

May 31, 2017

From: W. Turner

To: Nicole Frigault, Environmental Assessment Specialist
Canadian Nuclear Safety Commission

By email: cpsc.ea-ee.ccsn@canada.ca

Comments on the CNL's EIS for the Mound

CEAA Reference number: 80122

Dear Ms. Frigault

I have come to the end of reviewing CNL's EIS for their so-called "Near Surface Disposal Facility". I have therefore attached a table containing my comments. I recognize that some can be considered outside the scope of the Environmental Assessment Process. However, they do provide considerable insight into how CNL sees this process. In summary, CNL essentially ignores any impediment to meeting its self-imposed deadline.

To repeat my comments on the original Project Description from over a year ago (March 2016), the CNSC should intervene and call a halt to this travesty. I can see no merit in continuing to review the EIS. However, if the process continues, then I will participate in the review of CNSC's EA, and the licensing hearings.

As to why reviewing the EIS is a waste of time, I have listed some of my reasons below. This list is by no means complete.

1. Within two months of the commencement of the GoCo contract (September 2015), CNL made a presentation to the Environmental Stewardship Council which depicted their proposed facility (see Appendix 4.0-5). Since then, CNL has made no substantial changes to that concept, even after many rounds of public information sessions, comments on the original and revised project description, letters to the Editor, resolutions passed in several communities and at least one technical review session, all questioning the concept. The evidence shows that CNL is not listening. Obviously then, commenting on and asking questions about the project, is a waste of time and effort.
2. Even after the CNSC's September 2016 request that the Project Description be revised to include Intermediate Level Waste (ILW), CNL did not change a thing with respect to the proposed mound.
3. In his presentations to at least two town councils, the President and CEO of AECL, Mark Lesinski, has been deliberately misleading. Further, he has denigrated those who are questioning CNL during a review period. By his actions, he is deliberately interfering with the review process.
4. CNL did not address any comments on the two previous project descriptions in this EIS. Why provide comments on their documents when CNL will ignore them?
5. Virtually all CNL produced documents to which the EIS refers, must have been written after CNL's decided on its preferred option. Recall that in October 2015 CNL "announced" its disposal

facility. Therefore, all supporting documents produced by CNL after that date are biased. In other words, there are no CNL analyses that are objective.

6. CNL deliberately uses the term "Near Surface Disposal Facility" when it knows it is not "near surface". As they admit in the EIS, the facility is a mound, and above surface. The use of the term "Near Surface" is deliberately misleading. For example, the facilities CNL cites as "proven technology" are actually near surface, and not mounds.
7. CNL has yet to provide details as to the wastes that it intends to dispose of in the Mound. How can anyone review an assessment of the environmental impacts from a radioactive waste disposal facility when no one knows the characteristics of the wastes? How long does one have to wait for CNL to produce the WAC?
8. CNL is reluctant to provide the reference material when requested. Further, it feels free to redact information it deems unsuitable. For example, when the Integrated Waste Strategy was requested, CNL provided a summary only. That only occurred after repeated requests by several other reviewers.

If you wish to publish the above list on the Registry, please feel free.

Please call if you wish clarification or wish to discuss.

Thank your for the opportunity to review CNL's EIS for the proposed mound disposal facility

Regards

W. Turner
Deep River

**Comments on the EIS for the “Near Surface Disposal Facility at Chalk River Laboratories”
(CEAA Registry Number 80122)**

By W. Turner (Deep River Resident)

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1.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> The EIS report has all the symptoms of the “Decide-Announce-Defend” (DAD) approach to public engagement. The DAD approach is not appropriate for a disposal facility whose potential impact to the communities in the vicinity will extend essentially forever. 	<p>What is the evidence that CNL has taken the DAD approach to public engagement?</p> <p>First – In the EIS, CNL provides documented evidence that their approach public engagement with respect to their proposed undertaking is given in Appendix 4.0-5, <i>Environmental Stewardship Council Meeting #29, October 29, 2015</i>. In that Appendix a “disposal facility” is depicted that is somewhat similar to their current proposal. Notice the date for this is October 29th, 2015, less than 2 months after the GoCo contract start date (September 2015) and 7 months before the start of the EA process (May 2016).</p> <p>The time between the presentation (including the depiction of the Low Level Waste Disposal Facility) and the date of the contract (less than two months) strongly suggests that the contractors included this proposed undertaking as part of their contract submission. As a result, there is no incentive for the contractors seriously to engage the public.</p> <p>Whether or not it was part of the contract submission, for a disposal facility with the potential for long-term adverse impacts to the health and safety of persons, to the environment, and to the socio-economics of the communities in the vicinity, this timeframe is most disturbing.</p> <p>As the evidence provided in the comments below, all subsequent public engagement, including this EIS and CNL’s supporting documentation referenced in the EIS are effectively biased.</p> <p>Second – Let us compare the figure depicting the facility in the October 29th, 2015 presentation and all other depictions of the facility in the EIS. What does we find? There is no substantial difference among any of the figures. This is in spite of comments received questions raised on the two versions of the Project Description, at the Public Information sessions, and at the January 2016 Technical Meeting (discussed in Section 4.3.1.1.6 of the EIS).</p> <p>This is additional evidence that CNL decided on their optimum solution with very little consideration of public comments and questions.</p> <p>Third – Even though the justification for the disposal facility changed, CNL did not revise their preferred option.</p> <p>In the March 2016 project description, the problem, as stated, focused along the lines of “reducing the legacy liabilities and saving tax payers money”. Subsequently the justification became “<i>enabling the transformation of the Chalk River Laboratories into a world class centre for science and technology ...</i>” (see the April 12th edition of the NRT and the April 13th edition of “The News”, and the April 2017 edition of “Contact”).</p>

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				<p>These are two very different problem statements that should result in two very different solutions. However, CNL is proposing only one solution.</p> <p>This is additional evidence that CNL made their decision with little regard for the problem to be solved.</p> <p>Fourth– All public interaction sessions as described in the EIS and the associated Appendices are entirely “announcement” format. Further, even though CNL was aware of all the comments on the project description, since they are publicly available in the Agency Registry website, the EIS does not address in any substantial way. In other words, CNL’s public engagement activities are all one-way, “It is safe”, “It is proven”, “It is cost effective”, and “You have nothing to worry about”.</p> <p>A consequence of this approach is the reluctance of CNL to provide reviewers of the EIS the requested reference documents in a timely manner.</p> <p>Fifth – The “Announce” approach does not engender the public’s trust. The “announcement” format does not allow for answering any substantive questions. Essentially these sessions become “sales” talks. The long-term future of communities are involved and a “sales job” will not convince the public. In other words, “There is no buy-in.”</p> <p>Sixth – The EIS essentially is a defence of the decision to build and operate a mound disposal facility. Examples from the comments below include (but are not limited to):</p> <ul style="list-style-type: none"> • <i>The deliberate confusion of waste classification with waste types,</i> • <i>The choice of the term “near surface” for a facility that is clearly “above surface” (about 18 metres above)</i> • <i>The deliberate disregard of international best practice when it comes to radioactive waste disposal.</i> • <i>The deliberate selection of references that only support their selection of the mound technology as being the optimal solution. Several critical references are missing, such as the Integrated Waste Strategy. (That said, it is doubtful that as a reference the IWS is meaningful, see Comment 7 below).</i> • <i>For those references that are included in the EIS, CNL only selects the supporting information, ignoring all counter evidence.</i> • <i>The lack of a true “alternative means” assessment. The alternative means are deliberately selected to ensure the chosen option is the optimum option</i> • <i>No clearly defined waste acceptance criteria</i> • <i>No details as to the physical activities associated with the project.</i> • <i>Huge amount of information (more than 1500 pages for the report and appendices) with very little quality to that information.</i>

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				<ul style="list-style-type: none"> • <i>The use of emission rates instead of totals when evaluating potential adverse environmental effects.</i> <p>Experience from international and Canadian initiatives (w.r.t. Canada, this includes both radioactive waste disposal such as Port Hope, and non-rad projects such as oil pipelines), has shown that the DAD approach will significantly delay any project implementation and is likely to lead to the cancelation of the project.</p> <p>It is somewhat surprising that the authors (who represent a reputable consulting company and who produced the EA report for the Ontario Hydro geological repository in Tiverton) would be party to this approach.</p>
2.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> • All CNL reference document produced to support the preferred option decision are biased. 	<p>As noted in Comment 1 above, within 2 months of the implementation of the GoCo contract, CNL had decided on its preferred option. All documents subsequent to that date produced by CNL (or its contractors) to provide support for that decision must be considered biased, unless proven otherwise.</p>
3.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> • The EIS does not address comments submitted previously on the Project Description. 	<p>It is my understanding that CNL received all comments submitted to the CNSC on their revised project description. Further, as I understand the process, CNL is required to address those comments in the EIS.</p> <p>However, I cannot find any evidence that the comments where addressed in the EIS.</p> <p>Since CNL seems unwilling to address previous comments, I urge the CNSC to remind CNL of the requirement to address all comments received, and include the dispositions to those comments in the EIS. (See also Comment 28 below)</p>

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4.	The EIS	<p>General Comment</p> <ul style="list-style-type: none"> The deliberate disregard of internationally recognized waste class terminology even though these are the terms used in the <i>Statement of Work</i> of the GoCo Contract. 	<p>The authors need to explain why they do not use the waste classes defined by the IAEA, GSG-1, <i>Classification of Radioactive Wastes</i>, 2009.</p> <p>This is somewhat disturbing since the GoCo Contract between AECL and CNL explicitly uses the IAEA terminology. For example, the “SOC Agreement – <i>Schedule A, SOC Statement of Work</i>” provides the following definitions:</p> <ul style="list-style-type: none"> <i>Clean Waste Management Program - Inactive or clean waste covers a range of material from office waste, bulk materials, concrete and soil. The waste is conventional landfill waste. The Clean Waste Management Program classifies and confirms that waste is clean.</i> <i>Very Low Level Waste (VLLW) - Low level waste (LLW) that does not need a high level of containment and isolation and therefore is suitable for disposal in near surface landfill-type facilities, with limited control. Typical VLLW includes bulk material such as low activity soil and rubble as well as some uranium wastes.</i> <i>Low Level Waste (LLW) -Waste, as per IAEA safety standards, with radionuclide content above established clearance levels and exemption quantities, but that generally has limited amounts of long-lived activity. LLW requires isolation and containment for periods of up to a few hundred years. LLW does not require significant shielding during handling and transportation.</i> <i>Intermediate Level Wastes (ILW) - Waste, as per IAEA safety standards, which exhibits levels of penetrating radiation sufficient to require shielding but needs little or no provision for heat dissipation during its handling and transportation. ILW generally contains long lived radionuclides in concentrations that require isolation and containment for periods greater than several hundred years (i.e., more than 300 to 500 years).</i> <i>High-Level Waste (HLW) - Used (i.e., irradiated) nuclear fuel that has been declared as radioactive waste and/or is waste that generates significant heat (typically more than 2 kW/m3) via radioactive decay.</i> <p>The EIS does not define the IAEA waste class “<i>Very Short Lived Waste</i>”. That said, I would expect the authors to use the same terminology as provided in the Contract.</p> <p>Note: The <i>Canadian Nuclear Laboratories Integrated Waste Strategy Summary Document</i>, CW-508600-PLA-006 Rev. 0, 2017 April, released recently, uses most of these terms. Conspicuous by its absence in this strategy document is the waste class, “<i>Very Low Level Waste</i>” (see also Comment 6 below).</p> <p>This latter statement is more evidence of the “Decide-Announce-Defend” strategy. Apparently, both CNL and the EIS authors deliberately chose to ignore any guidance documentation (including the SOC Agreement itself) that does not support their preconceived choice of the solution. Further, they will also rewrite their supporting documentation in order to ensure their case “is proven”.</p>
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5.		The EIS	<p>Integrated Waste Strategy</p> <ul style="list-style-type: none"> Who within AECL approved the strategy? 	<p>Disclaimer: I realize that my observations on the <i>Integrated Waste Strategy</i> (this comment through to Comment 9 below) are outside the scope of the Environmental Impact Statement and the Environmental Assessment Process. That said, I suggest these comments provide sufficient background information to explain the difficulty in trying to understand whether what CNL is proposing will be an appropriate solution to the management of AECL’s legacy and operational wastes.</p> <p>The failure of the IWS to address VLLW has to be considered deliberate, since the <i>SOC Agreement</i> defines this waste class. It also points to a failure on the part of AECL to ensure the terms of the GoCo contract are met.</p> <p>My understanding of the GoCo contract is the activities of CNL are limited to operations and management of the AECL sites. As I understand that terminology, developing strategies is not within CNL’s responsibilities.</p> <p>Since there is no mention of AECL’s role in either reviewing, accepting and approving (or endorsing) this strategy, I am left to wonder whether this document has any status as a legitimate plan. It appears to be cobbled together after the fact in order to back date the justification for CNL’s proposed mound (see also the note to Comment 4 above)</p> <p>To reiterate AECL’s responsibility, I quote from the SOC Agreement:</p> <p>1.4.2.3.3.2.1 <i>If the on-site disposal option is approved by AECL, CNL shall complete any required safety basis analysis and documentation and engineering design for a fully licensed LLW disposal or LTWM facility.</i></p> <p>I note approval by AECL is not included in Figure 6, <i>Integrated Waste Strategy Interaction with Other CNL Strategies and Plans</i> (Page 3-7 of the Summary).</p> <p>This leads to several questions:</p> <ul style="list-style-type: none"> Does this strategy in any way fulfill AECL’s responsibility for decommissioning and waste management? If so, who within AECL approved this strategy? If not, what does it represent? It cannot be a CNL strategy since their responsibilities are limited to operations and management. What are the other “<i>CNL strategies and plans</i>” which interact with this strategy? Who within AECL approves those?

