined with the impacted water quality data near the WL site. It is unclear what the purpose of Table 6.4.2-4 is and the analysis shown within the table.	

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				It may be more meaningful if the data analysis is divided by proximity to the WL site – for example, for upstream of the WL site, adjacent (impacted) to the WL site and far-field downstream of the WL site. **Expectation to Address Comment:** Provide clarification on the purpose of the water quality data analysis and if appropriate, distinguish the data between upstream of the WL site, impacted by the WL site and far-field downstream of the WL site.	
92.	CNSC	Table 6.4.2-4	6-175	**Comment:** Canadian Council of Ministers of the Environment (CCME) water quality guidelines list a limit of 1ug/L for Cr(VI). Several measurements exceed this guideline; however, it is not clear if these measurements are for total Cr or if their charge states have been considered. **Expectation to Address Comment:** Please indicate if measurements for Cr(VI) have been made, if so, please consider posting them to this table. If not, consider either removing the guideline for Cr(VI) as it is not applicable to the total Cr measurements posted or provide a footnote explaining this.	
93.	CNSC ECCC	Table 6.4.2-7	6-183	**Comment:** For the post-closure performance, it is stated in Table 6.4.2-7 that: "Environmental monitoring around the WL site is required and will continue for the project" and "Environmental monitoring around the WL site will continue for the project." This seems to imply that environmental monitoring will extend beyond the institutional control portion of the post-closure period. However, these statements contradict monitoring commitments made in Section 3.5.4.2 Post-Closure Activities of the EIS where it is stated that: "during active institutional control, long-term performance monitoring…will continue through to 2124 … the passive institutional control period includes passive controls such as access restrictions…and will continue through 2024 to 2324." **Expectation to Address Comment:** Provide clarification with respect to the statement that environmental monitoring around the WL site will continue.	
94.	CNSC	Section 6.4.2.5.2.1 No Linkage Pathways	6-186	**Comment**: It is stated that wastewater from decommissioning activities will be directed to existing surface water management facilities such as storm drains and that wastewater may be directed to areas with enough distance from the river to provide adequate infiltration of wastewater. Have current facilities been assessed for an increased volume of wastewater and are they equipped to remove potential contaminants from decommissioning activities? **Expectation to Address Comment:** Please reference the assessment or provide information which supports the claim that existing surface water management facilities are adequately equipped to address the potential	

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				for increased wastewater created from decommissioning activities. Are the surface water management facilities equipped to adequately decontaminate decommissioning wastewater?	
95.	CNSC	Section 6.4.2.5.2.1 No Linkage Pathways	6-186	**Comment**: Stating "that wastewater may be directed to areas with enough distance from the river to provide adequate infiltration" gives the impression that wastewater will be released directly to soil and groundwater which will be used to dilute wastewater before reaching the river. Section 4.2.1 of REGDOC-2.9.1 states that "BATEA assessments of pollution prevention and control technologies for releases are necessary only where effects exceed or may exceed those identified in the ERA". However, upon review of the ERA the pathway of releasing wastewater to the ground does not seem to be assessed, therefore it is impossible to determine the risk associated with releasing wastewater to soil. **Expectation to Address Comment:** Please provide additional details and assessment of risk on the wastewater management strategy of directing wastewater to areas with enough distance from the river to provide adequate infiltration.	
96.	CNSC	Section 6.4.2.6.2 Application Case Results	6-196	**Comment**: This section of the EIS indicates that: "The assessment considered maximum surface water concentration in accordance with CNSC (2013) REGDOC 2.9.1." **Action required:** REGDOC-2.9.1 was updated in 2017.Please update the reference in all applicable sections of the EIS to reflect this and ensure the above statement is still in accordance with the updated document.	
97.	ECCC	Table 6.4.2-12 Table 6.5.5-2	6-197 6-229	**Comment:** In the analysis of predicted effects on aquatic biota for any phase of the project, it is important to consider that releases from the WL site, whether via surface water or via groundwater, are subject to the *Fisheries Act* since Winnipeg River is a fisheries water in Canada in which several fish species with socio-economic (i.e., Walleye, Northern Pike, Lake Whitefish, etc.) and conservation (i.e., Lake Sturgeon, Carmine Shiner) value are found. The *Fisheries Act* does not have provisions for a dilution zone in its general prohibition against the deposit of a deleterious substance. Therefore, the water quality at the final point of control is the relevant regulatory information used to determine whether the deposit via the discharge is deleterious to fish. In Table 6.4.2-12, the maximum groundwater concentrations of radionuclides are given in the post-closure phase of the project. Then a dilution factor of 1:1,300,000 is applied for a near-field site and 1:69,000,000 is applied for the Farm A intake site. The predicted maximum concentrations occurred at vastly different time periods ranging from 68 years to 500,000 years.	

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				Table 6.5.5-2 show the predicted dose to aquatic biota where the doses to the three fish species are identical at 4.03x10-6 mGy/d. This conclusion of radiological dose seems to have been based on the predicted concentrations after dilution in the Winnipeg River. It is stated in the 1st paragraph on p.6-229 that: "the Ecological Risk Assessment utilized groundwater release rates and dispersion modeling to estimate radionuclide concentrations in surface water to calculate dose rates to aquatic biota". It is also not clear whether the maximum concentrations predicted in Table 6.4.2-12 was used or a particular year was chosen and all the corresponding radionuclide concentrations predicted for that year was used for the dose calculation. **Expectation to Address Comment:** It is recommended that in the calculation of predicted dose to radionuclides, the dose be based on the maximum concentrations of radionuclides in groundwater before dilution in the river. Clarify how the predicted dose calculations accounted for the range of time periods when each radionuclide might reach its maximum concentration in groundwater. Provide a dose trend graph showing the dose contribution from the radionuclides of concern over time to describe the post-closure dose trends at the final point of control (i.e., based on groundwater).	
98.	ECCC	Table 6.4.2-12	6-197	**Comment:** C-14 is stated to be the largest contributor to dose in the post-closure phase, that it is globally high in background, and that it is also generated naturally in the atmosphere due to cosmic radiation. While these statements are true, it is not clear whether the background and natural generation of C-14 can be attributed to the maximum groundwater concentration predicted in Table 6.4.2-12. Section 3 of the TSD entitled *WR-1 Reactor Radiological Characterization Summary and Radionuclide Inventory Estimates*, shows that C-14 is an activation product resulting from the operation of WR-1 and that it may be found in the reactor core, the reactor biological shield and the helium and heavy water system. Section 7 also summarizes that at 1000 years after reactor shutdown, the predominant radionuclides include C-14. **Expectation to Address Comment:** Delineate the C-14 in the groundwater post-closure.	
99.	ECCC	Section 6.4.2.8 Table 6.4.2-16	6-203 to 6-204	**Comment:** The proposed follow-up and monitoring program for surface water is presented in Section 6.4.2.8 of the EIS. The post-closure monitoring program will provide data on whether the mitigation measures implemented are sufficiently protective of the environment. However, additional details and rationale on the follow-up and monitoring program are needed, including: information on monitoring frequency, sampling schedule, and justification of sampling locations.	

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				Table 6.4.2.-16 includes the potential environmental effect of: “changes to surface water quality from the release of solutes into the groundwater as the grout and reactor components gradually deteriorate over time during the post-closure phase.” The conceptual monitoring program proposes to monitor the quality of the water in the Winnipeg River to evaluate whether the quality of the water is being affected by the in-situ decommissioning of the reactor facility. The closest proposed water quality monitoring station to the facility is 2 km downstream of the site boundary. Given that CNL acknowledges that the most likely pathway for surface contamination is discharge of contaminated groundwater, a water quality sampling location in the immediate receiving environment, as informed by the groundwater model, would be required to detect/quantify whether groundwater discharge is causing an impact to surface water quality. In addition, the monitoring plan proposes no sampling schedule, or monitoring frequency for the water quality monitoring in the Winnipeg River. **Expectation to Address Comment:** Provide an updated water quality monitoring program that includes a near-field sampling location in the immediate receiving environment that is capable of detecting potential contaminated groundwater inputs into the Winnipeg River. Provide details on the monitoring frequency and sampling schedule for the water quality monitoring program.	
100.	ECCC	Table 6.4.2-16	6-204	**Comment:** Table 6.4.2-16 indicates that: “the number of parameters and locations of sampling may change based on annual review of monitoring data.” However, no detail on this proposal for changes to the water quality sampling program is provided in the EIS. **Expectation to Address Comment:** Describe the circumstances and criteria that would be required to alter the water quality monitoring program (i.e., sampling locations, sampling frequencies, and/or parameters).	
101.	ECCC	Table 6.4.2-13 Table 6.5.5-2	6-198 6-229	**Comment:** In the analysis of predicted effects on aquatic biota for any phase of the project, it is important to consider that releases from the WL site, whether via surface water or via groundwater, are subject to the *Fisheries Act* since Winnipeg River is a fisheries water in Canada in which several fish species with socio-economic (i.e., Walleye, Northern Pike, Lake Whitefish, etc.) and conservation (i.e., Lake Sturgeon, Carmine Shiner) value are found. The *Fisheries Act* does not have provisions for a dilution zone in its general prohibition against the deposit of a deleterious substance. Therefore, the water quality at the final point of control is the relevant regulatory information used to determine whether the deposit via the discharge is deleterious to fish.	

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				In Table 6.4.2-13, the maximum groundwater concentrations of non-radiological contaminants are presented with the predicted surface water concentrations at a near-field site and Farm A intake site which seems to have been calculated with a dilution factor similar to that applied for radionuclides. Several constituents in groundwater exceed aquatic toxicology benchmarks including cadmium, HB-40, lead and xylene. Additionally, there seems to be no consideration of PCBs given in the ERA or in the surface water quality assessment. CNL has made it clear that the ISD being proposed for the WR-1 includes the concurrent in situ burial of PCBs. **Expectation to Address Comment:** Include in the ERA the maximum groundwater concentrations predicted for the non-radiological contaminants and PCBs in the groundwater predictions during the post-closure phase as well as what is expected to be released from all potential final points of control under the existing conditions and during the closure phase.	
6.5 Aquatic Environment					
102.	CNSC	Figure 6.5.3-1	6-211	**Comment:** Change the color of the RSA boundary as it is very similar in color to the SSA (WR-1) and can be confusing visually.	
103.	ECCC	Section 6.5.4.2.3 Radioactivity in Fish	6-219	**Comment:** Lake Sturgeon is a long-lived species that feeds primarily on benthic organisms and therefore is likely to consume significant amounts of sediment. The radiation dose predictions to the Lake Sturgeon should be conservative since it is a *Species At Risk Act* (SARA) species. However, it is not clear whether the "double" dose of benthic organisms which would have accumulated radionuclides along with the direct ingestion of sediments and the associated radionuclides have been accounted for. Furthermore, since it has been documented that there are pockets of sediments that have elevated contaminants, these should also be taken into consideration to ensure that the predictions are conservative. **Expectation to Address Comment:** Include conservatism in the radiological dose calculation for the Lake Sturgeon. Consider worst case conditions for radiological contaminants including the ingestion of sediments with elevated radioactivity and benthic organisms that are also contaminated with radioactivity.	
104.	CNSC	Section 6.5.4.2.4 Benthic Macroinvertebrates	6-221	**Comment**: This section provides some basic background information on benthic species in the RSA. Section 4.1 Environmental Risk Assessment of REGDOC- 2.9.1 describes the types of science-based information required to support decision-making and to prioritize the implementation of mitigation measures. It appears that several studies were undertaken in the past to assess benthic invertebrates in the area of the WL site. **Expectation to Address Comment:** It would be useful to present the	