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6.		The EIS	<p>Integrated Waste Strategy</p> <ul style="list-style-type: none"> Why does the strategy ignore “Very Low Level Waste” as defined in the <i>SOC Agreement</i>? 	<p>With respect to a review of the IWS summary document (recently released), one issue that is missing is any mention of “Very Low Level Waste” (VLLW) (see Table 1, <i>Baseline Waste Strategy</i>, Page 1-1 of the IWS summary).</p> <p>This seems strange to me. “VLLW” is explicitly identified in the SOC Agreement (see Comment 4 above). Therefore, I expect that any documents, plans, strategies, etc. that address the radioactive wastes would include VLLW. Why? Because all these documents had to be produced a year or so after the Agreement took effect. So why is there no mention of VLLW in these documents? Well I suspect we know why (see Comment 7 below).</p> <p>So, to answer the question in the column to the left, VLLW was ignored in the strategy because the proposed undertaking had already eliminated this waste class from consideration. Thus, the Strategy had to be produced such that the proposed facility could be justified (See also Comment 5 above).</p> <p>The apparent inconsistencies with the timing of the contract, the Strategy and the proposed disposal facility is direct evidence as to why AECL and not CNL should be the proponent for this undertaking.</p>
7.		The EIS	<p>Integrated Waste Strategy</p> <ul style="list-style-type: none"> Which came first, the decision for the disposal facility or the IWS? 	<p>What do we know about the timings for the IWS and the disposal facility?</p> <p>We know that the proposal for an on-site disposal facility had to occur after the Agreement took effect (September 2015).</p> <p>We also know the proposal for the disposal facility was decided by the October 2015 presentation to Environmental Stewardship Council meeting. (see Comment 1 above, and Appendix 4.0-5)</p> <p>Thus, I can only conclude that the IWS was developed after the disposal facility decision.</p> <p>This can only mean that the IWS was developed to support that decision. As a result, the Strategy cannot be used to justify CNL’s choice of its disposal option.</p> <p>Consequently, all statements in the EIS that refer to the IWS as justifications are essentially circular and thus meaningless.</p> <p>NOTE: Even though the IWS was published after the disposal decision, several sections in the IWS are ignored in the EIS (see Comments 8 and 9 below).</p>

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8.		The EIS	<p>Integrated Waste Strategy</p> <ul style="list-style-type: none"> The EIS does not address the <i>Waste Hierarchy</i> as presented in the IWS summary document. 	<p>With respect to the release of the IWS summary document, CNL stated:</p> <p><i>Please note that the CW-508600-PLA-002 Rev. 0 - CNL Integrated Waste Strategy and CW-508600-041-000 Rev. 1 - CNL Waste Flows are not reference documents in the draft Environmental Impact Statement (EIS). The EIS incorporates all appropriate elements of the Integrated Waste Strategy specific to the NSDF project in its entirety. To provide additional information to support your review, we are providing the Canadian Nuclear Laboratories Integrated Waste Strategy Summary Document - CW-508600-PLA-006 Rev. 0.</i></p> <p>One significant issue that should be part of the EIS report is the <i>Waste Hierarchy</i> (Figure 5, on Page 3-6 of the Summary). However, I can find little (if anything) in the EIS on “Prevent, Reduce, Reuse, Recycle”, but lots on “Disposal”.</p> <p>Maybe CNL sees this hierarchy as not one of the “appropriate elements of the Integrated Waste Strategy specific to the NSDF project in its entirety”. I cannot see why it isn't.</p> <p>For example, I would strongly suggest if CNL actually implement this hierarchy, they could reduce the volume of the wastes destined for disposal in the Mound by 50 to 75% (see Comment 37 below).</p> <p>The authors must provide a justification for their decision to ignore the <i>Waste Hierarchy</i>.</p>

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9.		The EIS	<p>Integrated Waste Strategy</p> <ul style="list-style-type: none"> The EIS seems to ignore the “main waste management drivers” listed on Page 3-6 of the IWS summary 	<p>To quote from Page 3-6 of the IWS strategy document,</p> <p><i>As well as safety, compliance and cost minimization, the following are the main waste management drivers:</i></p> <ul style="list-style-type: none"> <i>use the waste hierarchy as practicable;</i> <i>minimize waste handling;</i> <i>use existing assets (e.g. current storage facilities) and the current supply chain, as practicable;</i> <i>optimize waste processes as practicable;</i> <i>use a graded approach; and</i> <i>adopt use of best practice for decommissioning</i> <p>I note that three of these bullets contain the words “<i>as practicable</i>” which suggests a large escape clause to these drivers.</p> <p>For example, see Comment 8 above in which the evidence shows that the <i>Waste Hierarchy</i> is ignored. If these are really the main drivers then a justification for that decision that the driver is not practicable has to be provided. Just ignoring them with no explanation is not acceptable.</p> <p>That said, with respect to the last bullet, “<i>adopt use of best practice for decommissioning</i>” there is no “<i>as practicable</i>” escape clause. And yet the proponent is not adopting best practice.</p> <p>For example, the proponent deliberately ignores IAEA waste classification in describing the wastes to be disposed of in the mound. Instead, CNL uses categories it calls “Waste Types”. These self-defined categories bear no relationship to the radiological content of the wastes (see Comment 67 below). Certainly not best practice. .</p> <p>This is more evidence that the proponent is in the “defend” phase of the DAD process (see Comment 1 above). Since a decision was made, then no justification is required.</p>

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10.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> The lack of detailed descriptions of the physical activities of the project. 	<p>The authors have made the review of the EIS document unnecessarily difficult since the details of the operations and activities associated with the mound and the supporting facilities such as the WWTP is lacking.</p> <p>That said, some details of these physical activities subject to the assessment are provided in separate reports.</p> <p>For example, there is no process diagram included for the WWTP (see Section 2.5.6.1 of the EIS). Yet in the reference, CNL, <i>Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement</i>, 232-509240-ASD-001, R0, 2017 March. Figure 6-4 depicts the process flow for this proposed plant.</p> <p>Further, the discussion of the WWTP in this reference describes the potential destination for the secondary wastes produced from this treatment process. Strange that: the EIS report does not include this activity even though it has the potential to interact with the environment (see Comment 58 below).</p> <p>To require a reader of the EIS to look to other documents to find the details of the processes and operations that are critical to any environmental evaluation is not acceptable. The authors' omissions appear to be intentional. Thus, it is unnecessarily difficult to evaluate the results, and conclusions of the environmental assessment.</p> <p>The authors must ensure the EIS provides all relevant details of all physical activities associated with the project in accordance with the CEA Act, 2012.</p>

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11.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> • The scope of the project is inadequate 	<p>As pointed out in Comment 10 above, the authors have not provided sufficient detail regarding the physical activities of the project, specifically those activities identified by the authors.</p> <p>But what about those physical activities the authors have not identified? The following is a list of several obvious omissions. This list is not intended to be complete. It provides several examples where the lack of information in EIS report make it impossible to evaluate the impact on the environment from the implementation of the proposed undertaking.</p> <ul style="list-style-type: none"> • The authors provide some information about the impact of transporting the wastes around the site. However, they do not provide any information about transporting wastes to the site from the other locations (Whiteshell, Douglas Point, NPD, Gentilly-1, etc.), • Somewhat strange to me, is that information is provided about waste transportation, but no information is given about how these wastes will be generated. As the authors state, these wastes will be generated from the decommissioning of more than 120 buildings, and the cleanup of contaminated sites around CRL. Therefore, here are several issues related to how these wastes are generated and moved. <ul style="list-style-type: none"> ○ How do these wastes end up in the transportation vehicles? The physical activity of putting the wastes into these vehicles must be an integral part of the transportation process. (At least the authors recognize that removing the wastes from these vehicles is a physical activity within the scope of the project. I do not understand why putting the wastes into the vehicles is not.) ○ As with any transportation process, some the items to be transported will not meet the criteria for transfer. So what will be done with these wastes? The physical activities associated with managing these “rejected” wastes must be an integral part of the transportation process. ○ One cannot separate the problem (managing the wastes generated from decommissioning and site cleanup) from its proposed solution (the mound). The authors state that the purpose of this facility is to dispose of these “problem” wastes. Therefore, the physical activities associated with waste generation must be included within the project scope. • The authors state that waste characterization is an essential aspect of this project (see Comment 63 below). But no information is provided. As an essential activity, it must be within the scope of the project. • No information is provided on waste volume reduction activities, and yet several guidance documents cited by the authors require wastes to be volume reduced as much as possible. It is also included in the “<i>Waste Hierarchy</i>”, Figure 5 in the IWS summary document, Page 3-6.

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12.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> The design life. 	<p>In about 24 places, the authors state that the design life of the mound is 500 years post-closure period. Yet in approximately 27 other places in the document, the authors state that the cover will fail in the year 2400, that is, 300 years after the Institutional Control period. In other words, there is a discrepancy of 200 years between the failure of the cover and the design life.</p> <p>Yet in the footnote on Page 3-14, the authors state:</p> <p><i>A substantial amount of the waste would exceed unconditional clearance levels after 500 years. The Safety Analysis Report demonstrate that even after failure of some of the design features, the wastes do not present a risk to the public and environment... .</i></p> <p>If after 500 years, “the wastes exceed ... unconditional clearance levels”, then the design life (which includes the Institutional Control period) must extend beyond the 500 years.</p> <p>The authors need to provide their rationale for their decision to use the 500-year design life, when the cover will fail within 300 years. Further, from the quotation above, the authors admit the wastes will exceed clearance levels after 500 years, therefore after that 500-year time period there will still be a need for institutional control.</p>
13.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> The Safety Analysis Report 	<p>The term “Safety Analysis Report” (SAR) occurs twice in the EIS. The first is on Page 3-14 in the footnote quoted in Comment 12 above, and the second on Page 5-548 where it states:</p> <p><i>Worker dose is being assessed as part of the Safety Analysis Report. Therefore, radiological dose to workers is not quantitatively assessed in the EIS.</i></p> <p>I am puzzled. The first instance, quoted in Comment 12 above, suggest that the SAR has been completed. In the second instance, the report is yet to be completed.</p> <p>This leaves me with disturbing questions, “Is the SAR being written to support the conclusion that ‘all is well’ with the mound?” “What assurance can be made that this is not be the case?”</p>

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14.	1-1	1.0	<p>INTRODUCTION</p> <p>“Low-level waste is material with radionuclide content above established clearance levels and exemption quantities, but with <u>limited amounts of long-lived activity</u> (IAEA 2009).”</p>	<p>This quotation from Section 1.0 is incomplete and does not match the intention of definition of LLW given in the IAEA document, <i>Classification of Radioactive Wastes</i>, GSG-1. 2009, To quote:</p> <p><i>“Low level waste (LLW): Waste that is above clearance levels, but with limited amounts of long lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered near surface facilities. This class covers a very broad range of waste. LLW may include short lived radionuclides at higher levels of activity concentration, and also <u>long lived radionuclides</u>, but only <u>at relatively low levels of activity concentration.</u>”</i></p> <p>I suggest that “limited amounts of long-lived activity” is not the same as “relatively low levels of activity concentration”. The former refers to a total activity in a gross volume of waste, whereas the latter refers to packets of wastes in which the radioactive concentration is at a low-level.</p> <p>The authors must revise this statement to conform to the definition of LLW given in the IAEA document. (See Comment 4 above)</p>

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15.	1-5	1.1	<p>Project Overview <i>“The NSDF will be designed as an engineered containment mound (ECM), and built at near-surface level on the CRL property.”</i></p>	<p>The authors admit that the proposed facility is not actually a near surface facility, but a mound (which is above surface).</p> <p>See also Page 11 of Patrick Quinn’s (CNL), <i>Letter to Ms. Johanna Echlin, 2016 December 16, File140-00170-000</i>, a copy of which is provided in Appendix 4.0-21 of the EIS.</p> <p>In answer to Ms. Echlin’s question:</p> <p><i>“13. Is it correct that the site could host up to 1 million cubic meters of waste on 15 hectares of land? “</i></p> <p>CNL’s response was:</p> <p><i>The NSDF building site measures slightly more than 33 hectares. Based on the current footprint, the engineered containment mound (ECM) will measure approximately 16 ha, including the waste disposal area and the surrounding berm that provides structural stability. The part of the ECM that holds and encapsulates the waste will measure -10.7 hectares. The total air space within the ECM will be approximately 1,400,000 cubic metres. <u>The mound will vary in height from 20 to 25 metres</u>, including the base liner and cover systems, each of which measures approximately 2 metres. All the above measurements are based on the current design proposal.</i></p> <p>Since CNL provided the response above, several advertisements appeared in the local newspapers (two examples, the April 12th edition of the NRT and the April 13th edition of “The News”) that suggest the height of the mound is 18 meters. That said, a mound 18 meters is still high and is comparable to a building height of 6 stories. No matter how one looks at this proposal, it is not “near surface”.</p> <p>From a cursory review of the Appendices and the figures included in the report itself, I note that all illustrations of the facility do not depict this mound. I suggest that this is deliberately misleading, especially when presenting this proposal to the public. (See also the advertisements in the local newspapers referred to above.)</p> <p>The authors must be consistent when describing this undertaking. Since the facility cannot be considered “near surface”, the authors must change all references in the EIS report, related to describing this as near surface, and all abbreviations (such as NSDF) to what the facility really is, an Engineered Containment Mound or ECM. (See also Comment 16 below)</p> <p>To ensure all communications regarding this undertaking are not misleading, these changes must extend to all CNL’s future communications with respect to this project. This includes the website, fact sheets, public engagement activities, correspondence, etc.</p>

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16.	1-5	1.1	<p>“The NSDF will be designed as an engineered containment mound (ECM), and built at near-surface level on the CRL property.”</p>	<p>This description does not match the definitions given in the IAEA document, <i>Disposal of Radioactive Waste</i>, SSR-5, 2011. To quote:</p> <p>(a) <i>Specific landfill disposal: Disposal in a facility similar to a conventional landfill facility for industrial refuse but which may incorporate measures to cover the waste. Such a facility may be designated as a disposal facility for very low level radioactive waste (VLLW) with low concentrations or quantities of radioactive content. Typical waste disposed of in a facility of this type may include soil and rubble arising from decommissioning activities.</i></p> <p>(b) <i>Near surface disposal: Disposal in a facility <u>consisting of engineered trenches or vaults constructed on the ground surface or up to a few tens of metres below ground level</u>. Such a facility may be designated as a disposal facility for low level radioactive waste (LLW). [emphasis added]</i></p> <p>Apparently CNL wishes to redefine near surface as a landfill mound. The proposed facility is “above ground” (see Comment 15 above). Further, this IAEA document suggests that a mound facility is not appropriate for the disposal of LLW.</p> <p>The authors must use terminology that is consistent with international guidance. This is especially critical if the authors wish to cite international practice as examples of “technical feasibility”. Otherwise, the authors’ use of the comparisons given in Section 2.5.2.1.1 is deliberately misleading (see Comment 44 below).</p> <p>For example, in Table 13.1-1 the authors define Near Surface Disposal Facility as:</p> <p><i>A facility for disposal of radioactive waste located at or within a few tens of metres from the earth’s surface.</i></p> <p>The authors have deliberately omitted the term “metres below ground level” (see IAEA reference above).</p> <p>The authors’ deliberate misuse of terminology that is widely recognized makes reviewing this report needlessly challenging.</p>

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17.	2-1	2.2	<p>CNL Integrated Waste Strategy <i>“Canadian Nuclear Laboratories has developed an Integrated Waste Strategy (IWS) which concisely details “cradle to grave” pathways for all CNL waste streams, from generation to final disposition.”</i></p>	<p>My understanding of the concept of “‘cradle to grave’ pathway” includes the concepts of “pollution prevention” and “reduce at source”. A perusal of Table 2.2-1 and Figure 2.2-1 in the EIS, these aspects of the “cradle to grave” pathway are conspicuously missing.</p> <p>From this cursory review, I suggest that CNL must revisit their strategy and ensure they address all aspects of the “‘cradle to grave’ pathway”.</p> <p>See also Comments 23 and 24 below.</p> <p>CNL must revise the IWS to address “pollution prevention” and “reduction at source”.</p> <p>Whether or not the IWS is revised, the authors must adjust this section to include “pollution prevention” and “reduction at source” as part of the strategy for this undertaking.</p> <p>(Note: A search of the terms “prevent” and “reduce” in the IWS summary document provides the following results:</p> <ul style="list-style-type: none"> • “Prevent” occurs nowhere • “Reduce” occurs 6 times of which only one is related to “waste generation” and that is for “Clean Waste” only. <p>It is no wonder that this EIS has no details with respect to the “cradle to grave” pathway, since the IWS does not either.</p> <p>See also Comments 5 to 9 above.)</p>

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18.	2-1 to 2-5	2.2	CNL Integrated Waste Strategy	<p>In this section, conspicuous by its absence is any description of the waste class, “<u>Very Low Level Waste</u>”. It is my understanding that most of the wastes from decommissioning and demolition would fall into this class.</p> <p>Ignoring this waste class in their strategy is somewhat disconcerting since it does not address all the classes of waste and that suggests efforts at waste volume reduction is not a priority.</p> <p>With respect to a definition of VLLW, see IAEA, <i>Classification of Radioactive Wastes</i>, GSG-1. 2009. To quote that guide:</p> <p><i>“(3) Very low level waste (VLLW): Waste that does not necessarily meet the criteria of EW [Exempt waste], but that does not need a high level of containment and isolation and, therefore, is suitable for disposal in near surface landfill type facilities with limited regulatory control. Such landfill type facilities may also contain other hazardous waste. <u>Typical waste in this class includes soil and rubble with low levels of activity concentration. Concentrations of longer lived radionuclides in VLLW are generally very limited</u>”. [emphasis added]</i></p> <p>Page 3-7 of the EIS lists six waste types. Comparing the descriptions of the wastes as given in the EIS, and this definition, I conclude that, significant quantities of Waste Types 1, 2 and 4 could be considered as VLLW. (See Comment 67 below)</p> <p>Since the safety and environmental effects resulting from the disposal of VLLW is considerably less than that for LLW, I can see no benefit from comingling these two waste classes in one disposal facility</p> <p>This is especially true since the authors’ description of the facility is best suited to the disposal of VLLW. (See Comment 16 above)</p> <p>The authors must revise this section to explicitly address the VLLW waste class.</p> <p>I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to ignore this waste class when writing this EIS report.</p> <p>Note: The IWS Summary document does not include the VLLW waste class (see Comment 6 above).</p>

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19.	2-2	Table 2.2-1	Column – Waste Class	<p>Since the authors have omitted including the VLLW class in this table, it appears that this waste class is destined for the proposed ECM</p> <p>To lump VLLW, and LLW along with some ILW into one repository is not acceptable in the long-term. Further, this is not international best practice.</p> <p>See also Comments 18 above and 23 below.</p> <p>The authors must revise the table to explicitly identify the VLLW waste class.</p>
20.	2-2	Table 2.2-1	Row – Low Level Waste, Column – Planned Disposition	<p>See Comment 27 below. In Section 2.2.2.3, the Bulk Material Landfill is identified as destination for VLLW.</p> <p>The authors must be consistent with Section 2.2.2.3 and ensure the VLLW class identified in this table.</p>
21.	2-3	Figure 2.2-1	Overview of Canadian Nuclear Laboratories Integrated Waste Strategy	<p>See Comment 19 above. Where is the waste class “Very Low Level Waste”?</p> <p>A comparison of this figure and Figure 2 from the IAEA document, <i>Classification of Radioactive Wastes</i>, GSG-1. 2009, suggests that CNL’s IWS is totally inadequate.</p> <p>If the intent of this figure is to depict a strategy, then it should be a flow diagram and illustrate the decision points.</p> <p>The authors must revise this figure to include decision points, and the VLLW waste class. In addition, the authors must include the criteria used at each of those decision points.</p> <p>See also Comment 6 above.</p>
22.	2-3	Figure 2.2-1	Overview of Canadian Nuclear Laboratories Integrated Waste Strategy	<p>I note that in this figure, the Bulk Material Landfill is identified as a repository for LLW. However, to quote Section 2.2.2.3 <i>CRL Bulk Material Landfill</i></p> <p><i>Sewage sludge is generated at the CRL Sanitary Sewage Treatment Plant and considered to be very low level waste (VLLW). For the foreseeable future, the sludge will continue to be placed in the CRL Bulk Material Landfill which is an engineered mound with leachate collection system (CNSC 2010).</i></p> <p>This supports the conclusion that the authors are deliberately misusing internationally recognized terminology. (See Comment 20 above)</p>

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23.	2-3	Figure 2.2-1	Overview of Canadian Nuclear Laboratories Integrated Waste Strategy	<p>As depicted in this figure, CNL’s strategy has identified only two of the three “R”s. These are “Reuse” and “Recycle”. Further, apparently these only apply to “Inactive” wastes.</p> <p>Yet, as anyone who is responsible for managing waste, whether it is hazardous, radiological, non-hazardous, or even municipal, knows that, the most significant management strategy both economically and environmentally is to reduce the wastes at source (see Figure 5 in <i>Canadian Nuclear Laboratories Integrated Waste Strategy Summary Document</i>, and Comment 8 above). So why is the first “R” (Reduce) of the three ignored?</p> <p>By reducing the wastes requiring “disposal”, CNL can reduce its disposal costs significantly both in the short and ultimately the long-term. As a consequence, the impacts to the environment will also be significantly reduced.</p> <p>To quote the CNSC Regulatory Policy, P-290, <i>Managing Radioactive Waste</i></p> <p><i>“5.0 Policy Statement</i></p> <p><i>When making regulatory decisions concerning the management of radioactive waste, it is the policy of the Canadian Nuclear Safety Commission to consider the extent to which the owners of the waste have addressed the following principles:</i></p> <p><i>a) The generation of radioactive waste is minimized to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices ...”</i></p> <p>In developing their IWS, I cannot see where CNL has addressed this CNSC policy statement. CNL must revise the IWS to address all aspects of the CNSC Policy P-290 including include the most important of the three “R”s, “Reduce”</p> <p>Whether or not CNL revises its IWS, the authors must address “Reduce” when describing the overall waste management strategy for this undertaking.</p> <p>(Again, I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to ignore one of the most significant contributors to reducing the impact of a waste repositories (that is waste reduction) when writing this EIS report.)</p> <p>(See also Comment 132 below)</p>