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				results of these studies, including a summary list of identified species.	
105.	CNSC	Section 6.5.4.2.5 Fish Habitat	6-222	**Comment:** This section provides some basic background information on fish species and fish habitat in the RSA. Section 4.1 Environmental Risk Assessment of REGDOC- 2.9.1 describes the types of science-based information required to support decision-making and to prioritize the implementation of mitigation measures. It appears that fish habitat is assumed and not documented here. **Expectation to Address Comment:** Additional description of fish habitat (potentially including habitat maps) would be useful for assessing potential impacts. Please provide a more robust description of fish and fish habitat.	
106.	CNSC	6.5.5.2 Results Table 6.5.5-1	6-224	**Comment:** Please clarify the "Pathway Assessment" of "No Linkage" for the closure activities. Provide additional detail regarding the mitigation to be implemented that will prevent site runoff to the Winnipeg River during closure activities. Section 4.1 Environmental Risk Assessment of REGDOC- 2.9.1 describes the types of science-based information required to support decision-making and to prioritize the implementation of mitigation measures. Section 6.5.5.2.3 should be updated if changes are made to the pathways assessments in Table 6.5.5-1.	
107.	CNSC	Section 6.5.5.2 Results Table 6.5.5-1	6-224	**Comment:** Please clarify that the "Pathway Assessment" for post-closure performance is appropriate for both the aquatic environment VCs and for the surface water quality VC as described in Table 6.4.2-7. Should post-closure performance be considered "primary" in both tables? Section 6.5.5.2.3 should be updated if changes are made to the pathways assessments in Table 6.5.5-1.	
108.	CNSC	Section 6.5.5.2.2 Secondary Pathways	6-227	**Comment:** "Installation of the engineered cover at the WR-1 building may alter drainage rates and flow patterns." Section 4.1 Environmental Risk Assessment of REGDOC- 2.9.1 describes the types of science based information required to support decision-making and to prioritize the implementation of mitigation measures. What are the current rate, predicted rate and range of natural variation in flow patterns, rates and discharge volumes in the SSA? **Expectation to Address Comment:** Provide details of the drainage, current flow rates, patterns and discharge volumes to be compared with predicted rate and range of natural variation in drainage rates. A more comprehensive summary of existing hydrology data are needed to make an assessment of proposed changes in hydrology and assessment of proposed mitigation.	
6.7 Human and Ecological Health					
109.	CNSC	Section 6.7.1.6 Residual Effects Analysis	6-296	**Comment:** In Table 6.1.2-1 of the EIS, worker health is identified as a VC. The rationale is that: "Workers are potentially exposed to both	

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				radiological and non-radiological hazards." As per CNSC's *Generic EIS Guidelines*, the EIS must present baseline information in sufficient detail to enable the identification of how the project could affect the VCs and an analysis of those effects, including mitigation measures, cumulative effects, follow-up monitoring program elements, etc. CNL has not identified or included an analysis of effects on worker health as a result of the project, due to radiological hazards; the rationale provided being that "doses to workers will be monitored and managed as part of CNL's Radiation Protection Program..." This statement alone is insufficient to demonstrate that the effects of the project on worker health, due to radiological hazards, have been analyzed, along with the identification of mitigation measures, cumulative effects, and follow-up monitoring program elements, as required by CNSC's *Generic EIS Guidelines*. **Expectation to Address Comment:** Update the EIS to include the analysis of effects as a result of the project, due to radiological hazards, for the VC, worker health. Mitigation measures, cumulative effects, and follow-up monitoring program elements must also be identified as necessary, as a result of the analysis.	
110.	CNSC	Section 6.7.1.6 Residual Effects Analysis	6-296	**Comment:** This section of the EIS notes that: "Nuclear Energy Workers and workers who lease businesses on site are not addressed…because their radiation exposure is monitored and their doses during closure are controlled through CNL's Radiation Protection Program. However, on-site workers are assessed for radiological exposure". **Expectation to Address Comment:** Please provide the following: a) clarify the statement above; it is unclear what is meant by the statement "However, on-site workers are assessed for radiological exposure"; b) clarify which workers will be leasing businesses on site, and; c) identify how these workers' doses will be monitored and controlled.	
111.	CNSC	Section 6.7.1.6 Residual Effects Analysis	6-297	**Comment:** With respect to the selection of radiological COPCs, CNL states that they have considered radionuclides that have been found in Whiteshell's airborne effluent or are reasonably expected to be found in airborne effluent. No source is provided for how these reasonably likely radionuclides were determined. **Expectation to Address Comment:** Identify and provide a reference for the radiological COPCs considered in this section.	
112.	HC CNSC	Section 6.7.1.6 Residual Effects Analysis	6-297	**Comment:** Provide more detail on how IMPACT was verified and validated, as well as information about any sensitivity analyses that were conducted in relation to the human health risk assessment (HHRA). In addition, with respect to the selection of radiological COPCs, please provide further detail on the operational controls and procedures that will	

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				be put in place to limit the release of airborne effluents. **Expectation to Address Comment:** Please revise accordingly.	
113.	HC	Section 6.7.1.6 Residual Effects Analysis	6-297, 2nd paragraph	**Comment:** This paragraph of the EIS makes reference to "CSA N299.1-08: Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluents for Normal Operation of Nuclear Facilities". The correct number to reference for this CSA standard is CSA N288.1. **Expectation to Address Comment:** Please revise accordingly.	
114.	HC	Figure 6.7.1-3 Figure 6.7.1-4	6-300 6-301	**Comment:** The details and reference for the soil type used in the conceptual model for the HHRA is missing from this section of the EIS. **Expectation to Address Comment:** Provide details and a reference for the soil type that was used in the model for the Whiteshell area.	
115.	CNSC HC	Figure 6.7.1-3 Figure 6.7.1-4	6-300 6-301 (and all corresponding pathway models)	**Comment:** Several pathways identified in CSA N288.1 have not been considered in the conceptual model, including: • transfer from the soil surface to the atmosphere • transfer from surface water to aquatic animals, aquatic plants, and sediment • transfer from aquatic animals to a harvester (i.e., a fisherman) • transfer from air to surface water **Expectation to Address Comment:** Include or justify not including the pathways identified above in the model and update this section of the EIS accordingly.	
116.	CNSC	Section 6.7.1.6, Residual Effects Analysis	6-304	**Comment:** CNL states that the predicted maximum dose to on-site worker during closure phase was 6.03×10^{-3} mSv/year during demolition and 1.21×10^{-5} mSv/y during grouting. No additional information has been provided in the EIS on which workers were considered as part of this dose assessment. Based on the TSD, *Decommissioning Safety Assessment Report*, it appears that this dose was calculated for an onsite receptor (e.g., personnel leasing office/business space on the WL site). **Expectation to Address Comment:** Provide additional context and supporting information within the EIS for the dose information provided for an on-site worker.	
117.	HC	Section 6.7.1.6.2.2 Results	6-310, last paragraph	**Comment**: The following sentence in the EIS indicates [emphasis added]: "However, to assess the total radiation dose for each identified human receptor over the groundwater modelling timeframe, the modelling timeframe was split into five time windows based on **inspecting** the time of peak loading rates (0-60 years, 60-40,000 years, 40,000-175,000 years, 175,000 to 300,000, and 300,000 to 500,000 years)." The sentence uses the term "inspecting". Is it meant to indicate	

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				"expecting"? **Expectation to Address Comment:** Please revise accordingly.	
118.	CNSC	Section 6.7.1.7 Prediction Confidence and Uncertainty	6-313	**Comment**: The EIS states that: "progeny-inclusive dose coefficients were developed for each radionuclide that has progeny expected to be at or above 10% of parent activity after 40 years of ingrowth". The EIS also indicates that: "this timeframe is used in CSA N288.1-14 for development of progeny-inclusive dose coefficients for sediment and soils exposure". However, this information was not found in CSA N288.1-14. **Expectation to Address Comment:** Provide a justification for the 10% progeny criterion or consider all progeny regardless of ingrowth percentage of parent activity.	
119.	CNSC	Section 6.7.2.2 Valued components	6-319	**Comment**: In the assessment of species at risk known to be present or potentially present at the Whiteshell site, a number of surrogate VC species were considered, although it is unclear what, if any, species-specific criteria were used in this selection/substitution. A surrogate receptor can be used to evaluate risk for a species at risk; however, the risk characterization must be cognisant of differences in the assessment endpoints (population vs. individual protection). Surrogate selection for species at risk may be done using published scientific literature [1][2] as well as other reliable sources such as the U.S. EPA [3] and the U.S. Fish and Wildlife Service [4]. **Expectation to Address Comment:** Please identify if any species-specific criteria were used in the selection of surrogate species for species at risk and provide supporting evidence to demonstration that the selection is based on available credible information that is scientifically defensible. **References:** [1] Weins, J.A., G.D. Hayward, R. S. Holthausen, and M.J. Wisdom (2008). Using surrogate species and groups for conservation planning and management. BioScience, 58 (3): 241-252. [2] Banks, J.E., A.S. Ackleh, and J.D. Stark (2010). The use of surrogate species in risk assessment: using life history data to safeguard against false negatives. Risk Analysis. 30 (2): 175-182. [3] Dwyer, F.J., L.C. Sappington, D.R. Buckler, and S.B. Jones (1995). Use of surrogate species in assessing contaminant risk to endangered and threatened species. U.S. Environmental Protection Agency, Final Report – September, 1995. EPA/600/R-96/029. 78 pp. [4] Dwyer, F.J., F.L. Mayer, L.C. Sappington, D.R. Buckler, C.M.	