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24.	2-3	Figure 2.2-1	Overview of Canadian Nuclear Laboratories Integrated Waste Strategy	<p>I note that this figure makes no provision for pre-treatment of any wastes. Apparently all the wastes will be stored then transferred to their ultimate “Disposition Route:”</p> <p>CNL must revise the IWS to include waste processing and/or pre-treatment, such as incineration, metal melt, supercompaction, etc. as demonstrated by international best practice. The objective of these treatment processes is to reduce the volume that needs to be disposed of. Volume reduction will significantly reduce the potential environmental impact of any repository.</p> <p>(Surely, the authors (who represent a reputable consulting firm) would recognize the benefits of waste processing and pre-treatment when it comes to managing radioactive wastes. So why did the authors ignore these gains when writing the EIS report?)</p>
25.	2-5	2.2.2.2	<p>Intermediate Level Waste Repository</p> <p><i>“The IWS recognizes the need for a disposal solution for ILW. ... Treatment of ILW may be required to meet the WAC for the future repository.” [emphasis added]</i></p>	<p>If CNL recognizes a need for a “disposal solution for ILW”, CNL needs to explain why it proposes to include ILW in the ECM. I suggest the best option for the ILW CNL intends to include in the ECM is to store it until the “future ILW repository” is built.</p> <p>In other words, there is no need for CNL to include ILW in the ECM at this time.</p> <p>NOTE: This statement suggests that CNL has an alternative means for managing its ILW. However, for the “small amount of ILW” to be emplaced in the ECM, this alternative is not assessed in the EIS. This suggests an intentional oversight on the part of CNL.</p> <p>The authors must justify the need to emplace ILW in the ECM.</p> <p>(Surely, the authors (who represent a reputable consulting firm) would recognize that ILW is not suitable for disposal in an ECM. I find it surprising that they would agree to CNL’s strategy by including ILW in the ECM when CNL actually identified an alternative means for this class of wastes.)</p>
26.	2-5	2.2.2.2	<p><i>“The feasibility of locating an ILW repository deep underground within bedrock at CRL has been assessed and it was determined that CRL bedrock is suitable for such a facility.”</i></p>	<p>Noted.</p> <p>If this is true, why is CNL proposing to dispose of ILW in the proposed ECM? Surely, the best option for ILW is to build a facility specifically designed to handle this waste class.</p> <p>Apparently, at some time in the future, CNL intends to build such a facility. (See also Comments 19 and 25 above)</p>

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27.	2-5	2.2.2.3	CRL Bulk Material Landfill	<p>CNL describes this facility as an example of a destination for VLLW. In order to compare the wastes emplaced in this facility with those for the ECM, please provide the WAC for this existing facility. (See also Comment 19 above)</p> <p>The authors must be consistent in the use of waste classes. In other words, the waste class VLLW must be addressed.</p>
28.	2-6	2.3	<p>Purpose of the Project</p> <p><i>“The purpose and urgency of the NSDF Project is rooted in the requirements established by Atomic Energy of Canada Limited (AECL), on behalf of the Government of Canada, to substantially reduce the risks associated with the CNL legacy wastes (see Table 2.2-1), liabilities and the cost of laboratory operations to taxpayers in the 10-year period 2016 to 2025, and to create the conditions for the revitalization of the CRL property”</i></p>	<p>Except for a reference to Table 2.2-1, I note that this wording is exactly the same as that provided in the Project Description (CNL, <i>Project Description: Near Surface Disposal Facility At Chalk River Laboratories</i>, 232-509200-ENA-001 Rev. 1, Sep 2016, Page 3-1). In my review of that revision of the Project Description (available from the Canadian Environmental Assessment Registry, document number, 116478E) I raised several questions, none of which have been addressed here.</p> <p>I am aware that the CNSC provided responses to those comments. However, if CNL was serious about engaging the public in this project, then the authors should have revised this statement to address the questions raised previously. I will not repeat those questions here, but refer the authors to my previous review of the Project Description.</p> <p>I can find nothing in Table 2.2-1 that addresses the stated purpose of the ECM, “to substantially reduce the risks associated with the CNL legacy wastes.” In fact, the table does not provide any indication of the risks that are associated with the wastes.</p> <p>There is no waste class (or waste type) identified as “CNL legacy wastes”. Further, none of the descriptors includes the words “CNL legacy wastes”.</p> <p>The authors must provide a definition and a listing of “CNL’s legacy wastes”. Please categorize these “legacy wastes” into the five IAEA waste classes (IAEA 2009), along with an estimate of their quantities (and not just their volumes)</p> <p>The authors must provide the appropriate evidence for this assertion. Otherwise, as a justification for this proposed mound, this statement is meaningless.</p>

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29.	2-11	2.4.2.2	<p>Canadian Nuclear Safety Commission <i>“The P-290 policy document describes the philosophy that underlies the CNSC’s approach to regulating the management of radioactive waste and the principles that are taken into account when making regulatory decisions on waste management. <u>Canadian Nuclear Laboratories considered these CNSC’s guidance documents in developing the design and safety case for the NSDF</u>”.</i></p>	<p>I could find little evidence that CNL actually used these principles as guidance in designing or developing the safety case for the ECM.</p> <p>The following is a short summary of the results of a search of the EIS report to find where the authors actually addressed the following principles quoted from P-290,</p> <p><i>a) The generation of <u>radioactive waste is minimized</u> to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices;</i></p> <p>I could find nothing with respect to minimizing the wastes to be emplaced in the ECM (see Comment 23 above)</p> <p><i>b) The <u>management of radioactive waste is commensurate with its radiological, chemical and biological hazard to the health and safety of persons and the environment and to national security;</u></i></p> <p>Since the waste classes as given in the IAEA document, GSG-1, Classification of Radioactive Waste, corresponds to their radiological content, I would expect that the EIS would directly address these classes. Instead, the authors have decided to use their own definitions of waste types as defined and described in Section 3.2.1.1, (see Comment 67 below). This is not appropriate.</p> <p><i>c) The <u>assessment of future impacts of radioactive waste on the health and safety of persons and the environment encompasses the period of time when the maximum impact is predicted to occur;</u></i></p> <p>I note that in Table 6.4.4-5: <i>Dose to Farm Resident from Chronic Exposure</i>, the maximum impact will likely occur 66 thousand years from now. I can find no information in the EIS that assesses the impacts of the wastes that extends this far into the future.</p> <p><i>d) The <u>predicted impacts on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision;</u></i></p> <p>Since the authors predict that the estimated dose to a farmer living on the mound exceed the regulatory dose limit of 1 mSv/y, this principal has not been addressed. (See Comments 84 and 85 below.)</p> <p><i>e) The <u>measures needed to prevent unreasonable risk to present and to future generations from the hazards of radioactive waste are developed, funded and implemented as soon as reasonably practicable; ...</u></i></p> <p>See comment associated with item c) above. The authors do not describe any measures that could prevent the “unreasonable risk” to the future farmer living on the mound.</p>
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				<p>While the authors may have considered this guidance in their EIS report, apparently they decided to ignore these five principles.</p> <p>(Surely the authors (who represent a reputable consulting firm) are aware of these P-290 policy statements. Therefore, it is not clear why they did not specifically address them in the EIS report.)</p>
30.	2-12	2.5	<p>Alternative Means for Carrying out the Project</p>	<p>I regret to say that this section and the analysis is totally inadequate (see Comment 31 below). To evaluate only two means for a disposal facility (as summarized in Table 2.5-2) is just not credible. This is especially true since Table 2.5-1 actually identifies three alternatives, the ECM, a GWMF and an above surface concrete vault.</p> <p>To me, the authors have purposely selected the alternatives (given in Table 2.5-1) such that the analysis of alternative means would result in the selection of the ECM. This is not acceptable.</p> <p>Some suggested alternative means that are obvious.</p> <ul style="list-style-type: none"> • First, processes for waste volume reduction. There is nothing that addresses reducing the volume of wastes that require disposal. As stated above in Comment 24 above, volume reduction will significantly reduce the potential environmental impact of any repository including the ECM. • Second, segregation of VLLW from the other wastes identified for emplacement in the ECM. As CNL states, the intent of proposed ECM is to dispose of LLW, and some ILW. Then CNL has conveniently ignored the VLLW waste class (see Comment 18 above), which would include most of the wastes to be emplaced in the proposed ECM. • Third, the ECM is not suitable for the disposal of LLW and some ILW. As discussed in the IAEA document <i>Classification of Radioactive Wastes</i>, GSG-1, the only wastes suitable for a mound facility are wastes classified as VLLW. This begs the question, what are the alternatives for the LLW and some of the ILW that CNL has considered? If one takes Table 2.5-1 as the extent of CNL’s “alternative means” identification, then as far as I can determine, none. Certainly, the list in that Table does not distinguish among these three waste classes as to which waste class is most suitable for which “means”. <p>The authors must identify other credible alternative means such that the outcome of the analysis is not predetermined.</p>

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31.	2-12	Table 2.5-1	Alternative Means Evaluated for the NSDF Project	<p>Under the column <i>Aspect of the Disposal Facility</i> there are two “categories” that are redundant. What is the difference between “Facility Type” and “Facility Design”?</p> <p>Further, the authors have failed to identify the difference between a near surface facility and a mound (see Comment 16 above).</p> <p>So, for the “type” row, the authors identify two alternatives, the ECM (or as CNL likes to identify it, Near Surface Disposal Facility) and a geological facility. One does not even have to look at the evaluation criteria to determine which of these two would be selected.</p> <p>For the “design” row, the authors also identify two alternatives, both of which they have chosen to describe as “near surface”, This is somewhat confusing since under the column “Alternatives Considered in the EIS” both are actually above surface. (See Comment 16 above).</p> <p>I note that in Table 2.5-2, the authors only evaluate the two alternatives, ECM and a GWMF and not the “Above-ground Concrete Vault” as identified in this table.</p> <p>This selection of alternative means appears to be such that the preferred option will be selected. I would expect the authors of this report (who represent a reputable consulting firm) would know that these alternatives do not meet the intent of alternative means clause of CEAA 2012.</p> <p>That said, both CNL and the authors must identify other credible “alternative means” such that the outcome of the analysis is not predetermined (see Comment 30 above).</p>
32.	2-13	Table 2.5.1-1	Criteria for Evaluating Alternatives	<p>To quote Section 19(1)(g) of the CEAA, 2012:</p> <p><i>(g) alternative means of carrying out the designated project that are <u>technically and economically feasible</u> and the environmental effects of any such alternative means;</i></p> <p>Thus, any alternative means selected for evaluation must be “technically economically feasible”. Thus, at least two of these criteria are redundant and unnecessary.</p> <p>(I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to assess technical and economic feasibility since these are already requirements for selecting an “alternative means” under the Act.)</p>

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33.	2-13	Table 2.5.1-1	Criteria for Evaluating Alternatives	<p>None of these evaluation criteria are quantitative, let alone semi-quantitative. As such, they are completely unsuitable for determining the best alternative.</p> <p>Unless the authors can describe these evaluation criteria either quantitatively or semi-quantitatively, they represent opinions only. As opinions, they cannot be considered objective. By not using objective criteria, it is unlikely that another group of evaluators will come to the same conclusions.</p> <p>Further, there is no weighting given among each of these criteria. Thus “complexity of monitoring” (a simple issue to address) is given the same weight as “protection of ecological health” (a much more difficult and complex issue).</p> <p>The authors must provide a sensitivity analysis to determine which of these criteria contribute the most to the selection of the best option. Otherwise, this assessment must be considered biased towards the selection of the ECM.</p> <p>In other words, this evaluation is just not credible and does not meet the requirements of the Act.</p> <p>(Again, I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to report the results of an analysis as flawed as this.)</p>
34.	2-14	2.5.1.1	Technical Feasibility	<p>To repeat Section 19(1)(g) of the CEAA, <i>(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means;</i></p> <p>Thus any alternative means selected for evaluation must be “technically ... feasible”. Thus, this evaluation is unnecessary.</p> <p>That said, even the analysis reported within this section is just not credible. (See Comments 33 above and 44 below)</p> <p>(Again, I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to assess technical feasibility since it is already a requirement for selecting an “alternative means” under the Act.)</p>

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35.	2-14	2.5.1.1 Para 1	<p>“Project Purpose - <i>The purpose of the NSDF Project is to substantially reduce the risks associated with the CNL legacy wastes, liabilities and the cost of laboratory operations to taxpayers in the 10-year period 2016 to 2025, inclusive”</i></p>	<p>Reducing costs over a 10-year period cannot be a justification for a disposal project whose timeline extends way past several hundred to possibly thousands of years. This is especially true since the authors have provided no evidence to support this assertion. .</p> <p>The authors must provide a quantitative (or semi-quantitative) estimate of the current risks associated with the legacy wastes, and an estimate of the reduction to that risk resulting from the implementation of each identified alternative means.</p> <p>The authors must provide a definition of CNL legacy wastes that includes a quantitative estimate sub-divided into the five IAEA waste classes.</p> <p>The authors must provide an estimated of the “cost of laboratory operations” over the 10-year period, and compare it to the estimated costs of each alternative over their projected life-time, including operations, closure, post-closure, institutional control period, etc.</p> <p>The authors must revise or delete this statement.</p> <p>See Comment 28 above</p>
36.	2-14	2.5.1.1 Para 2	<p>“Schedule - <i>To enable planned decommissioning and site restoration activities, the project must be operational and ready to accept waste by 2020; therefore, this criterion evaluated the likelihood of the alternative to meet this schedule. The alternative was considered to be most favourable if it was very likely the schedule could be met, favourable if there was a low risk that the schedule could not be met; and least favourable if it was unlikely the schedule could be met.”</i></p>	<p>The authors must provide the details to support the assertion that “the project must be operation and ready to accept waste by 2020”.</p> <p>The authors must describe the infrastructure required to support each “alternative means” to meet this schedule. For example, each “alternative means” will likely require different support activities. Thus, it is unlikely that physical organisation necessary will be the same for each alternative and their respective schedules will differ.</p> <p>Each “alternative means” must address the five IAEA waste classes appropriately. As such each “alternative means” will have its own WAC, such that the “rejected” wastes will differ for each: Thus, how these rejected wastes are managed will also differ. Any description of an “alternative means” must also address the management of those rejected wastes.</p> <p>In summary, a qualitative evaluation of the schedule is just not appropriate. The authors must provide quantitative estimates of the differing schedules for each “alternative means” and the development of the required infrastructure (including managing the rejected wastes)</p> <p>Note: depending on the infrastructure required to manage the “rejected wastes”, the environmental effects from these different structures will also be different. As such, under the Act, the environmental effects of these infrastructure variances must be evaluated. This evaluation appears to be missing from Section 2.5.1.3, <i>Environmental Effects</i> and the subsequent sections addressing the two alternatives selected for evaluation.</p>

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37.	2-14	2.5.1.1 Para 3	<p>“Disposal Capacity/Expandability - <i>The alternative must accommodate 1,000,000 m³ of LLW and other wastes that meet the WAC. This volume is based on waste forecasting from future facilities and approaches to waste management. Alternatives that accommodated 1,000,000 m³ and that provided future expandability were most favourable, while alternatives with adequate volume, but no option for future expandability were considered to be favourable. Alternatives that did not accommodate 1,000,000 m³ of waste were least favourable.</i></p>	<p>The basis for this requirement is assumes no volume reduction. This is assertion is false (see Comments 23 and 30 above).</p> <p>A combined program that addresses waste diversion and segregation, and volume reduction will likely to reduce the volumes by 50 to 75%. Therefore, the requirement to accommodate 1 million m³ is does not really address the overall waste problem at CRL.</p> <p>By ignoring any methods to reduce the waste volumes to be emplaced in the mound, the authors have accepted the false premise that the schedule is the primary objective for the project. Protection of the health and safety of persons, and the environment in the long-term is an afterthought, done mainly to meet the requirements of the CEAA.</p> <p>Further, identification of “alternative means” that truly address waste diversion, segregation and volume reduction will likely demonstrate that the current choice of the ECM is not the optimal solution (see Comment 30 above).</p>
38.	2-14	2.5.1.1 Para 4	<p>“Proven Technology - <i>This criterion evaluated the technology to be implemented with the alternative being considered. Proven technology was most favourable, while unproven technologies were considered to be favourable. An alternative was considered to be least favourable if the technology was disproven or outdated.</i></p>	<p>Since no radioactive waste disposal facility has been in operation for more than a few decades and, as far as I am aware, none has been closed, there is no technology that has been proven.</p> <p>The authors must delete this as an “alternative means” evaluation criterion, since there is no evidence for the assertion that any “alternative means” has been proven.</p>
39.	2-14 & 2-15	2.5.1.1 Para 5 & 6	<p>Disposal Facility Design Robustness and Complexity of Monitoring</p> <p><i>“This criterion considers the compatibility of the disposal facility construction materials with the radioactive wastes to be disposed as well as the design life of the facility ...”</i></p>	<p>Trying to determine quantitative or semi-quantitative measures of these criteria is difficult and likely meaningless. As such, it is a waste of time to consider them.</p> <p>No further comment is necessary.</p> <p>The authors must delete this as an “alternative means” evaluation criterion.</p>

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40.	2-15	2.5.1.2	Economic Feasibility	<p>To quote Section 19(1)(g) of the CEAA, <i>(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means;</i></p> <p>Thus, any alternative means selected for evaluation must be “economically feasible”. Thus this evaluation is unnecessary.</p> <p>(Again, I am somewhat surprised that the authors (who represent a reputable consulting firm) would agree to assess economic feasibility since it is already a requirement for selecting an “alternative means” under the Act.)</p>
41.	2-15	2.5.1.3	Environmental Effects	<p>I am at a loss to address this section. The list seems to focus on the environmental effects of the ECM, and not on the potential effects potentially resulting from any of the other alternatives under consideration.</p> <p>For example, in Table 2.5-1, under the column “Aspect of the Disposal Facility” two attributes are listed, “Facility Location” and “Site Selection”. Yet none of the environmental effects listed in this section actually address the differences included under column “Alternatives Considered for the EIS”. This assumes that this table is appropriate, which I suggest, it is not (see Comment 31 above).</p> <p>Without an adequate assessment of the environmental effects of each alternative, the authors are out of compliance with Section 19(1)(g) of the Act, <i>(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means;</i></p> <p>This is somewhat surprising since the authors (who represent a reputable consulting firm) appear not be aware of this legal requirement.</p>
42.	2-15	2.5.2	<p>Facility Type <i>“To meet the IAEA Specific Safety Requirements, CNL has defined the NSDF Project within its IWS as the primary disposal path for LLW and other wastes that meet the WAC.”</i></p>	<p>This statement provides the evidence that the authors have preselected the ECM as the primary disposal path. Since the ECM solution was selected before any analyses were conducted, any subsequent evaluation of alternatives is essentially meaningless.</p> <p>That said, as pointed out in Comment 16 above, the <i>Disposal of Radioactive Waste</i>, SSR-5, 2011, we know that an ECM is not a suitable repository for LLW let alone ILW.</p> <p>Therefore, I must repeat again my surprise that the authors (who represent a reputable consulting firm) would agree to repeat this statement.</p>

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43.	2-15 - 2-20	2.5.2.1 & 2.5.2.2	Near Surface Disposal Facility & Geologic Waste Management Facility	<p>See Comment 42 above. Essentially evaluating alternatives for which the optimum solution has already been chosen is a waste of time and effort.</p> <p>As noted in Comment 30 above the selection of just these two “alternative means” as worthy of evaluation is totally inadequate.</p> <p>That said, several sub-sections in the evaluation of these two alternatives are deliberately misleading. (See comments below.)</p>

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44.	2-17	2.5.2.1.1	Technical Feasibility	<p>CNL cites the following as examples of operational near surface disposal facilities. To quote:</p> <ul style="list-style-type: none"> • <i>LLW Repository near the Village of Drigg in Cumbria operated by United Kingdom (UK) Nuclear Waste Management Ltd (consisting of AECOM, Studsvik UK, and Areva) on behalf of the Nuclear Decommissioning Authority.</i> • <i>Four commercial LLW disposal facilities in the United States, namely:</i> <ul style="list-style-type: none"> ○ <i>Waste Control Specialists in Andrews, Texas;</i> ○ <i>Energy Solutions facility in Barnwell, South Carolina;</i> ○ <i>Energy Solutions facility in Clive, Utah; and,</i> ○ <i>US Ecology Washington’s site at Hanford, near Richland, Washington.</i> • <i>United States Department of Energy Facilities and National Laboratories on-site disposal facilities:</i> <ul style="list-style-type: none"> ○ <i>Idaho CERCLA Disposal Facility at the Idaho National Laboratory, Idaho;</i> ○ <i>Environmental Management Waste Management Facility at the Oak Ridge National Laboratory, Tennessee;</i> ○ <i>Fernald Environmental Management Project – On-Site Disposal Facility near Hamilton, Ohio; and,</i> ○ <i>Environmental Restoration and Disposal Facility at Hanford Site, Washington.</i> <p>As far as I can determine, none of these are actually engineered containment mounds (in which the wastes emplaced therein actually form the pile). Therefore citing these as examples is deliberately misleading.</p> <p>That said, I am concerned that this list of examples does not match the lists provided by CNL on its website, during its public information sessions, and both the original and revised project descriptions (see Appendices 4.0-1, and 4.0-15). I take these discrepancies as more evidence that CNL is being deliberately deceptive.</p> <p>In order to determine whether these are facilities are comparable to the proposed undertaking, the authors must identify which of these are “mound disposal facilities”, and describe the rad and non-rad characteristics of the wastes that are emplaced therein (that is, their respective WACs).</p> <p>Otherwise, the authors must delete these examples since they provide no basis for comparisons to the proposed ECM facility.</p>
45.	2-18	2.5.2.1.2	Economic Feasibility	<p>Since no details are provided as to how these estimated costs are derived, they cannot be verified. As such, they cannot be used for comparisons.</p> <p>The authors must provide details as to the methodology for calculating cost estimates.</p>

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46.	2-19	2.5.2.2	Geologic Waste Management Facility	<p>To imply that an ECM can be compared with a GWMF is deliberately misleading. This is especially true since the ECM is not a suitable repository for LLW or ILW (see Comment 16 above)</p> <p>Whether a GWMF is a suitable when international best practice suggests that a near surface facility is more appropriate (see the quotation from the IAEA document, <i>Disposal of Radioactive Waste</i>, SSR-5, 2011 given in Comment 16 above), it appears that the GWMF option was chosen to specifically to demonstrate the ECM was best choice.</p> <p>I suggest that the better comparison would be between the ECM and a near surface facility that actually matches the guidance given in IAEA SSR-5.</p> <p>Therefore, I must repeat that I am surprised that the authors (who represent a reputable consulting firm) would agree to ignore the near surface option that clearly addresses the requirements of the IAEA document SSR-5 and selected the GWMF option that evidently does not.</p> <p>The authors must select “alternative means” for further evaluation that truly meet the definition of “alternative”. (For examples, see Comment 30 above).</p>

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47.	2-20	2.5.2.3	<p>General Comment</p> <ul style="list-style-type: none"> • Confusion over Mitigation Measures 	<p>The CEAA 2012 defines mitigation measures as:</p> <p><i>“... measures for the elimination, reduction or control of the adverse environmental effects of a designated project, and includes restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means. “</i></p> <p>In the first paragraph of Section 2.5.2.3 of the EIS the authors state:</p> <p><i>“... engineered barriers and mitigation measures will be implemented to prevent or delay the migration of contaminants, protect human and ecological health, and limit effects to the aquatic and terrestrial environments. These barriers and mitigation measures represent an important component of the safety from the operational phase through the period of Institutional Control.</i></p> <p>Since the authors have defined mitigation measures as separate from the engineered barriers, I would expect to see a list of these measures that do not include the engineered barriers. However, I cannot find that list.</p> <p>However, the authors are not consistent. For example, in first sentence of the last paragraph in Section 2.5.2.3, the authors state:</p> <p><i>“Overall, mitigation through the implementation of the above described engineered barriers ...”</i></p> <p>The authors are deliberately confusing the two concepts. Either the barriers are mitigation measures or they are not. From the CEAA definition, I conclude that barriers are not mitigation.</p> <p>The authors must explicitly identify each mitigation measure associated with a specific potentially adverse environmental effect. If no mitigation is required, (that is, the engineered barriers are sufficient to address the potentially adverse effect), then the authors must explicitly identify those situations.</p>