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				Bridges, I.E. Greer, D.K. Hardesty, C.E. Henke, C.G. Ingersoll, J.L. Kunz, D.W. Whites, T. Augspurger, D.R. Mount, K. Hattala, and G.N. Neuderfer (2005). Assessing contaminant sensitivity of endangered and threatened aquatic species: Part I. Acute toxicity of five chemicals. Arch. Environ. Contam. Toxicol, 48: 143-154.	
120.	ECCC	Figure 6.7.2-1 *Environmental Risk Assessment*, Figure 6.1	6-333 6.8	**Comment:** These identical figures have not included any aquatic species – waterfowl, fish, benthic invertebrates or aquatic vegetation. During the closure phase, it is described that site runoff will be managed by existing stormwater management system and dust generation during closure activities will be minimized with the implementation of dust suppression methods. However, there will likely continue to be some discharge through the various groundwater and surface water pathways to the river until such a time these pathways are closed. Furthermore, the existing conditions for the Aquatic Environment (Section 6.4 of the EIS) describe high concentrations of radionuclides in sediment near the outfall location identified as OFL in the river. Also, though Cs-137 is described to be at a low concentration downstream of the process sewer in Section 6.4.2.4.2.2 of the EIS, this implies that near the outfall the Cs-137 concentration is higher. Similarly, there are other radiological and conventional contaminants in the existing discharge points from the WR-1 and other components of the WL site that may have impact on the water quality of the Winnipeg River near the site. These existing pathways should be considered and represented in the ecological conceptual model. In addition to an ecological conceptual model for the closure and post-closure phases of the project, a model for the existing conditions should also be developed to use as a comparison for the later phases of the project. It follows that an ecological risk assessment for the existing conditions should be conducted at an equivalent level of detail as the closure and post-closure phases. It is also unclear whether the OFL outfall is different from the process sewer outfall. **Expectation to Address Comment:** Develop the ecological conceptual model for the existing conditions that includes aquatic biota linkages to consider the influences of existing discharges to the Winnipeg River on the river's water quality. Also include aquatic biota including benthic invertebrates, benthic fish, aquatic plants and waterfowl in the closure phase ecological conceptual model. Conduct an ecological risk assessment based on the existing conditions and the existing conditions ecological conceptual model. The results of the existing conditions ERA should also be reported in the EIS. Clarify whether the OFL is a different outfall than the process sewer	

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				outfall.	
121.	ECCC	Figure 6.7.2-3 *Environmental Risk Assessment*, Figure 7.2	6-339 7.10	**Comment:** These identical figures have not included a terrestrial predator (Red Fox) or a terrestrial prey (Meadow Vole) species. The aquatic plant is not connected to the sediment – note majority of aquatic plants will be rooted in sediment and hence this pathway is critical. The aquatic predator, Walleye, is not connected to a prey fish species. Only surface water is indicated as a pathway for contaminants for Walleye. A prey species like the Carmine Shiner is an important pathway for contaminants especially if it's biomagnifying. The Lake Sturgeon is not connected to benthic invertebrates in the conceptual model, however, the biological characterization in Appendix A of the ERA Technical Supporting Document clearly states that the majority of the food for Lake Sturgeon is benthic invertebrates. **Expectation to Address Comment:** Modify the ecological conceptual model for the post-closure period to ensure that a terrestrial prey and predator species are represented. Ensure there is a pathway between sediment and aquatic plants as well as pathways between Walleye to a prey species and Lake Sturgeon to benthic invertebrates. Lastly, ensure that the dose calculations for the ERA reflect these pathways.	
6.8 Land and Resource Use					
122.	CNSC	Table 6.8.2-2	6-348	**Comment:** Consistent with the pathways analysis on pages 6-378 to 6-380, the measurement indicators in Table 6.8.2-2 should not only be limited to "relative abundance and distribution" of vegetation, fish and wildlife species but also consideration of changes to their habitat. **Expectation to Address Comment:** For consistency and transparency, given that consideration of changes to vegetation, fish and wildlife and their habitats are considered in the effects pathway analysis, the measurement indicators in Table 6.8.2-2 should be updated to include consideration of habitat.	
123.	CNSC	Figure 6.8.3-1	6-351	**Comment:** The narrative that defines the LSA on p. 6-349 indicates the following: "The LSA is intended to capture land and resource use within proximity of the WL site and extends approximately 1 km beyond the WL site boundaries with the exception of the western boundary, which follows Provincial Trunk Highway 11". Figure 6.8.3-1 does not seem to match this narrative as the western boundary is not depicted as following the Provincial Trunk Highway 11. **Expectation to Address Comment:** Please clarify the extent of the LSA on the western boundary and update the documentation accordingly.	
124.	CNSC	Section 6.8.4.2.5 Traditional Land and	6-366	**Comment:** The final EIS should indicate whether CNL has gathered any traditional knowledge from identified First Nation and Métis groups to	

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		Resource Use by Aboriginal Peoples		inform the EIS, including the identification of VCs, as per the guidance of REGDOC-3.2.2.	
125.	CNSC	Section 6.8.4.2.5.1 Historic and Present Day Traditional Land Use	6-371 to 6-374	**Comment:** This section, which describes the potential interactions of the WR-1 project with trapping, hunting, fishing and harvesting activities, provides limited evidence that CNL has gathered up-to-date information regarding traditional land use activities in close proximity to the WL site directly from identified First Nation and Métis groups. The description of historic and present day traditional land use seems to be limited to information gathered from desktop reviews. **Expectation to Address Comment:** CNL must demonstrate how it has or will be validating the traditional land use activities currently described in Section 6.8.4.2.5.1 with identified First Nation and Métis groups and organizations. As per the requirements/guidance in REGDOC-3.2.2, CNL should demonstrate that through its engagement activities that it has asked identified First Nation and Métis groups regarding traditional land use activities in proximity to the CRL and project location and determine if the proposed project could have any potential impacts on those practices as per the requirements of CEAA 2012.	
126.	CNSC	Section 6.8.5.2.2 Secondary Pathways	6-385, 1st paragraph	**Comment:** This section of the EIS indicates that: "The Local Government District of Pinawa has expressed a desire to develop economic activity at the Whiteshell Labs site to offset lost jobs due to closure of the site… This is a potential outcome for the WL site and will require agreement by AECL as the land owner, and potentially the Province of Manitoba…This may include transfer of the land to other parties following engagement with stakeholders, Aboriginal groups and the public. Future uses/zoning have not been determined, but it is assumed that the land will meet Canadian Council of Ministers of the Environment (CCME) land use criteria." Several different possibilities and parties are mentioned in the EIS with respect to the future use(s) of the site. There is a lack of clarity on the process and the roles and responsibilities of these identified parties in determining the future use(s) of the site. **Comment:** If possible, please provide clarity on the process and the roles and responsibilities of the identified parties in determining the future use(s) of the site.	
6.9 Socio-economic Environment					
127.	CNSC	Section 6.9 Socio-Economic Environment	6-389 to 6-447	**Comment:** As required under paragraph 5(2)(b) of CEAA 2012, the EIS should provide a description and analysis of how changes to the environment caused by the project could affect health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing	

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				that is of historical, archaeological, paleontological or architectural significance, as they pertain to non-Aboriginal peoples. That is to say, the EIS should describe the indirect socio-economic effects that occur as a result of change that the project may cause to the environment. While Section 6.9 Socio-Economic Environment of the EIS provides specific discussion and analysis of the indirect effects on health and socio-economic conditions, there is no clear linkage in the descriptions of the VCs and effects pathway analysis between the indirect effect and the direct environmental effect. **Expectation to Address Comment:** Please provide clarification and describe, in the ”Socio-economic Environment” assessment, the linkages between the indirect socio-economic effects identified and the project-related changes to the environment that result in these indirect effects on health and socio-economic conditions.	
7.0 Accidents and Malfunctions					
128.	CNSC ECCC	Section 7.0 Accidents and Malfunctions	7-1 to 7-33	**Comment**: The EIS largely focuses on the possible release of radiological hazards and provides little information respecting non-radiological hazards. No fate and behaviour or dispersion modelling was provided for either radiological releases or non-radiological releases to support the analyses of accidents and malfunctions and the associated conclusions. Fate and behaviour, and dispersion modelling form the basis of emergency preparedness and response planning as they define the temporal and geo-spatial boundaries for accidents and malfunctions. In the absence of this information, it cannot be determined if the applicant’s emergency preparedness plans and associated response capacities are commensurate with the geographical extent of the expected impacts from accidents and malfunctions. This information would inform a determination of the extent of expected environmental consequences that would lead to an assessment of significance of any residual effects. **Expectation to Address Comment:** It is recommended that CNL provide any supporting modelling that may have been conducted in support of their emergency preparedness and response planning.	
129.	CNSC	Section 7.1.1 Hazard Identification	7-2 and 7-3	**Comment**: The methodology section of the “Accident and Malfunctions” assessment of the EIS states that the: “likelihood, consequence and mitigating factors were discussed to determine which hazards were “credible events” (credible events are defined as having a reasonable probably (sic) of occurring.” However, there is no clear definition (or threshold) of what is meant by reasonable probability for the purposes of the assessment? **Expectation to Address Comment:** Clearly outline the threshold for how credible events were determined.	

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130.	CNSC	Section 7.1.1 Hazard Identification	7-2 and 7-3	**Comment**: The EIS states that the hazards associated with the project are grouped into four categories: radiological hazards, non-radiological hazards, internal initiating events and occupational hazards and external initiating events. Further, based on the methodology described in the EIS, it is not clear which hazards were considered in the assessment and which ones were carried forward to determine potential risk as it appears all the hazards listed in the subsequent sections were carried forward. **Expectation to Address Comment:** Clarify which hazards were considered in the assessment and which of the four groups they belong to. Additionally, clarify the methodology used to assess whether a hazard was credible and therefore required further assessment. Those hazards which were not carried forward for further assessment should also be identified and explanation provided for why these were not deemed credible.	
131.	Manitoba Sustainable Development	Section 7.2.2 Non-Radiological Hazards	7-7	**Comment:** With respect to the 2nd paragraph in Section 7.2.2, Non-Radiological Hazards, provide the quantity and type of materials that contain PCBs and asbestos within the WR-1 building. What portion of this is going to be removed for offsite disposal?	
132.	ECCC	Section 7.2.2 Non-Radiological Hazards 7.3 Accidents and Malfunctions	7-7 7-8 to 7-29	**Comment**: Although the EIS lists hazardous materials that are present within the WR-1 Building as including asbestos, lead, PCBs, mercury, mould and various chemicals, there is no supporting detail on potential sources, quantities, rate, form or characteristics relating to these substances. Table 7.2.1-2 lists over a dozen other hazardous substances where only general locations and quantities are indicated. In the absence of this information, it cannot be determined if the CNL's emergency preparedness plans and associated response capacities are commensurate with the environmental risks that the proposed activities present. **Expectation to Address Comment:** It is recommended that CNL provide additional information relating to all hazardous substances known to be on the project site, including sources, quantities, rate, form and characteristics. This information would help to understand the full magnitude of the accident and malfunction scenarios presented.	
133.	CNSC	Section 7.3 Accidents and Malfunctions	7-8 to 7-34	**Comment**: Dose estimates were not provided for accidents and malfunctions described in Section 7.3 of the EIS. **Expectation to Address Comment:** Please provide the following: a) dose estimates to workers and the public as a result of a bounding materials handling accident or provide adequate justification for	

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				not including this in the EIS. b) dose estimates to workers and the public as a result of fires and explosions or provide adequate justification for not including this in the EIS.	
134.	ECCC	Section 7.3.5 System and Equipment Failure	7-15, 1st paragraph	**Comment:** The EIS indicates: "As secondary containment and Emergency Preparedness Plans already exist, these hazards associated with Project activities are limited to onsite personnel who are working on the Project and do not pose a threat to the public or the environment." It is important to understand the full extent of the preventive measures and design safeguards that are in place in order to assess whether they are commensurate with the environmental risks posed by the accident and malfunction scenarios. **Expectation to Address Comment:** Provide additional information that details secondary containment design and capacity for all structures at the WL site that contain radiological and non-radiological hazardous substances.	
135.	ECCC	Section 7.3.6 Fires and Explosions	Page 7-16, 3rd paragraph	**Comment:** The EIS indicates that: "Controls are in place to limit the potential for liquid borne contamination as the result of firefighting to spread to the surrounding environment." The EIS Executive Summary indicates on p.xxix [emphasis added]: "The engineered cover system will be designed to limit water infiltration, to direct any infiltration water away from the grouted structure, to resist degradation, and will be graded to promote drainage from the site to the Winnipeg River, **similar to the rest of the WL site**." It is important to understand the full extent of the controls that are in place to limit the potential for liquid borne contamination to spread to the surrounding environment in order to assess whether they are commensurate with the environmental risks posed by the fire and explosion scenario. **Expectation to Address Comment:** Provide details on all of the preventive measures and design safeguards (both passive and active) that are in place to limit the potential for liquid borne contamination, such as contaminated firefighting water runoff, to migrate to the surrounding environment, including to the Winnipeg River.	

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136.	CNSC	Section 7.3.6 Fires and Explosions	7-16 to 7-18	**Comment**: In the assessment of fire in Section 7.3.6 of the EIS, no consideration appears to have been given to the environmental (or offsite) effects of a fire due to decommissioning activities at WR-1. Depending on environmental conditions, a fire or explosion at the site might trigger a forest fire or other event that may have offsite implications. **Expectation to Address Comment:** Offsite (environmental) impacts of a fire or explosion at WR-1 should be included in the "Accident and Malfunction" assessment of the EIS or its exclusion be justified.	
137.	ECCC	Section 7.3.6 Fires and Explosions	7-17, 2nd and 3rd paragraphs	**Comment:** The EIS indicates: "If a fire does occur, the Fire Response Involving Radioactive Material (CNL2013) at WL manages the hazards for emergency personnel involved in fire suppression and/or rescue activities that potentially involve radioactive materials (AECL 2013)." The following paragraph also indicates: "CNL's Emergency Preparedness Program is designed to respond to any emergency at the WL site. The Emergency Preparedness Program provides guidelines for CNL's emergency management staff to ensure that adequate staff and materials are available to meet the requirements of provincial and municipal emergency plans. The program provides the earliest possible coordinated response to reduce the effects from an emergency to workers, the public, and the environment, as well as restore normal operations as quickly as possible to site." It is important to understand the full extent of CNL's emergency response and post-incident remediation and monitoring capacities in order to assess whether the expected effectiveness of those mitigation efforts may lead to possible residual environmental effects. **Expectation to Address Comment:** Provide supporting details in respect of fire and explosion response capacities, in terms of both on-site equipment and trained personnel, including any exercise regimes and 24/7 response times. Provide information on CNL's Emergency Preparedness Program in specific relation to any post-fire or post-explosion environmental effects mitigation, remediation and monitoring activities and capacities. Provide a response to the expected effectiveness of CNL's Emergency Preparedness Program in specific relation to environmental effects mitigation, remediation and monitoring activities for accident and malfunction scenarios.	

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138.	ECCC	Section 7.3.7 WR-1 ISD Structure Failure *Decommissioning Safety Assessment Report*, Appendix 5.1.2-1 CNL WR-1 In Situ Decommissioning Activities Hazard Identification and CNL WR-1 In Situ Decommissioning Activities Accidents and Malfunctions, Section 4.2.7	7-19, 2nd paragraph 8	**Comment:** The EIS indicates: "CNL will use an experienced grout supplier with an appropriate QA Program for execution of the grouting program." Appendix 5.1.2-1 of the *Decommissioning Safety Assessment Report* indicates: "Use of an experienced grout supplier with an appropriate QA Program can ensure adequate grout performance." It is important to assess any contingency plans that would be relied on should the work of the selected grout supplier or the performance of the grout compound be found to be sub-standard at any point during the encapsulating process as a failure of either could compromise the long-term integrity of the structure and thus could lead to residual environmental effects. **Expectation to Address Comment:** Provide complete details on the work experience of the selected grout supplier/installer with specific references to their grouting experience encapsulating radiologically contaminated materials. Include any grout formulation issues they may have encountered for such projects, success rates of any adaptations and important lessons learned. Provide any contingency plans that would be relied on should the work of the grout supplier be found to be sub-standard, and/or should the selected grout supplier not be able to provide their services through to project completion. Provide a contingency plan that would be relied on in the event that grout compound performance is found to be sub-standard.	
139.	CNSC	Section 7.3.8.2 Human Intrusion and Human Habitation	7-25	**Comment**: Exposure to the (1) drill crew at the wellhead, (2) residents near to the site, (3) core transportation personnel, and (4) laboratory technicians from a human intrusion scenario involving exploratory drilling were mentioned in the EIS but no dose estimates were provided. **Expectation to Address Comment:** Provide dose estimates to receptors following a human intrusion scenario involving exploratory drilling.	
140.	CNSC	Section 7.3.8.2 Human Intrusion and Human Habitation	7-25	**Comment**: According to the EIS: "The dominant contributor to the total dose is carbon-14 taken up through ingestion of local terrestrial plants and animals, and aquatic animals." However, according to Table D-9 of the ERA, ingestion of water is the dominant contributor, which is expected. **Expectation to Address Comment:** Provide clarification and make appropriate corrections.	
141.	CNSC ECCC	Section 7.4 Risk Evaluation of Accidents and Malfunction	7-29	**Comment:** The EIS indicates: "The potential accidents and malfunctions, applicable mitigation and estimates of residual risks following the implementation of the risk mitigation actions, are summarized in Table 7.4-1. None of the accidents and malfunctions described in Section 7.3 were classified as High (red) risk level, requiring additional assessment	

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				work to inform Project design or execution, as shown in the Project Risk Matrix (Table 7.1-3).” The same passage goes on to indicate: “Occupational accidents, material handling accidents, fires and explosions were all identified as High priority level during closure.” Table 7.4-1 indicates High (orange) Risk Matrix Priority Levels for all of: occupational accidents, material handling accidents, fires and explosions, and WR-1 ISD structure failure. Table 7.1.3-1 indicates that “More detailed risk analysis may be required” for the risk level of High (orange). It is important to reconcile potential contradictions in leveled risk classifications in order to fully understand and appreciate CNL’s priorities in relation to environmental emergency management and the protection of the surrounding environment. **Expectation to Address Comment:** Explain why additional assessment work to inform project design or execution was deemed to be not required for the high-priority accident and malfunction scenarios of material handling accidents, and fires and explosions.	
142.	CNSC	Table 7.4-1 Section 7.3.3 Material Handling Accidents Section 7.3.5 System and Equipment Failure	7-30 to 7-33 7-13 to 7-14 7-15 to 7-16	**Comment**: The summary of the “Accidents and Malfunctions, Mitigation Actions and Residual Risk Estimates” for the material handling accidents and system and equipment failure accident and malfunctions as summarized in Table 7.4-1 are not consistent with the text in Sections 7.3.3 Material Handling Accidents and 7.3.5 System and Equipment Failure. **Expectation to Address Comment:** Correct Table 7.4-1 to be consistent with the text in Sections 7.3.3 Material Handling Accidents and 7.3.5 System and Equipment Failure.	
143.	ECCC	Table 7.4-1	7-31	**Comment:** The “Mitigation” column indicates: “Emergency Preparedness Program has emergency plans for off-site accidents”. No emergency management information has been provided in relation to off-site accidents. It is important to understand the full extent of CNL’s off-site emergency response and post-incident remediation and monitoring capacities in order to assess whether the expected effectiveness of off-site emergency management efforts may lead to off-site residual environmental effects. **Expectation to Address Comment:** Provide all emergency response plans (ERP) and emergency response assistance plans (ERAP) for radiological and non-radiological off-site accidents. Provide a response as to the expected effectiveness of CNL’s Emergency Preparedness Program in specific relation to environmental effects mitigation, remediation and monitoring activities for accident and	

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				malfunction scenarios that occur off-site.	
144.	ECCC	Table 7.4-1	7-32	**Comment:** For the accident and malfunction scenario of "fires and explosions" the environmental consequences severity column indicates "n/a". It is important to fully understand and appreciate CNL's approach to environmental consequences and associated environmental protection plans in order to assess whether the plans are commensurate with the credible environmental risks. **Expectation to Address Comment:** Provide an explanation that supports the "n/a" rating for environmental consequences with specific attention to air quality that may be impacted by toxic smoke, to surface water quality and pathways thereto that may be impacted by contaminated firefighting water runoff that may potentially migrate off the project site towards the Winnipeg River. Also, include an assessment of any potential impacts to fish and fish habitat, aquatic species and to migratory birds as defined in Section 5 of CEAA 2012.	
8.0 Summary of Cumulative Effects					
145.	CNSC	Section 8.3 Summary of Cumulative Effects	8-9	**Comment**: The EIS states: "The preliminary exposure assessment for radiological contamination of the ditch resulted in a dose of 0.16 mSv/a at the predicted peak concentration of technetium-99." No details were provided on how this was determined. **Expectation to Address Comment:** Provide the methodology and assumptions used to estimate this dose.	
10.0 Assessment of Effects of the Environment on the Project					
146.	ECCC	Section 10.1.2 Extreme Rainfall Events, Snowmelts and Flooding	10-1	**Comment**: Precipitation estimates have been presented in the EIS up to a maximum of 100 year precipitation events. A peak flooding event in the Winnipeg is considered for a 100 year return event and dismissed as not having the potential to impact the project. These assessments seem to be focused on the post-closure scenario where an engineered cover has been placed over the entombed reactor. Furthermore when considering a long term project in geologic timescales, considering only 100 year return events seems inadequate. **Expectation to Address Comment:** It is recommended that the flooding assessment consider the worst case scenario associated with spring melt coinciding with a probable maximum precipitation event during the closure and the post-closure phase. It is further recommended that the closure phase considered should be prior to the engineered cover being installed.	
147.	CNSC Natural Resources	Section 10.3 Seismic Events (and associated	10-4	**Comment:** The most current references available were not used in this section of the EIS.	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
	Canada (NRCan)	references)		**Expectation to Address Comment:** Specifically, the NRCan references can be updated to the most recent information. It is recommended that CNL: • cite the National Building Code of Canada (NBCC) 2015 hazard values: http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-en.php and replace the mention of zones. • extract the current database of earthquakes (1985 – present) at http://www.earthquakescanada.nrcan.gc.ca/stndon/NEDB-BNDS/bull-en.php	
148.	CNSC	10.3 Seismic events	10-4	**Comment**: There is no review of the seismic record. The two paragraphs devoted to describing seismic events require further development, and supporting documentation. A seismic hazard assessment should be supported by a documentation of the geological environment, including the tectonic setting and regionally important structures. It is inappropriate to claim the site is aseismic based on a short period of measurements of seismicity in the region. The seismic hazard of the site should be determined / assessed with consideration of the timeframe that is defined for the project. **Expectation to Address Comment:** Determine the seismic hazard corresponding to the defined timeframe and assess its impact on the facility.	
11.0 Summary of Monitoring and Follow-Up Programs					
149.	CNSC	Section 11.0 Summary of Monitoring and Follow-up Programs	11-1 to 11-3	**Comment:** Section A.3.10 of REGDOC-2.9.1 requires that the EIS present a framework or preliminary follow-up program. Section 12 of CNSC's *Generic EIS Guidelines* (p.19) specifies that the EIS should include: • roles and responsibilities to be played by the proponent, regulatory agencies, Aboriginal peoples, local and regional organizations and others in the design, implementation and evaluation of the program results • information management and reporting (reporting frequency, methods and format) • description of any contingency procedures or plans or adaptive management provisions The information presented in the summary provided in Section 11.0 lack sufficient detail on the information requirements above. **Expectation to Address Comment:** Please outline a framework or preliminary plan, which describes the scope, objectives and proposed approach for developing the details with respect to the design and implementation of the follow-up program.	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
				Please include further details on: • the roles and responsibilities for the program and its review process, by regulatory agencies, Aboriginal peoples, and the public • the reporting methods that will be used, including reporting frequency, methods and format • a general framework with respect to how contingency and adaptive management plans will be incorporated in both the follow-up program's design and implementation •	
150.	CNSC	Section 11.3 Engagement and Communication	11-3	**Comment:** A number of Indigenous groups, including the Sagkeeng First Nation and Wabaseemoong Independent Nations, have expressed an interest in being engaged in on-going monitoring activities for the WR-1 project and WL site in general, especially as it relates to their traditional land use activities (e.g., fishing). In addition, Section 12 of CNSC's *Generic EIS Guidelines* (p.19) specifies that the description of the follow-up program in the EIS should include discussion on possible opportunities for the proponent to include the participation of the public and Aboriginal groups, during the development and implementation of the program. **Expectation to Address Comment:** Please clarify whether CNL has considered the possibility of collaborating and engaging with interested Indigenous communities on environmental monitoring activities specific to the WR-1 project and the WL site more generally. If applicable, and consistent with Section 12 of CNSC's *Generic EIS Guidelines*, provide details on possible opportunities for Indigenous communities to be engaged in monitoring.	
151.	CNSC	Table 11.0-1	11-8	**Comment:** The conceptual monitoring program for human and ecological health monitoring for air quality is limited to dust and to tritium in air. Other radionuclides that could affect air quality should be monitored as well. **Expectation to Address Comment:** Relating to the EA monitoring and follow-up programs, CNL should expand the conceptual monitoring program for Section 6.7 Human and Ecological Health, to include monitoring for potential radionuclides that could affect air quality.	
Appendices					
Appendix 1.0-1 Concordance Table					
152.	ECCC	Appendix 1.0-1	20	**Comment**: Section 6.2.2.8 Residual Effects Classification and Determination of Significance – Greenhouse Gases and Section 6.2.2.9 Monitoring and Follow-up – Greenhouse Gases are listed in the concordance table (Appendix 1.0-1) but do not exist in the EIS (p.6-60 to	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
				6-69). **Expectation to Address Comment:** Revise EIS and related documentation as appropriate.	
153.	CNSC	Appendix 1.0-1	35	**Comment**: Section 6.3.1.4, as listed in the concordance table, is shown to be the section that will provide the information to meet the geology requirement for the EIS. The required information is either not included, incomplete, or not referenced (e.g., but not limited to geotechnical properties of the overburden, structural geology specifically documenting fractures and faults, petrology, complete geological model, seismic hazard assessment). **Expectation to Address Comment:** Include the required information, for consistency with REGDOC-2.9.1. This is also information that will be used to assess the long-term safety case for the project.	
Appendix 6.2-2 Emissions Estimates					
154.	ECCC	Section 4.1.1.2 Demolition	15	**Comment:** PM_{10} emissions from demolition were calculated using the method from Chapter 3 of the *WRAP Fugitive Dust Handbook* (Western Governors' Association, 2006). This assumes open-air demolition, while components to be demolished and buried below-grade include the PHT system and vent stack, which include hazardous non-radiological contaminants (e.g., lead, cadmium, asbestos) and radiological contaminants (assuming activation products remain embedded in cladding and concrete walls, etc.) Table 5.3.2-4 of the *Decommissioning Safety Assessment Report* (p.165) states that: "Fission, corrosion and activation products may be encountered." Larger emissions than anticipated could also occur. This indicates the potential for release of hazardous non-radiological and radiological contaminants during demolition. **Expectation to Address Comment:** Define the criteria for moving from the enclosed/filtered decontamination phase to the open-air demolition phase, and the monitoring of radiological and non-radiological contaminants. As to the criteria for moving from the enclosed/filtered to the open-air phase, explain its relation to air quality during the demolition phase.	
Technical Supporting Documents					
Environmental Risk Assessment Report					