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48.	2-20	2.5.2.3	Environmental Effects	<p>Since the “alternative means” chosen for assessment were selected to demonstrate the ECM was the preferred option, this assessment is of very little merit.</p> <p>Several other means could have been selected (see Comment 30 above) that would have resulted in a considerably lower environmental impact than the current mound.</p> <p>For example, activities to address reducing the volume of the wastes targeted for disposal in the mound would significantly reduce the required footprint of the facility.</p> <p>Ensuring that organic wastes are pretreated (i.e. incinerated) would significantly reduce the greenhouse gases (specifically methane) produced as this category of waste decomposes anaerobically in the mound over the long term.</p> <p>These two obvious benefits could result from a proper choice of “alternative means” whose selection process was not deliberately manipulated to produce the prechosen option.</p> <p>As stated above, because the process to select “alternative means” is tainted, I see no benefit in reviewing this section any further.</p>
49.	2-21	2.5.2.3	<p><i>“In GWMF facilities, the waste is normally placed below the ground water table and will thus have a water saturated environment outside the engineered barriers soon after closure of the repository (<u>Argonne National Laboratory 2011</u>).”</i></p>	<p>I cannot find the reference “Argonne National Laboratory 2011” in the list of references in Section 12.</p>

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50.	2-24	Table 2.5-2	Evaluation of Alternatives – Facility Type	<p>I regret to say that the results presented in this table are essentially meaningless. These comparisons are “qualitative” and each of the criteria are given the same weighting. In an evaluation of alternatives for radioactive waste disposal, this is not acceptable. (See Comments 32 and 33 above)</p> <p>Further, several criteria under the headings <i>Technical Feasibility</i> and <i>Economic Feasibility</i> are either deliberately misleading or entirely redundant (See Comments 34 through to 46 above)</p> <p>In addition, the alternatives selected for evaluation are tainted (see Comment 30 above).</p> <p>To ensure that this evaluation is credible, the authors must select appropriate alternatives, and select quantitative (or semi-quantitative) evaluation criteria that truly assess the potential impacts to the environment (as required under CEAA, 2012)</p> <p>While the costs of each alternative need to be considered, that is not a criterion that should be addressed in an assessment of the potential environmental effects of a proposed undertaking. Costs are addressed after ensuring that the health and safety and the environment from the proposed undertaking receive the highest priority.</p> <p>Recall this report is an Environmental Impact Statement, not a cost-benefit analysis. (Since the cost associated with the management of the wastes that fail to meet the ECM WAC is not included, even as a cost-benefit analysis, this report is incomplete.)</p> <p>The authors must ensure their evaluation criteria are quantitative. This will ensure that the potential environmental impacts are given the appropriate priority weighting.</p>

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51.	2-25	Table 2.5-2	Evaluation of Alternatives – Facility Type (Environmental Effects)	<p>Sorry, but this analysis is totally inadequate. If one takes the two alternatives proposed by the authors at face value, several omissions in the criteria become obvious.</p> <p>First – The proposed footprint of the ECM is given as about 30 ha. I cannot find any estimate of the footprint for the GWMF. Since the GWMF is mostly underground, I would expect the footprint to be less than 1 or 2 ha.</p> <p>Since clearing a 30 ha site will have a significantly larger impact than clearing a 2 ha site, I would expect comparing the environmental impact from just clearing the site would significantly favour the GWMF over the ECM.</p> <p>Second – The mound is to be covered and lined with impenetrable membranes. As such, the surface water drainage patterns for the 30 ha site will be severely impacted. (in fact, the authors admit this in their design and the groundwater flow modelling (see also reference, Golder (Golder Associates Ltd.). 2017. Groundwater Flow Modelling of the NSDF)</p> <p>It is somewhat disturbing that a similar assessment has not been conducted for the other alternative identified (that is, the GWMF)</p> <p>Third - For the following criteria the authors state there is “<i>No difference between alternatives</i>”:</p> <ul style="list-style-type: none"> • <i>Atmospheric Environment</i> • <i>Surface Water Environment</i> • <i>Aquatic Biodiversity</i> • <i>Ecological Health</i> • <i>Land and Resource Use</i> <p>Except that assertion is impossible if one compares the footprint of the two alternatives, the ECM with a footprint of 30 ha, and the GWMF with a footprint of 2 ha.</p> <p>If CNL decides to ignore other alternative means, then the authors must revise their evaluation to address the difference in the footprints of the two alternatives.</p>
52.	2-26 & 3-1	2.5.3.1.1 & 3.1.1	<p>Technical Feasibility (last paragraph last sentence)</p> <p>“... <i>the 500-year post-closure design life of the ECM.</i>”</p> <p>Project Overview (2nd paragraph)</p> <p>“<i>The design life for the ECM is 500 years...</i>”</p>	<p>Not that it matters much, since the design life is speculative anyway. However, from the quotations in the column to the left, there are inconsistencies with the proposed design life for the facility.</p> <p>The authors must ensure consistency.</p>

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53.	2-31	Table 2.5-3	Evaluation of Alternatives – Facility Design	<p>Essentially the same comments apply to this table as outlined in Comments 50 and 51 above.</p> <p>The evaluation criteria are subjective and not quantitative. Since there is no weighting provided, all criteria must be seen as equivalent. This puts into question the results of any evaluation of alternatives.</p>
54.	2-34 to 2-40	2.5.4 (including Table 2.5-4)	Evaluation of Alternatives - Facility Location	<p>As a separate category, <i>Facility Location</i> cannot be seen as an alternative means. This is especially true since the three alternatives identified by the authors could be sited anywhere, since (except for the Chalk River site) they have chosen not to provide any geotechnical assessments. Without the geotechnical information, one cannot make any assessment as to whether the NPD or Pinawa sites are better locations.</p> <p>Further, of the three alternatives, the authors specifically address the siting of mound only. Therefore, the contents of this section assessment are inadequate.</p> <p>The authors must delete this assessment since <i>Facility Location</i> is not an alternative means.</p>
55.	2-41 to 2-51	2.5.5 (including Table 2.5-5)	Evaluation of Alternatives - Site Selection	<p>For exactly the same reasons as given Comment 54 above, as a separate category <i>Site Selection</i> cannot be seen as an alternative means.</p> <p>The authors must delete this assessment since <i>Site Selection</i> is not an alternative means.</p>

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56.	2.43	Figure 2.5.5-1	Site Options Evaluated for the Near Surface Disposal Facility Project	<p>I note that the selected site straddles the East Mattawa Road. It is my understanding that this road is designated as an Emergency Road #3 (ER3) in the event of a nuclear accident in the built-up area of the CRL site.</p> <p>During the clearing of the location, the construction, operation, and closure of the facility, this route will not be available.</p> <p>Somehow, not including this fact in the site selection criteria suggests those criteria are just not credible (see Comment 55 above).</p> <p>In Section 2.5.5.1.1, it is stated that ER3 will be “... <i>re-routed as part of a previously planned upgrade to this road</i>”. I wonder where that re-routing will occur. Somehow, I doubt there would be any requirement to re-route this road if the mound was not located on that road. An examination of the figures presented in the EIS (for example this figure) suggests that its current location is optimal. This is especially true, since any new route will have to cross Perch Creek, and the current crossing is adjacent to the mound facility.</p> <p>Yet there is nothing in the assessment that addresses the changes required to this route. Further, there is no mention of this road (or its relocation) in the selection used to determine that the EMR site is the preferred location for the mound.</p> <p>This is an example of the inadequacy of the site selection process and thus the resulting assessment.</p> <p>Note: None of the figures in the EIS report identify the East Mattawa Road as the Emergency Road #3 (ER3). I suggest this is deliberate.</p>
57.	2-52 to 2-54	2.5.6	Leachate Treatment	<p>It is not clear to me how <i>Leachate Treatment</i> is an alternative means. It does not address the actual disposal of wastes. Further, it is only relevant to the mound facility, not a GWMF or an above ground concrete vault.</p> <p>The authors must delete this assessment since <i>Leachate Treatment</i> is not an alternative means.</p>

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58.	2-52	2.5.6.1	<p>Waste Water Treatment Plant (New) <i>“A new WWTP is proposed that will be used for treatment of wastewater sources at the NSDF site, including contact storm water and leachate generated from the ECM, equipment and personnel decontamination water, and laboratory wastewater. ...”</i></p>	<p>The authors do not provide any details as to the processes to be used in the WWTP, except to state:</p> <p><i>The WWTP includes two duplicate trains of treatment, and is made up of the following primary components: influent equalization, chemical precipitation, clarification, membrane filtration, ion exchange, final effluent storage, residuals storage and dewatering, and support facilities.</i></p> <p>However, one of the significant omissions in the description of this facility is the management of the concentrated contaminant wastes generated. Removing contaminants from the leachate (and storm water) will result in a waste, not just the “cleaned up discharge”. Although important, the effluent from this facility does not represent the greatest risk to the public or the environment. The concentrated wastes represent the largest hazard.</p> <p>From the description of the processes quoted above, these wastes could be concentrated solutions from the ion-exchange, and solids from the precipitation clarification and membrane filtration.</p> <p>What do the authors propose for these wastes? What is the expected concentration of the contaminants in these wastes? Since the process is intended to remove radioactive contaminants, what is the potential radiation levels from the concentration process?</p> <p>Since the authors intend to include ILW in the emplaced wastes, I would expect to see these nuclides in the leachate and/or storm run-off with the possibility that the activity in the concentrate would present a significant hazard to the workers.</p> <p>Since the authors describe the existing facility in Section 2.5.6.2 they should be aware of all of these aspects of a operational liquid waste treatment facility.</p> <p>The authors have chosen not to provide sufficient details with respect to the facility's potential adverse effects to the health and safety of persons (i.e. the workers) and the environment (the wastes). This is completely inadequate.</p> <p>Since authors state that this is treatment facility is a critical aspect of the mitigation measures to prevent the discharge of contaminated leachate to the surrounds (including Perch Creek), this omission puts into question the overall conclusions of the EIS.</p>

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59.	2-54	2.6	<p>Conclusion</p> <p><i>“The recommended alternative for the disposal of low-level waste based on the Alternative Means analysis is to build a NSDF at the CRL property on the ERM site. The preferred design is that of an ECM along with a WWTP for leachate treatment. The most favourable alternative means are based upon consideration of economic, environmental and technical factors. “</i></p>	<p>From Comment 17 through to Comment 57 above, I can only conclude that the authors have not provided sufficient evidence that the chosen option of the ECM is the “most favourable”.</p> <p>Three examples stand out.</p> <ul style="list-style-type: none"> • First: the authors have failed to identify appropriate alternative means that specifically address the five waste classes as defined in IAEA, <i>Classification of Radioactive Wastes</i>, GSG-1. 2009. These classes include VLLW, LLW and ILW. • Second: the authors deliberately misuse the terminology for their proposed waste facility. As defined in IAEA document, <i>Disposal of Radioactive Waste</i>, SSR-5, 2011, this facility is a mound not a near surface structure. • Third: the authors have deliberately ignored the waste class VLLW. The wastes that could be classified as VLLW comprise the largest volume destined for the ECM (see Comment 18 above). By disregarding this waste class, the overall assessment is flawed. <p>The authors must provide the appropriate evidence to support their conclusion</p> <p>Since the selection of the “most favourable alternative” is flawed, reviewing this EIS report is largely a waste of time and effort.</p>
60.	3-1	3.1	<p>Introduction</p> <p><i>“Where there remains uncertainty around the design, conservative assumptions or options still under consideration have been presented herein to provide a conservative assessment of potential effects of the NSDF Project in the environmental assessment.”</i></p>	<p>I may be mistaken, but within this section I can find no discussion of the</p> <p><i>“... uncertainty around the design, conservative assumptions or options still under consideration ...”</i></p> <p>I take this to mean that the authors are categorical in their decision on the best option before any assessment (environmental, safety or otherwise) has been completed.</p> <p>In other words, the authors will not consider any findings from this assessment process that could counter their choice of the ECM as the best option. Since the environmental assessment process is an integral part of project planning, and that process has yet to be completed, this stance is unacceptable,</p> <p>The authors must discuss the uncertainties around the design, assumptions and options and the potential risks resulting from those uncertainties to the health and safety of persons, to the environment, and all the other factors under Section 19(1) of the CEAA, 2012.</p> <p>The authors must include a summary of their contingency plans that will address scenarios in which their current design, assumptions and/or options prove to be wrong.</p>