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
155.	CNSC	General	N/A	**Comment:** REGDOC-2.9.1 indicates that environmental protection measures are commensurate to the risk of a given activity. CNL indicates that atmospheric releases are limited to the terrestrial environment and concludes that an ERA for the aquatic environment is not necessary. **Expectation to Address Comment:** Provide the rationale of why atmospheric releases would be limited to the terrestrial area and not extend to the Winnipeg River.	
156.	HC	Executive Summary	xvi	**Comment:** The executive summary of the *Environmental Risk Assessment* document indicates: "Gamma spectrometry of the sediment samples confirmed the presence of uranium and thorium progeny. All samples are below the Nuclear Substance and Radiation Devices Regulations Clearance Level for naturally occurring uranium and thorium progeny. Beta activity in the sediment samples includes contributions from naturally occurring potassium-40 and from cesium-137. The majority of the beta activity for all locations continues to be from naturally occurring potassium-40." Only NORM is identified as being detected by gamma spectrometry, although Cs-137 is clearly present if it is contributing to the beta activity. **Expectation to Address Comment:** Include a complete list of radionuclides identified through the gamma spectroscopy analysis.	
157.	CNSC	Section 2.0 Site Description	2.10	**Comment**: Clause 6.2.2 of the CSA standard N288.6-12 recommends that a detailed description of the site be included in the ERA. The standard makes a reference to Annex C Site Characterization Components, which provides the number and range of characteristics and parameters that could be considered as part of site characterization, for example: relevant background concentrations (including soil, vegetation etc.), physical and chemical characteristics of soil (including soil type, soil texture, bulk soil density, etc.), identification of plumes and migration, anticipated contaminant behaviour etc. This information does not appear to be present in the ERA report, however, itis necessary to fully assess all potential environmental pathways which may be impacted by the ISD. **Expectation to Address Comment:** The ERA document should provide a description of site characterization components indicated above for consistency with the CSA N288.6-12 as appropriate.	
158.	CNSC	Section 3.1.1.1 Release during Demolition Prior to Grouting Section 3.1.1.2 Release during Grouting	3.8 to 3.10	**Comment**: Sections 3.1.1.1 and 3.1.1.2 of the ERA reference the maximum and average particulate release rates (Table 6.2.1-9 and Table 6.2.1-10, respectively in the EIS). However, these tables in the EIS are not radionuclide particulate release rates. **Expectation to Address Comment:** Provide clarification.	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
159.	CNSC	Section 3.1.1.1 Release during Demolition Prior to Grouting Section 3.1.1.2 Release during Grouting	3.8 to 3.10	**Comment:** A total of 20.1% of the radionuclide inventory from the PHT system is assumed to be released. **Expectation to Address Comment:** Explain how this is a conservative assumption or consider a more conservative option.	
160.	CNSC	Section 3.1.1.1 Release during Demolition Prior to Grouting Section 3.1.1.2 Release during Grouting	3.8 to 3.10	**Comment:** The ERA indicates that radionuclide inventories at year 30 were used to estimate radionuclide release rates prior to and during grouting. It is also indicated that CNL determined the radionuclide specific surface contamination levels based on radionuclide inventory at 40 years. **Expectation to Address Comment:** Explain why 30 years was used in parts of the ERA while 40 years was used in others.	
161.	CNSC	Section 3.1.1.1 Release during Demolition Prior to Grouting	3.8	**Comment:** The estimated release rate per radionuclide from demolition activities during the closure period assumes that the radionuclide inventory is mixed evenly with the demolished material. **Expectation to Address Comment:** Explain why this is conservative or consider a more conservative assumption.	
162.	CNSC	Section 3.1.1.2 Release during Grouting	3.10	**Comment:** The ERA states: "While there can be higher and lower concentrations in different parts of the ISD envelope, the average concentration on the particles released is relevant to the average dose received by receptors as a result of particle release and transport. The uniform mixing calculation represents this average concentration." CSA N288.6-12 states: "Estimates of the average … and upper range of exposure concentration data should be presented." **Expectation to Address Comment:** Include upper ranges of exposure concentration data.	
163.	CNSC	Section 3.1.1.3	3.13	**Comment:** In the ERA, tritium releases to the atmosphere are considered as releases of HTO only. Are there any other tritium forms that may be reasonably expected to be released due to ISD (tritiated hydrogen, for example)? Although it is indicated that tritium will be released from the helium and heavy water system, its inventory following shutdown is not immediately available as opposed to other radionuclides (Section 3.1.1). **Expectation to Address Comment:** Provide clarity within the ERA with regard to potential tritium releases and its inventory.	
164.	CNSC	Section 3.1.1.3 Release of Tritium	3.13	**Comment:** The tritium release rate during grouting during the closure period was estimated based on a CNL study conducted on tritium releases during couponing activities associated with the radiological characterization in the helium and heavy water system. The release rate of 1.28E10 Bq/week was characterized as a conservative estimate compared to the average weekly tritium release for the five-year period 2011-2015.	

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				Additional details should be provided to indicate that the activities associated with couponing are similar to those that will take place during the closure phase and therefore the release rate is conservative for the purposes of the assessment. **Expectation to Address Comment:** Provide additional supporting information that the release rate for tritium during the closure phase is sufficiently conservative. The uncertainty in this assumption should also be discussed.	
165.	CNSC	Table 3-1	3.2	**Comment:** Table 3-1 Project Activities, Components and Emission Sources during Closure is not consistent with the text in Section 3.1.1 Radiological Releases and Table 3.2. Demolition is identified to be a source or radiological releases during the closure period. This includes demolition of the main reactor hall, above grade portion of 50T reactor hall bridge crane and the ventilation stack. Table 3.1 should be corrected to indicate that demolition of these later project components have the potential for radiological releases. **Expectation to Address Comment:** Correct Table 3.1 to indicate that the demolition of the main reactor hall, above grade portion of 50T reactor hall bridge crane and the ventilation stack have the potential for radiological releases.	
166.	HC	Table 3-6	3.6	**Comment:** Several of the half-lives identified for radionuclides in Table 3-6 do not seem to correspond to the known values for physical half-life, including Pu-238, Pu-241, Am-241, and C-60. Using these values in calculations to support the assessment would lead to incorrect conclusions. **Expectation to Address Comment:** If incorrect values were used in the calculations, update the calculations and Table 3-6 accordingly, with the use of the appropriate half-life values.	
167.	HC	Section 3.1.1 Radiological Releases	3.13	**Comment**: The following sentence of the EIS indicates [emphasis added]: "This assumption is based on a study CNL conducted on tritium releases during **couponing** activities associated with radiological characterization in the helium and heavy water system (CNL 2015b)." The term "couponing" is not explained or defined. **Expectation to Address Comment:** Define the term "couponing" in the documentation for clarity purposes.	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
168.	CNSC	Section 3.2.1 Radiological Release	3.16	**Comment**: It is stated that: "Aquatic dispersion of radon-222 was excluded as it is expected to volatilize rapidly to air". This statement raises a number of questions. First, this is the only place in the ERA document where radon is indicated as a radionuclide expected to be potentially released from the ISD. Why have radon loadings been considered for the post-closure period only and for aquatic dispersion only? Second, what is the source of radon and why the sources as well as the radon inventory have not been described in the report? Third, what kind of criteria was used to exclude the exposure to radon that rapidly volatilize to air and whether the potential exposure to this radon has been considered in the report? Finally, it is not clear why uranium-238 is missing in the list of radiological parameters in Table 3-16 while other uranium isotopes and daughters (like radium-226, radon-222, lead-210 etc.) are present. **Expectation to Address Comment:** Clarification is needed to address the several questions and comments raised above in order to address the potential exposure to radiological releases from the ISD.	
169.	CNSC	Section 4.1.1 Receptor selection	4.1	**Comment**: In the selection of human receptors, Aboriginal receptors were not included in the assessment. While it is understood that the closest Aboriginal group is some distance away from the project site, Aboriginal groups may spend time in closer proximity to the site and consume higher amounts of local and country foods. How has this been considered in the HHRA? **Expectation to Address Comment:** Aboriginal receptors should be included in the HHRA, taking into account their cultural practices and their higher reliance (compared to the general Canadian population) on traditional and country foods.	
170.	CNSC	Section 4.1.2 Selection of Chemical, Radiological and Other Stressors	4.2	**Comment**: As identified in comment #68 above, the proposed project includes construction of temporary structures, demolition, transportation and power generation. In addition to the indicator compounds identified in the assessment there is the potential for the increased levels of other fuel-combustion products such as polycyclic aromatic hydrocarbons, volatile organic compounds and metals. **Expectation to Address Comment:** Provide justification for not including other products of fuel combustion (i.e., polycyclic aromatic hydrocarbons, volatile organic compounds and metals) as COPCs for the HHRA.	