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61.	3.1 to 3.2	3.1.1	<p>Project Overview</p> <p>“... The main physical works related to the NSDF Project are the ECM that will contain the radioactive and mixed waste that meets the WAC; ... various support facilities that enable operation; and site infrastructure ...”</p>	<p>I am somewhat puzzled since the authors all the “... <i>support facilities that [would] enable operation ...</i>” have not been identified.</p> <p>For example, this statement suggests that the mound will only contain wastes that meet the (as yet to be defined) WAC. This begs the question, “what are the ‘support facilities’ required to manage the wastes that do not meet those criteria?” The authors provide no answer.</p> <p>How one manages these “rejected” wastes is integral to supporting the operation of this undertaking, and a critical component of the “site infrastructure”.</p> <p>Therefore, with respect to managing the wastes that do not meet the WAC, this <i>Project Overview</i> is missing two key elements: the support facilities and the corresponding infrastructure.</p> <p>The authors must address the support facilities and infrastructure required to manage the wastes that do not meet the WAC.</p>
62.	3-5	3.1.1	<p>“The main components and activities associated with the operations phase of the NSDF Project include the following ...”</p>	<p>I note that managing wastes that do not meet the WAC is not identified in this listing. This is a deliberate oversight (see Comment 61 above)</p> <p>The authors must address this omission since managing the “rejected” wastes is critical to the operations of the ECM.</p>
63.	3-5	3.1.1	<p>“The main components and activities associated with the operations phase of the NSDF Project include the following ...”</p>	<p>Conspicuous by their absence are any activities associated with ensuring the wastes destined for the ECM meet the (yet to be defined) WAC. These activities include waste characterization, waste segregation and managing any wastes that fail to meet the WAC.</p> <p>This is an unacceptable oversight, since these “activities” are critical to determining the potential impacts to health, safety and the environment from the immediate operations and the long-term closure and post-closure activities.</p> <p>To quote from Section 3.2.2 of the EIS,</p> <p><i>The WAC, along with adequate waste characterization, are essential for ensuring only waste with acceptable physical, radiological, and chemical characteristics is emplaced in the ECM. [emphasis added]</i></p> <p>The authors must address all activities critical to ensuring that the health, safety and environment is protected through all phases of the project. This includes activities such as (but not limited to) waste characterization, waste segregation and managing ‘rejected’ wastes. (See also Comment 76 below)</p>

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64.	3-6	3.2	<p>Integrated Waste Strategy</p> <p><i>“Canadian Nuclear Laboratories IWS for the CRL property includes waste disposal strategies identified for each of the waste classes. The following sections describe the waste types and estimated waste volumes to be disposed of in the ECM, the WAC defined for each waste type, and the process for handling wastes that do not meet the WAC.”</i></p>	<p>The authors must be consistent. As noted in Comments 18 and 19 above, CNL has deliberately ignored the waste class VLLW. Further, in Section 3.2.1.1, the waste types listed do not match the IAEA waste classes (see Comments 67 and 71 below).</p> <p>I am concerned that this strategy does not address the appropriate disposal pathways for the <u>hazardous content of the wastes</u> (in other words, the risks associated with both radiological and non-radiological content). A reading of this section leads me to conclude that CNL is only concerned with waste volumes not the health, safety and environmental risks that would result from disposing of these wastes.</p> <p>Without quantitative data about the inventories, and the hazardous content, I cannot see how CNL can assert that this disposal option will protect the health and safety of persons and the environment over the total lifetime of any proposed undertaking, including those required for decommissioning, pre-treatment, interim storage, transport, disposal, site closure and eventual abandonment of the site.</p> <p>Focusing on volumes may be appropriate for a municipal waste dump, but it cannot be acceptable for the proposed ECM.</p> <p>The authors must ensure that CNL revises their IWS to address the actual risks from the rad and non-rad hazard content of the various wastes.</p>
65.	3-6	3.2.1	<p>Waste Types and Volumes</p> <p><i>“Sources of the waste to be placed in the ECM ..., including legacy radioactive wastes currently stored on the NSDF Project site.”</i></p>	<p>It is my understanding that the site for the proposed ECM is currently undisturbed. Otherwise, I do not understand the statement from 3-2:</p> <p><i>All site preparation activities will be completed, including vegetation clearing and earthworks,</i></p> <p>From this statement, I conclude that the site is currently undisturbed. I cannot find anything in the EIS that states otherwise.</p> <p>Since no physical activities can proceed on the site until the EA is complete and the license issued, this begs the question, “What wastes are currently stored on the Project site?”</p> <p>Note: if there are wastes stored on project site, then CNL is likely in violation of the CEA Act.</p> <p>Assuming that this assertion is true, then the authors must provide an estimate of the quantity (categorized by IAEA waste class) of the “legacy radioactive wastes currently stored on the [ECM] Project site.”</p>

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66.	3-7	3.2.1	<p><i>“The waste characterization is based on conservative assumptions as most of the waste to be disposed of in the NSDF has not yet been characterized or generated.”</i></p>	<p>I am confused. How can waste characterization be “essential” (see Comment 76 below) and be based on “conservative assumptions”?</p> <p>This is a disposal facility whose long-term safety and environmental impact results from what is emplaced in that facility. Basing the characterization of the wastes on “conservative assumptions” is not acceptable.</p> <p>The authors must provide the details of the characterization program for both the radiological and non-radiological contaminants in the wastes.</p> <p>The authors must include descriptions of both the sampling protocol and the analytical procedures. If CNL proposes to use off-the-shelf methodology, then references to that methodology must be provided. Any in-house methods (whether sampling or analytical) must be summarized. All method descriptions must include an explanation of the required Quality Assurance and Quality Control.</p> <p>The authors must include a summary of the errors and uncertainties that must be met by any methodology chosen to address both sampling and analysis.</p> <p>Further, the authors must describe when particular methods will be used to characterize the wastes, and ensure responsibilities for conducting that assessment are assigned.</p> <p>Note, the characterization program must be defined up front, before any of the wastes are emplaced in the ECM.</p>
67.	3-7	3.2.1.1	<p>Waste Types</p>	<p>I am confused. My understanding is that this proposal addresses the need for a “radioactive waste disposal facility”. The waste types listed here are not classified according to their radioactive characteristics.</p> <p>Without a characterization of the wastes according to their radioactive content, suggests the authors is either deliberately misleading or does not understand the nature of a radioactive waste disposal facility.</p> <p>The authors must provide a listing of the waste types according to their radioactive content. Instead of listing waste types, I suggest using the classes given in the IAEA document, GSG-1, Classification of Radioactive Waste.</p>

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68.	3-7	3.2.1.1	<p>Type 1 – Soll and Soil-like waste <i>“Type 1 waste includes contaminated soils and other waste materials with characteristics similar to soil that can be placed within the mound with little to no handling requirements beyond what would be used for soil fill. Environmental remediation activities at CRL site will be the main source of these wastes.”</i></p>	<p>I note that this waste type includes soils from remediation activities. My understanding is that remediation is cleanup of contaminated soils to criteria (both rad and non-rad) that is protective of human and ecological health.</p> <p>Since these clean-up criteria will determine the volume of the wastes generated by these remediation activities, CNL has to provide their proposed clean-up criteria. In addition, CNL has to summarize the sampling and analytical protocols that will be used to characterize the soils removed, and evaluate the location remediated.</p>
69.	3-7	3.2.1.1	<p>See quote from Comment 68 above. Type 1 waste includes 370,000 m³ of contaminated soil.</p>	<p>In Table 3.2.1-1, the volume of this waste is given as 370,000 m³. To produce a volume of this magnitude, the proponent must be expending a considerable effort in digging up these contaminated locations. However, the authors do not describe these excavations, nor do they assess their environmental impact.</p> <p>The total volume of these excavations will result in a significant environmental impact. I am not sure, but I expect this activity will leave large gaping holes in the landscape. Depending on the depth of these holes, they will fill with storm water, and likely groundwater, thus changing the hydrogeology in their vicinity.</p> <p>By failing to assess the environmental effects resulting from the excavation of 370,000 m³ of contaminated soils, the authors have neglected to assess all potential impacts from the physical activities associated with the project. This is not acceptable.</p> <p>Without an evaluation of the environmental effects of these excavations, the environmental impact assessment of the project is incomplete.</p> <p>The authors must include an assessment of the potential environmental impacts of the excavation of the 370,000 m³ of contaminated soils from around the laboratory complex. If the project intends to remediate the resulting holes, then those remediation activities must be included in this assessment.</p> <p>I note that the areas to be remediated are within the boundary of the “Local Study Area” as defined on in Section 5.1.3.1, <i>Spatial Boundaries</i>.</p>

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70.	3-7	3.2.1.1	<p>Type 3 – Non-soil-like Waste: <i>“Type 3 waste includes waste that can be excavated and handled as a bulk material, but do not have the physical characteristics of soil and soil-like materials. These include primarily materials such as process residues, high organic or highly compressible wastes, <u>high moisture content wastes, flowing wastes (i.e., wastes that do not pass the slump test), and sludges.</u>”</i></p>	<p>I note that wastes that do not pass the slump test are (by definition) liquids.</p> <p>I am surprised that the authors (who represent a reputable consulting firm) would suggest that disposing of liquids in a solid waste facility would be considered acceptable. As the authors well know, disposing of liquid wastes in a facility such as what is being proposed (i.e. a mound) will enhance the transport of pollutants through the wastes thus contributing significantly to the quantity of contaminants in the leachates.</p> <p>The authors must describe the processes (either physical or procedural) that will ensure that liquids are not emplaced in a facility designed for solid wastes.</p> <p>Note: the authors cannot justify the emplacement of these liquids by declaring that this waste type is only a “very small fraction” of the total wastes. Even though this may be true (the volume of this waste type as given in Table 3.2.1-1 is 10,000 m³) the relative quantity is not the issue. Neither the radiological nor the non-radiological hazard content of the liquids are provided (here or anywhere else in the text). Therefore, it is impossible to determine the potential adverse consequences to the safety and health of persons or to the environment resulting from the emplacement of these liquids in a solid waste mound.</p>
71.	3-7	3.2.1.1	<p><i>“CRL identifies and tracks several hundred waste sources via its Waste Tracking Database. Each waste is specific to the waste source (e.g., building or process) and includes radiological and chemical characteristics. <u>The method used to identify waste characteristics was to review and compile existing information into a consistent radiological and chemical source term and set of physical characteristics.</u> Wastes are categorized into six waste types as described below.”</i></p>	<p>The listing of waste types in this section appears to be based on their physical characteristics only. While this may be suitable for a municipal waste facility, it is <u>NOT</u> adequate for a radioactive disposal facility.</p> <p>When demonstrating protection of the biosphere over the 300 to 500 year duration of this project, the physical characteristics of the wastes are inconsequential.</p> <p>Since the authors admits to having information on the “radiological and chemical source term” for these wastes, please revise the descriptions of these waste types expressly to address these two source terms.</p>