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171.	CNSC	Section 4.1.2.2 Screening of non-radiological COPCs	4.3	**Comment**: It is unclear why a number of non-radiological hazardous substances were not considered in the assessment of exposures to workers. For example, asbestos, PM_{10}, $PM_{2.5}$, PCBs, VOCs, lead, diesel exhaust, and biological (mold spores). **Expectation to Address Comment:** Provide a rationale for exclusion of the above noted COPCs from the assessment of exposure of workers and the health risk posed.	
172.	HC	Section 4.1.3 Selection of Exposure Pathways	4.6, 2nd paragraph	**Comment:** The reference or rationale to support bounding medicinal plant intakes by the assumed consumption of local berries is missing from this section of the EIS. **Expectation to Address Comment:** Provide a reference to support the assumption that ingestion of berries is appropriate to bound the exposure through consumption of medicinal plants.	
173.	HC	Figure 4.2	4.8	**Comment**: The irrigation pathway is missing from Figure 4.2 but is mentioned in the text. **Expectation to Address Comment:** Make the appropriate correction and update, where appropriate, other relevant sections of the EIS and ERA documentation, including adding dose from this pathway to the relevant components of the assessment.	
174.	CNSC	Section 4.2.2 Exposure Duration and Frequency	4.10 to 4.11	**Comment**: The harvester is not assumed to eat local fish, since the relevant exposure pathways are terrestrial. Is this reasonable to assume? Section 5.1.3 Selection of Exposure Pathways of the document states: "residents from Farm A are also assumed to fish in the Winnipeg River." and Table 5.3 shows fish consumption. Should harvester consumption be included in the earlier assessment?	
175.	CNSC	Section 4.2.4 Exposure Factors	4.15	**Comment**: Average intake rates were used to estimate doses to human receptors. For the purpose of the EIS, it would be more conservative, thereby beneficial, to use 95th percentile values. In addition, according to CSA N288.1-14: "Conservatism is introduced into the current model by selecting conservative values for food, water, soil, and air intake rates for the representative person, typically at the 95th percentile level. Conservative values are also chosen for occupancy factors (e.g., fraction of the total time spent by the representative person at the exposure location, fraction of the year spent swimming or bathing in contaminated water). All other model parameters, including those that determine environmental dispersion and partitioning of contaminants, should be selected to be realistic. This combination of conservative intakes and exposure factors, and realistic dispersion and partitioning parameters, provides sufficient conservatism to be protective; selection of all factors at conservative values is excessively restrictive. Use of 95th percentile intakes is in line with ICRP 101 guidance on representative persons."	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
				Expectation to Address Comment: Use 95th percentile values for intakes of air, water, soil and foodstuff.	
176.	CNSC	Section 4.2.4 Exposure Factors	4.16	**Comment:** Ingestion of local duck was not considered for the farm resident or harvester. In addition, beef liver was not considered for the farm resident. **Expectation to Address Comment:** Justify not including these food ingestion pathways described in CSA N288.1-14.	
177.	HC	Section 4.2.4.1 Dose Coefficients	4.17	**Comment:** The following sentence in the EIS states that: "Any radionuclides not already included in the IMPACT™ database were added with appropriate parameter values." **Expectation to Address Comment:** Provide information about or a reference for new radionuclides and parameters that were added to the IMPACT database.	
178.	CNSC	Section 5.1.1 Receptor selection	5.56	**Comment**: In the selection of human receptors for post-closure HHRA, Aboriginal receptors were not included in the assessment. Aboriginal groups may consume higher amounts of local and country foods and may spend time in closer proximity to the site. **Expectation to Address Comment:** Aboriginal receptors should be included in the post-closure HHRA, taking into account their cultural practices and their higher reliance (compared to the general Canadian population) on traditional and country foods.	
179.	CNSC	Section 5.1.3 Human Health Conceptual Model	5.63	**Comment**: Ingestion of terrestrial plants was not included as an exposure pathway for the harvester during post-closure. **Expectation to Address Comment:** Include this exposure pathway.	
180.	CNSC	Section 5.2.6 Exposure Point Concentrations and Doses	5.76	**Comment**: Default intake rates were used to estimate doses to harvester receptors. How do these intake rates compare with what was learned from communities that harvest local food? **Expectation to Address Comment:** Discuss how the intake rates assumed are relevant to local communities.	
181.	CNSC	Table 6-3	6.5	**Comment**: Fish SAR species are not included in this table which identifies assessment endpoints, measurement endpoints and lines of evidence during closure. **Expectation to Address Comment:** Please clarify why fish are missing from this table? Is this an oversight or related to closure and post-closure effects?	
182.	CNSC	Section 7.2.6 Radiological concentrations and dose	7.16	**Comment**: C-14 is the main dose contributor to both terrestrial and aquatic biota. Considering that C-14 is predominantly present in a gaseous form and to a lesser extent, dissolved in water, it is surprising that doses to both aquatic and terrestrial biota are similar. Appendix C	

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		Table 7-6	7.17	provides an example of C-14 dose calculation to wild waterfowl but does not provide examples for other VCs and most transfer parameters are calculated so it is difficult to verify if the dose calculations are conservative. **Expectation to Address Comment:** Please provide C-14 dose calculation for all species and explain why aquatic biota receive similar dose than terrestrial biota, even if C-14 is predominantly present as a gas.	
				Radiological Characterization Summary and Radionuclide Inventory Estimates Report	
183.	CNSC	All - General	N/A	**Comment**: The inventory for the reactor core which supports the current version of the EIS is based on computer modelling performed in 1992 and there has been no radionuclide characterization of contaminants contained within closed systems of the primary transport system or the experiment loop to determine the relationship of fission products and actinide activity. **Expectation to Address Comment:** Provide within the EIS and supporting documentation any additionally available WR-1 radiological and non-radiological characterization data in order to adequately support the EIS assessment and its conclusions. If no changes are proposed, provide a justification.	
184.	CNSC	3.2 Non-Radiological	13 to 14	**Comment**: Characterization of non-radiological hazards was carried out in 2006 which identified a number of COPCs such as, but not limited to, friable asbestos, lead, PCBs, mercury, and mold. As such, a more recent inventory of non-radiological hazards is needed to better assess potential risks to workers and members of the public. This uncertainty is exacerbated by the lack of quantitative estimates of these hazardous substances (see Table B-3) as well as unknown locations of certain chemicals/materials (e.g. beryllium, hydrazine, chromium/cadmium) anecdotally expected to be present within the reactor. **Expectation to Address Comment:** Provide a more recent characterization of non-radiological hazards including, if possible, quantitative estimates, and a discussion of uncertainty in the assessment of risks posed by these hazards to workers and members of the public.	
185.	CNSC ECCC	Section 7.2 Discussion	23	**Comment**: Section 7.2 of this TSD identifies additional activities and work that could be warranted to enhance the currently available radionuclide inventory information for the reactor core, WR-1 biological shield, heavy water and helium systems, and primary heat transport system and experimental loops. In this document, limitations of the current data are discussed. For example, specifically for fuel channels, Section 4.2 acknowledges that the calculated exposures rates for fuel channels based on the model do not agree well with the measured rates, "with the measured exposure rate being significantly lower in stainless steel fuel channels and significantly higher in Ozhennite and Zr-2.5 Nb". These variations call into question whether the modelling that was done in the early 1990s can be relied upon to determine a conservative reactor core inventory.	

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				CNSC staff is aware that CNL is undertaking additional source term characterization work and will be providing an update by March 2018. **Expectation to Address Comment:** Identify what work is being carried out to enhance the source term characterization information, and to specifically identify whether they are currently undertaking the enhancements identified in Section 7.2 of this TSD. If any of the enhancements identified in Section 7.2 are not being pursued, CNL should provide a justification. CNL is also requested to provide justification to support that the source term inventory information, with any enhancements taken into account, is sufficiently conservative for the purposes of modelling releases to the environment and doses to the public, workers and to non-human biota.	
Decommissioning Safety Assessment Report					
186.	ECCC	Sections 2.2.3 Environmental Protection and 2.2.4 Emergency Preparedness Appendix 5.1.2-1	38 to 39	**Comment:** The EIS and supporting documentation largely focuses on the mitigation measures (both passive and active) in the prevention of accidents and malfunctions and on the preservation of human health and safety. The EIS and supporting documentation are, however, lacking sufficient detail on possible environmental effects as a direct result of accidents or malfunction scenarios. No information could be located within the EIS detailing any environmental monitoring plans, contingency plans or environmental clean-up and restoration work that would be required during or immediately following postulated malfunction or accident scenarios. Of equal importance, there was no mention of specific environmental response plans or capacities, nor of the expected success rates of response and restoration activities. The EIS does reference (in Section 2.2.3) the WL Environmental Protection Program, CNL's Environmental Protection Program Manual, Environmental Management System, the WL Environmental Monitoring Program, WL's Emergency Preparedness Program (in Section 2.2.4)), and the CNL Emergency Plan – all of which may contain some of the missing information that is required in the EIS. In the absence of this information, it cannot be determined if CNL's emergency preparedness plans and associated response capacities are commensurate with the environmental risks that the proposed activities present. ECCC recommends that CNL provide details related to the expected success rates of response and restoration activities in order to inform a determination of significance of any residual effects. **Expectation to Address Comment:** It is recommended that CNL provide information that specifically details their planned mitigation measures that includes any monitoring, contingency, clean-up or restoration work in the surrounding environment that would be required during or immediately following the postulated malfunction or accident scenarios.	

No.	Department/ Agency	Section, Table or Figure	Pg. #	Information Request or Summary of Comment	Response (to be completed by CNL)
187.	CNSC	Section 2.3.1.1 Section 2.3.1.7, Table 2.3.1-1	42 46	**Comment:** CNL states that they are using a defence-in-depth multi-barrier approach within their safety strategy, and describe the reactor core and bioshield components as a barrier. However, within Section 2.3.1 of the DSAR, there is no supporting information or reference made to supporting information as to the adequacy of this barrier to containment, although this information has been provided for other engineered barrier system components. For example, what is the expected hydraulic conductivity and degradation rate of this barrier, and if this is provided elsewhere, reference should be made within the DSAR. **Expectation to Address Comment:** Describe the adequacy of the reactor core and bioshield components to containment and if the supporting evidence has been provided in another supporting document, make reference to such information within the safety assessment report.	
188.	CNSC	Section 2.3.1.2, para 2 Section 2.3.1.7, Table 2.3.1-1 Barrier Performance	42 46	**Comment:** CNL states that the grout formulation will provide a hydraulic conductivity of 1E-9 m/s, however, there is no reference provided in the DSAR to support this claim. For modeling purposes, CNL has assumed a hydraulic conductivity of 5E-8 m/s and have applied a step function to increase the hydraulic conductivity in order to simulate degradation; however there are no references provided in the DSAR to support the claim that the grout and cover will perform accordingly. **Expectation to Address Comment:** Provide supporting evidence to justify the claims made. If the supporting evidence has been provided in another supporting document, CNL should make reference to such information within the safety assessment report.	
189.	CNSC	Section 2.4.3, Figure 2.4.3-1 Time frame	58 to 62	**Comment:** Selection of a time frame should be supported using a multiple lines of evidence approach, which must encompass the time frame when the maximum impact is predicted to occur, as per P-290. When assessing multiple lines of evidence to support the time frame, consideration should be given to the source-term and the longevity of the source-term, the use of natural analogues, and the period with maximum exposure to critical receptors as per an acceptable Normal Evolution Scenario. It is not clear within Section 2.4.3 of the DSAR how CNL has used a multiple lines of evidence approach to support their selection of an assessment time frame. For example, considering the source-term inventory and longevity, based on CNSC's independent estimates of the reactor core and heat transport system decay rates (using CNL data), the radionuclide inventory will decay to background in 300,000 years (if daughter products do not contribute significantly to the long-term dose) yet the selected assessment timeframe is 60,000 years. Furthermore, a natural analogue may be used to support the proposed assessment time frame, however no information has been provided to support the acceptability of using the Prairie Flats uranium deposit as a natural analogue to define the time frame (see related comment on Natural Analogues). The use of a natural analogue, which has not been	

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				shown to be similar to the proposed facility and its site, alone, is not sufficient to determine the assessment time frame. **Expectation to Address Comment:** Provide additional lines of evidence to support CNL's rationale for the selection of a 60,000 year timeframe and explain CNL's estimated decay of the radionuclide inventory and how this estimate was used to support the proposed assessment timeframe.	
190.	CNSC	Section 2.4.3 Section 2.4.5.2.6 Natural Analogues	58 to 62 71 to 77	**Comment:** Part 1- It is not possible to fully evaluate CNL's use of natural analogues in the DSAR based on the information provided. Surficial uranium deposits are used as natural analogues (by CNL) in two ways: 1) as the main tool to select the safety assessment timeframe (Section 2.4.3); and 2) to consider the potential effects of future glaciation (Section 2.4.5.2.6). While proposing the Prairie Flats uranium deposit as a natural analogue to justify the selection of the safety assessment time frame (Section 2.4.3 Timeframes, p.59, DSAR), CNL present very limited information to support this argument in a figure (Figure 2.4.3-1) depicting activity vs. time in both the "grout block" and the Prairie flats U deposit. Characterization of the Prairie flats U deposit was not found in any of CNL's submissions. In Section 2.4.5.2.6.2 (DSAR p.75) further near surface uranium deposits are listed in support of their arguments about post-closure glaciation scenarios. The cited 2007 CCME report is a supporting document as a basis for assessment and remediation of contaminated sites, to support environmental guidelines. It does not characterize the deposit. Tixier and Beckie [1] and Rossel [2] indicate that organic-rich material and clay units created conditions favourable for uranium precipitation in the shallow subsurface. The limited characterization of the surficial deposits at the WR-1 site (see related comments on the EIS) suggest that organic materials are not present on the Whiteshell site (e.g., Figures 6.3.1-6, 6.3.1-7 in the EIS; Figures 3-2, 3-3, *Hydrogeological Study Report*). Part 2 - The Maqarin natural analogue is a well-documented analogy for cementious radioactive waste engineered barriers (usually for low and intermediate level waste). Numerous studies have been done to evaluate cement evolution, and high pH leachate development and potential consequences (e.g., Khoury et al [3]). **Expectation to Address Comment:** Part 1 - The use of natural analogues in both the time frame assessment and the glaciation scenario requires further characterization in CNL submissions including characterizing the analogue, clearly identifying how it is analogous to the WR-1 project using relevant scientific literature (are these analogues for the entire system or just one component), and integrating those	

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				components with the site characteristics – or by clearly defining the limitations of the analogue. Please also clarify whether this is the first use of post-glacial, surficial uranium deposits as a natural analogue. If so, this is another reason that the arguments require substantiation. Part 2 - Consider using information about the Maqarin natural analogue to evaluate the impact of alkaline plume generation at the WR-1, from interaction of cementitious materials and groundwater. **References:** [1] Tixier K, Beckie R. 2001. Uranium depositional controls at the Prairie Flats surficial uranium deposit, Summerland, British Columbia. Environmental Geology. Volume 40, issue 10 page 1242-1251 [2] Rossel, K. 1999. A hydrogeological and geochemical study of the origin and nature of the prairie flats uranium deposit, Summerland, BC. University of British Columbia, MASc thesis. [3] Khoury HN, Salameh E, Clark ID, Fritz P, Bajjali, W. Milodowski AE, Cave MR, Alexander WR. 1992. A natural analogue of the high pH cement pore waters from the Maqarin area of northern Jordan. 1. Introduction to the site. Journal of Geochemical Exploration. Volume 46, Issue 1, pages 117-132.	
191.	CNSC	Table 2.4.5-2	66	**Comment:** For the "Human Habitation Bounding Scenario", the solute transport modeling results are not presented in the modeling report. It is not clear where the groundwater supply well is located, and what the breakthrough curve in this location looks like. The DSAR indicates that the following two bounding scenarios are included in the bounding scenario evaluation: localized failure of ISD structure and substantial failure of ISD structure. It is not clear what the difference is between the two failure scenarios in terms of the consequences and how they are represented in the modeling. Are these two scenarios simulated in the groundwater flow and solute transport modeling? **Expectation to Address Comment:** For each bounding scenario presented in the DSAR, the corresponding solute transport modeling results should be presented in the *Groundwater Flow and Solute Transport Modeling Report*. CNL should confirm if the localized failure of ISD structure and substantial failure of ISD structure are all simulated in the groundwater flow and solute transport modeling.	
192.	CNSC	Section 2.4.5 Normal Evolution Scenario	63 to 79	**Comment:** As defined in G-320: "A normal evolution scenario should be based on reasonable extrapolation of present day site features and receptor lifestyles. It should include expected evolution of the site and degradation of the waste disposal system (gradual or total loss of barrier	

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				function) as it ages." CNSC staff do not consider the proposed Normal Evolution Scenario (NES) to be in alignment with G-320 for the following reasons: i. Selection of critical receptors: with respect to the habits of the critical receptors, it is assumed that the on-site farmer will be exposed to contaminated surface water from the Winnipeg River, which will act as their source of water for drinking, bathing, and agricultural use. Currently the Unplanned Human Habitation scenario, whereby a human receptor is exposed to the radioactivity through drinking groundwater from a well within the plume, is considered as an independent bounding scenario. However, based on reasonable receptor lifestyles, it is likely that an on-site resident would drink groundwater from a well over the course of the 60,000 year time frame and this exposure pathway should therefore form part of the NES. ii. Performance of the engineered barrier system: sufficient uncertainty exists within the key model parameters (i.e., hydraulic conductivity and degradation rates) of barrier performance (i.e. grout, foundation). In the absence of scientific evidence, a level of conservatism in the performance of the EBS that is commensurate with the level uncertainty, should be applied to the NES and justified (see related comments on the *Groundwater Flow and Solute Transport Modelling Report*). For instance, given the unavailability of the current specifications of the grout type(s) to be used in the decommissioning of WR-1, and uncertainty in the current integrity and degradation rates of the building foundation, it may be more appropriate to assume complete degradation of these barriers over the reference timeframe. iii. Performance of the natural barrier system: in Section 2.4.5 of the DSAR, CNL states that: "the expected longevity and integrity of the subsurface geological surround, including the WR-1 ISD structure, is encompassed by the Normal Evolution Scenario", however it is not clear how this may be the case without adequate characterization of the site geology and it's anticipated evolution in the reference time frame (see related comments on the EIS). CNL should provide supporting evidence to demonstrate that the site geology and its anticipated evolution in the reference time frame is being considered in the Normal Evolution Scenario, and has been adequately documented in supporting documentation. **Expectation to Address Comment:** CNL should reassess their proposed Normal Evolution Scenario and take into consideration the following: i) an on-site human resident drinking groundwater from a well capturing the	

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				plume; ii) conservatism within the key model parameters of barrier performance, commensurate with the level of uncertainty that exists with the properties of the final grout formulation and existing integrity of the building foundation; and iii) adequate characterization of the current geology and its evolution within the reference timeframe.	
193.	CNSC	Section 2.4.5, Table 2.4.5-2 Section 2.4.5.3 Disruptive Event Scenarios and Bounding Scenarios	63 to 65 77 to 79	**Comment:** In Table 2.3.5-2 and Section 2.4.5.3, CNL is using the terminology of Bounding Scenarios to describe Disruptive Event Scenarios. As per G-320, bounding assessments are used to provide limiting or "worst-case" predictions, whereas Disruptive Event Scenarios, including human intrusion are used to test the robustness of the system in the occurrence of an improbable or unlikely event. **Expectation to Address Comment:** Use the appropriate terminology and distinguish between Disruptive Event Scenarios and Bounding Scenarios.	
194.	CNSC	Section 2.4.5, Table 2.4.5-2 Scenario Development	63 to 79	**Comment:** Section 2.4.5 does not provide a clear description of each scenario outlined in Table 2.4.5-2, including a description of the release characteristics and the transport and exposure pathways through the engineered and natural barrier systems to the defined receptors. **Expectation to Address Comment:** Provide a table and/or a diagram clearly describing the underlying assumptions of each scenario evaluated in the DSAR.	
195.	CNSC	Section 6.1.3, Table 6.1.3-1 FEPs	187 to 222	**Comment:** It does not appear that effects of permafrost have been considered as a features, events and processes (FEP). Other periglacial effects such as frost penetration and action need further assessment based on the further characterized physical property of the overburden soils. **Expectation to Address Comment:** Clarify whether the effects of permafrost have been included or excluded as an FEP and justify why. In the event that it has been included, describe how permafrost and its evolution were considered within the assessment of scenarios. Re-assess the effect of frost penetration and action on the project based on the further characterized overburden soils.	
196.	CNSC	Section 6.1.3, Table 6.1.3-1 FEP# 2 1 12	206	**Comment:** It is understood that gas will be generated during the life time of the project. However, it is not clear whether "gas sources and effects (in wastes and EBS)" has been taken into account within the Normal Evolution Scenario or other scenarios, although it has been included as an FEP in Table 6.1.3-1. **Expectation to Address Comment:** CNL should describe whether/how it has considered the effects of gas generation and migration on the facility safety within the Normal Evolution Scenario and a description of any models that have been used in the safety assessment.	
197.	CNSC	Section 6.1.3, Table 6.1.3-1 FEP# 1 2 3	193	**Comment:** Seismicity is excluded from FEP as CNL claims that the project site is within a region recognized as aseismic. As per comment #148 above, it is inappropriate to claim the site is aseismic based on a short period of measurements of seismicity in the region. The seismic hazard of the site should be determined/assessed with consideration of the	

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				timeframe that is defined for the project. **Expectation to Address Comment:** Seismicity should be included as the FEP and its effect on the facility safety should be assessed under a normal evolution scenario.	
198.	CNSC	Section 8.0 para 1, Table 8.0-1	299	**Comment:** There is a large disconnect between the text in Section 8.0 "Maintenance, Monitoring, and Design Implications", which references Table 8.0-1 as summarizing the results of the analysis completed as part of the DSAR, and the information actually provided in Table 8.0-1, which summarizes a HAZOP and Accidents & Malfunctions Analysis. **Expectation to Address Comment:** Ensure the information on "Accidents & Malfunctions", as well as the information on "Maintenance, Monitoring, and Design Implications", are appropriately captured in the right sections of the DSAR. To clarify what appears to be the intent of Section 8, and meet requirements of G-320, Section 8 should discuss and make reference to the monitoring programs that will be used in both the closure phase and the post-closure phase during active and passive institutional controls. Refer to Guidance on Monitoring programs in IAEA SSG-31.	
199.	CNSC	General and Appendix 2.1-1 Concordance Table	General	**Comment**: CNL has provided a concordance table in Appendix 2.1-1, which identifies sections of the DSAR which align with G-320 and IAEA SSR-5. However, a more detailed review of these sections has identified that in many cases the required information is either not included, incomplete, or not adequately referenced. Additionally, the level of conservatism applied for key model parameters of barrier performance (engineered and natural), and in the development of the Normal Evolution Scenario and Bounding Scenarios, should be included and justified commensurate with the level of uncertainty that exists within the safety strategy (see related comments). As a result of CNSC staff's assessment, CNL has not demonstrated that the proposed safety case is robust, nor has it been well supported by scientific evidence. CNSC staff do not consider the proposed safety case to meet CNSC's expectations as outlined in G-320. In alignment with guidance provided in CNSC G-320 (Section 5.0) and IAEA SSR-5 (Section 1.26 and Requirement 3.0), a safety case consists of a safety assessment, complemented by a set of additional arguments that is used to give reasonable assurance that long-term waste management will be conducted in a manner that protects human health and the environment. In this respect, the flow and organization of information submitted to support the safety case is a crucial element that is necessary to provide reasonable assurance that the long-term management of waste will be adequately implemented. To clarify CNSC staff's expectations, the safety case is considered to comprise of a suite of living documents, which are revised throughout the life of the project, prior to release from institutional control. The set of	

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				documents that comprise the safety case could be organized in many ways. An example of a possible organization is shown in Figure 1 (see Appendix to this comment table below) in which the *Preliminary Safety Assessment Report* (PSAR) contains the arguments that support the safety case, and the supporting documentation provides the detailed assessment and the scientific evidence to support those arguments being made in the PSAR. **Expectation to Address Comment:** Submit a safety case, which meets CNSC staff's expectations, in alignment with G-320 and IAEA SSR-5, and take into consideration additional guidance provided in the comment above. CNSC staff should be engaged to provide additional guidance as necessary.	
200.	ECCC	Appendix 5.1.2-1 CNL WR-1 In Situ Decommissioning Activities Hazard Identification and CNL WR-1 In Situ Decommissioning Activities Accidents and Malfunctions, Section 2.2.3	38	**Comment:** The Appendix indicates: "A governing document index is provided (CW-509200-GDI-101 Revision 1) so that individuals involved with the Environmental Protection Program have a comprehensive list of documentation used within the program. Refer to Section 4.3.4.10.1.7 Post-closure Monitoring for a brief description of the environmental assessment follow-up." ECCC was not able to locate the above-mentioned section. It is important to fully understand CNL's environmental monitoring and follow-up capacities in order to assess whether they are commensurate with the credible environmental risks and remediation expectations. **Expectation to Address Comment:** Provide Section 4.3.4.10.1.7 Post-closure Monitoring for review of follow-up activities and capacities.	
Groundwater Flow and Solute Transport Modeling Report					
201.	CNSC	*WR-1 Groundwater Flow and Solute Transport Modeling Report* *WR-1 Hydrogeological Study Report*	N/A	**Comment:** With respect to model calibration and solute transport simulation: i. The calibrated recharge rate of 0.8 mm/yr over the whole modeling domain represents 0.14% of the annual average precipitation of 562 mm/yr. It seems very small. Confusingly, it states on p.90 that the estimated net infiltration rate for the WL area is approximately 100 mm/yr. ii. The model does not consider water collected by sumps in other buildings other than WR-1; iii. The ratios of K_h:K_v are very large for some stratigraphic units, particularly for basal sand (340); Considering the non-uniqueness of groundwater flow model calibration, it should be demonstrated if a different combination of parameters (e.g., larger recharger rate, larger hydraulic conductivity, smaller ratio of K_h:K_v, incorporation of sumps in other buildings other than WR-1within the modeling domain, etc.) is possible. If it is possible, it would indicate a more conservative case in predicting the impact of the contaminants.	

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				It is understood from the hydrogeology report that the shallow bedrock is highly fractured, and thus fractures would form the preferential pathways for groundwater flow. Would an equivalent porous media model be conservative in predicting the impact of solute transport in fractured media? **Expectation to Address Comment:** Justify the very small values of recharge rate and ratio of K_h:K_v. Demonstrate if a different combination of parameters (e.g., larger recharger rate, larger hydraulic conductivity, smaller ratio of K_h:K_v, incorporation of sumps in other buildings other than WR-1 within the modeling domain, etc.) is possible. Evaluate the conservativeness of conceptualizing the fractured media as equivalent porous media in the modeling.	
202.	CNSC	Section 4.1.3 Table 4.3	65 66	**Comment:** Release rates of radionuclides are very low. These low release rates are based on low corrosion rates obtained from supporting documentation for Ontario Power Generation's (OPG) application for the Deep Geological Repository (DGR) for Disposal of Low and Intermediate Level Waste. Theoretically, corrosion is mainly affected by salinity, pH, groundwater level variation and resistivity (Decker et al 2008). The groundwater model supporting documentation for the Whiteshell EIS indicates that the water table will likely vary around the reactor core. Corrosion of the reactor core and its components will be affected by variations in water levels. Combined with the alkalinity of the water in contact with the grout, it is possible that the corrosion rates used for the DGR project may not be conservative or apply to this project. **Expectation to Address Comment:** Justify the use of the OPG corrosion rates for their project.	
203.	CNSC	Section 4.1.3 Table 4.3	65 66	**Comment:** CNL assumes that the radionuclides are evenly distributed within the calandria and heat transport system structures. This assumption does not appear particularly conservative. Further, the OPG DGR documentation reports a mean corrosion rate of 1E-7 m/yr. The OPG DGR also reports a maximum value of 1E-5 m/yr, 100 times higher than the current value used in the post-closure modeling for this ISD project. In the DGR project, to address barrier-related matters, OPG evaluated an instant release scenario. **Expectation to Address Comment:** In the event that using the corrosion rates from the OPG DGR is adequately justified, CNL should provide a sensitivity analysis of the corrosion rates in Section 5 of the report and determine how these corrosion rates will affect the breakthrough curves for groundwater and the Winnipeg River. CNL should also evaluate an instant release scenario in order to conservatively address the assumptions regarding corrosion rates and radionuclide distribution.	
204.	CNSC	Section 4.1.4	67	**Comment:** In Section 4.1.4, CNL states that current specifications of the	

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				grout type(s) to be used in the decommissioning of WR-1 are not available. CNL also states that based on the grout specifications of the Savannah River analogue the grout formulation will provide a hydraulic conductivity of 1E-9 m/s, and CNL have assumed a hydraulic conductivity of 5E-8 m/s within the safety assessment to take into account voids which will not be penetrated by the grout. Due to the absence of evidence, the data presented does not support the claim that the grout (and cover) will perform as indicated. A level of conservatism for this model parameter should be included and justified commensurate with the level of uncertainty that exists. **Expectation to Address Comment:** A level of conservatism for this model parameter should be included and justified commensurate with the level of uncertainty that exists. Provide supporting evidence and make reference to appropriate documentation within the safety assessment report, to support the claim that the grout will perform as stated.	
205.	CNSC	Section 4.1.4	67	**Comment:** CNL have applied a step function to reduce the hydraulic conductivity over time in order to emulate degradation in-line with information provided by Walton et al. (1990). Walton et al. (1990) states that "the empirical concrete degradation models included in this report are out of necessity applied outside their range of validity when evaluating long-term performance of concrete". In light of this, it is not clear whether the data presented to support the claim that the grout and cover will perform as indicated is conservative enough provided the level uncertainty, even when considering the sensitivity analysis that was conducted (Scenario 8). **Expectation to Address Comment:** Provide supporting evidence and make reference to such information within the safety assessment report, to support the claim that the grout will perform as stated.	
206.	CNSC	Section 4.1.5	67	**Comment:** In Section 4.1.5, CNL states that: "In the absence of data this material was assumed to have a hydraulic conductivity of 5E-10 m/s, which is 100 times higher than the values for ordinary concrete". However, there is no information provided which describes the current state of the building foundation and its effect on the hydraulic conductivity. CNL also states that: "any perforations in the foundation will be filled and sealed"; however since no technical evidence has been provided on the state of the existing building foundation, in order to account for the current level of uncertainty, the assessment should be appropriately conservative and ignore the effect of any improvements to the foundation, until they have been adequately characterized. **Expectation to Address Comment:** Apply a sufficient level of conservatism in their model parameters that is commensurate with the	

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				level of uncertainty that exists, and adequately justify their selection.	
207.	CNSC	Section 5.1 Table 5-4	90, 97 109	**Comment:** Sensitivity run (Scenario 1, p.90) was conducted to simulate the impact of a preferential pathway on solute transport. In Scenario 11 (p.97), the hydraulic conductivity in the upper 5 m of the bedrock unit was increased to double the base case value to represent an upper "weathered zone". It is not clear what the difference between Scenario 1 and Scenario 11 is. The note under Table 5-4 (p.109) states that Scenario 1 had identical flows to the base case. However, it also states on P.90 that the flow rate through the preferential pathway (Scenario 1) was set to be 10 times greater than the flow rate specified in the bedrock pathway. The two statements seem contradictory with each other. **Expectation to Address Comment:** Explain how the preferential pathway is represented in Goldsim (for example, is it located in bedrock? What is its geometry?) Clarify the difference between Scenario 1 and Scenario 11. Clarify the flow rate for the Preferential Pathway (Scenario 1).	
208.	CNSC	Section 5.1	91	**Comment:** It is assumed in the Goldsim model that the source area is uniformly distributed within the grout block, and the release of contaminant is diffusion dominated. Since the grout degradation/failure lead to increase in flow rates through the grout, is the release of contaminant still assumed to be diffusion dominated after grout degradation/failure? Is advective flow also considered as a mechanism for the release of contaminants from the source area? **Expectation to Address Comment:** Clarify if advective flow is considered as a mechanism for the release of contaminant from the source area for the base case and the bounding scenarios.	

APPENDIX

Figure 1: Example of Safety Case Supporting Documentation and Information Flow