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72.	3-8	3.2.1.2	Waste Volumes	<p>Providing waste volumes is somewhat disingenuous.</p> <p>This is a proposal for radioactive waste disposal facility. Therefore, waste volumes cannot be of the greatest concern to designing, operating, closing, and the eventual abandoning of this facility.</p> <p>If one is concerned about protection of the biosphere, it is the type and total quantity of the radiological, chemical and biological hazards contained in the wastes and any changes to that inventory over the long-term that must drive the design, operation, closure and eventual abandonment. Volume considerations can only be addressed once the inventory of the hazards is known.</p> <p>The authors must provide a table that addresses both the initial hazardous content (inventory) and the changes to that inventory resulting from the decay (radioactive, chemical and biological), and potential releases to the environment.</p>
73.	3-8	Table 3.2.1-1	Phase 1 and 2 Waste Types and Volumes	<p>The authors must explain what is meant by “Phase 1 and 2 Waste Types and Volumes”. What are the phases?</p>
74.	3-8	Table 3.2.1-1	Phase 1 and 2 Waste Types and Volumes	<p>See comment 71 above. These volumes have very little meaning with respect to the risks associated with the radiological and chemical content of the wastes.</p> <p>The authors must revise to provide estimates of both the radiological and the chemical content of these wastes. Although a volume estimate should be easily obtained, these estimates are of little value. To demonstrate protection of the biosphere in the long-term, estimates of the actual inventories are required.</p>
75.	3-9	3.2.1	<p>General Comment</p> <ul style="list-style-type: none"> Failure to provide information about the waste characterization procedures. 	<p>The authors fail to describe the waste characterization procedures, processes, etc. Further, they do not even provide even a short summary (at least none that I could find). (See also Comment 66 above).</p> <p>Since the authors state “<i>waste characterization [is] essential</i>” (see Comment 76 below), an omission of this magnitude is more evidence that to support the conclusion that the EIS report is fundamentally flawed.</p>

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76.	3-9	3.2.2	<p>Waste Acceptance Criteria</p> <p><i>“The WAC, along with adequate waste characterization, are essential for ensuring only waste with acceptable physical, radiological, and chemical characteristics is emplaced in the ECM.”</i></p>	<p>If waste characterization is essential, then, under the definition of a Designated Project under the Canadian Environmental Assessment Act (2012), this would be an activity incidental to the project. To quote the Act:</p> <p><i>“designated project means one or more physical activities that: ...</i></p> <p><i>It includes any physical activity that is incidental to those physical activities...”</i></p> <p>The authors must address the essential activity of waste characterization is addressed within the scope of this project and thus addressed in the EIS.</p> <p>(See also Comments 63 and 66 above)</p>
77.	3-9	3.2.2	<p><i>“..., the WAC are developed for the following purposes:</i></p> <ul style="list-style-type: none"> <i>• provide quantitative limits (applicable to the disposal of radioactive waste in the ECM) that are protective of workers, the public and the environment;</i> [emphasis added] 	<p>In Section 6.4.4.2, <i>Chronic Exposure from Living in a House and Farming on Top of the Engineered Containment Mound</i>, the authors explicitly state that the estimated exposure to a farmer residing atop the mound will be higher than the regulatory dose limit. The only conclusion is that in developing their WAC for this facility, the authors have failed to meet their purpose which is clearly stated here.</p> <p>A failure of this magnitude precludes any serious evaluation of this section that describes development of the WAC by the authors.</p> <p>Again, this is more evidence to support the conclusion that the EIS report is fundamentally flawed.</p> <p>(See also Comments 141 to 148 below)</p>

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78.	3-9	3.2.2	<p><i>“The development of the WAC is based on the interpretation and application of IAEA guidelines, relevant regulations and WAC documents from other approved similar waste disposal sites. In addition, the WAC are based on Canadian Standards Association (CSA) standards, and CNL’s strategic planning and stakeholder workshops.”</i></p>	<p>Without appropriate references to the documents, processes, standards, and procedures this assertion has no merit.</p> <p>Since developing the WAC for a disposal facility is critical to the protection of workers, the public and the environment including the post-closure period, I am surprised that the authors (who represent a reputable consulting firm) would not provide these references.</p> <p>I note that in my comments on the Project Description (Comments (& Observations) on the Revision to the “Project Description - Near Surface Disposal Facility at Chalk River Laboratories” (Registry Number 80122) CEAA document number 116478E), I provide a short summary of the WAC for the Low-Level Waste Repository in Cumbria, UK. (The authors cite this repository as an example of proven technology, Section 2.5.2.1.1 (see Comment 44 above))</p> <p>Since this repository is a cited as an example of “<i>approved similar waste disposal sites</i>”, it comes as a bit of surprise that the authors have provided no evidence that the WAC for this UK facility were even considered for their propose mound. Note: the UK facility requires the wastes to be pre-treated before disposal.</p> <p>The authors must provide more detail as to how the WAC were developed. An assertion is not good enough for a critical requirement for a radioactive waste disposal facility.</p> <p>This is one more piece of evidence to support the conclusion that the EIS report is fundamentally flawed.</p>
79.	3-9	3.2.2	<p>General Comment</p> <ul style="list-style-type: none"> • Failure to provide sufficient information regarding the WAC 	<p>Since the authors have provided minimal information as to the “<i>quantitative limits ... that are protective of the workers, the public [or] the environment</i>”, a basic requirement of the WAC, I cannot justify spending any more time reviewing this section.</p>
80.	3-9	3.2.2	<p><i>“Requirements relating to ensuring Criticality Safety and potential constraints on the quantities of fissile material and hazardous chemicals were considered using separate analyses. Other, operational safety objectives, such as WWTP operations and compliance with the ALARA principle were considered. It was concluded that these requirements can be met through appropriate design measures and operational systems and should not impact radiological limits for WAC.”</i></p>	<p>The authors (who represent a reputable consulting firm) need to explain why they would even consider that disposing of fissile materials in a mound is acceptable.</p> <p>They also need to explain how “<i>appropriate design measures and operational systems</i>” will ensure that the quantity of fissile material emplaced in the mound will not “<i>impact [the] radiological limits for the WAC</i>”</p>

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81.	3-9	3.2.2	“Requirements relating to ensuring Criticality Safety and potential constraints on the quantities of fissile material and hazardous chemicals were considered using separate analyses.”	The authors need to provide details as to the “separate analyses” that were used to ensure “potential constraints on the quantities of fissile material and hazardous chemicals” (see Comment 80 above).
82.	3-10	3.2.2.2	Radiological Characteristics <ul style="list-style-type: none"> • “limited concentrations of fissile materials, such that criticality safety can be assured during the NSDF Project operations and post-closure; 	The authors need to explain why disposing of fissile materials in a mound facility is acceptable (see Comment 80 above).
83.	3-13	3.3.1	Design Requirements	I find it somewhat disconcerting that although the authors cite IAEA <i>Technical Considerations in the Design of Near Surface Disposal Facilities for Radioactive Waste</i> (2001), they do not include it in their list of references for this section in Section 12. This is indicative of the authors’ lack of QA.
84.	3-13	3.3.1	<p>“Protection of future generations – radioactive waste shall be managed in such a way that predicted effects on the health of future generations will not be greater than relevant levels of effects that are acceptable today.” And</p> <p>”Burdens on future generations – radioactive waste shall be managed in such a way that will not impose undue burdens on future generations.”</p>	<p>See Section 6.4.4.4.2, and Table 6.4.4-5.</p> <p>It appears that the design of this fails to meet these two fundamental principles.</p> <p>This is one more piece of evidence to support the conclusion that the EIS report is fundamentally flawed.</p> <p>Since the authors have not demonstrated that their proposed design will meet these two principles, a fundamental requirement, I cannot justify spending any more time reviewing this section.</p>

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85.	3-14	3.3.2	<p>Strategic Requirements</p> <p>“... provide for the long-term safety, and provide an acceptable level of protection, to the public and the environment.”</p>	<p>See Section 6.4.4.4.2, and Table 6.4.4-5 and Comment 141 below.</p> <p>The footnote to this sentence is:</p> <p><i>A substantial amount of the waste would exceed unconditional clearance levels after 500 years. The Safety Analysis Report demonstrate that even after failure of some of the design features, the wastes do not present a risk to the public and environment... .</i></p> <p>The authors state that the institutional control period ends at year in the year 2400, at which time the public will have free access to the site. In other words, the site will be released unconditionally. And yet the authors admit that in 500 years they cannot meet this requirement.</p> <p>To quote the CNSC policy statement given in P-290:</p> <p><i>d) The predicted impacts on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision;</i></p> <p>Just another example of where the authors have failed to meet the requirements they have set for themselves.</p>
86.	3-15 to 3-75	3.4 thru to 3.12	<p>General Comment</p> <ul style="list-style-type: none"> • Failure to meet the self-imposed principles. 	<p>See Comments 83 to 85 above.</p> <p>The authors need to ensure the design of the facility meets the principles that they supposedly have set for themselves.</p> <p>Since the proposed design cannot meet the principles referred to above, except for a couple of egregious examples (see Comments 87 and 89 below), I can see little benefit in reviewing the Sections 3.4 through to 3.12</p>

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87.	3-21	3.5.2.5	<p>Berms</p> <p>“Berms form the outer boundaries and sidewalls for most of the perimeter of the ECM and make the ECM a containment system. <u>They are formed of soil or rock and compacted. ... Heights of the berms vary from 1 m to 15 m...</u>”</p>	<p>In this section, the authors state that the berms will be formed of soil or rock and compacted. I am not sure how a berm constructed of rock would provide any containment for the wastes in the mound. But then the authors state:</p> <p><i>The inside face of the berm will be covered with the various liner system layers, while the outer face will be covered with the intrusion barrier rockfill over geomembrane, geotextile cushion and geogrid. The top of the berm is covered with various layers of granular A material, geomembrane and geotextile cushion with the top layer granular A becoming the top of berm roadway.</i></p> <p>That said, I am somewhat surprised that the berm will be 15 m high in some places. Although the authors never give the height of the mound, in recent newspaper ads, the proponent the mound will be 18 m high.</p> <p>For an 18 m high mound, a 15 m berm does not seem credible.</p> <p>I note that none of the figures in the EIS report depicts the berm, although a road on the top of the berm is shown in several “plan” figures.</p> <p>What is the source of the materials for these berms? (See Comment 89 below.)</p>
88.	3-21	3.5.2.5	<p>General Comment</p> <ul style="list-style-type: none"> • Depictions of the Berm – See Ref: Golder Associates, “Groundwater Flow Modelling of the Near Surface Disposal Facility 60% Design”, 232-509249-REPT-001, Rev 0, Feb 2017. 	<p>At the bottom of Figure 4.1, in this reference, a cross section of the mound including the berm is shown. I note that the liner for the mound extends to the crest of the berm on the waste side. In other words, any leachate from the wastes within the berm will not be collected in the Leachate Collection System (see also Comment. 89 below).</p> <p>Somewhat problematic with what is depicted in this cross-section is that the cover does not extend past the crest of the berm. I suspect that the surface water run-off from the cover will also percolate through the berm, adding even more contaminants in the berm’s leachate.</p> <p>Then there is the problem of the berm roadway 87 above). The berm road is not shown in this figure.</p> <p>What is most troubling is the EIS Report and the same consulting firm (Golder Associates) wrote this reference.</p> <p>Sorry, but this is strong evidence not enough time has been spent reviewing the documents to ensure consistency. This puts into question the credibility of the reports authored by this consulting firm.</p>

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89.	3-47	3.6.1.2.7	<p>Waste Placement by Waste Type Type 1 Waste - Soil and Soil-Like Waste <i>“This material may also be used as berm material for berm containment areas used to contain Type 3, 4, and 5 wastes.”</i></p>	<p>I find this statement totally incredible.</p> <p>The authors need to justify why the containment berm (see Comment 87 above) can also function as the waste repository.</p> <p>What would the WAC be for the wastes to be used in the berm?</p> <p>Further, I cannot find anywhere in the EIS where the leachate collection system extends below the wastes to be emplaced in the berm.</p> <p>I can only conclude that the wastes within the berm will not be contained. Essentially the authors have described a facility that is designed to fail before it is even constructed.</p> <p>This is another example as to why this proposed undertaking is totally unacceptable.</p>
90.	3-67	3.10.4.1.2	<p>Infiltration Barrier Component of Cover System <i>“The geomembrane ... is also expected to prevent or limit the upward migration of radon and other landfill gases from the waste fill into the atmosphere.”</i></p>	<p>One (rather disturbing) example of the lack of following simple safety principles as identified in Comment 86 above is the sentence quoted in the column on the left.</p> <p>If <i>“the upward migration of radon and other landfill gases ... into the atmosphere”</i> is prevented or limited, where do those gases go? I suggest they would build up under this geomembrane. Two obvious events are possible, both of which will be catastrophic.</p> <ul style="list-style-type: none"> • First, the membrane will break from the internal stresses from the buildup of the gases, accompanied by a sudden release of radiologically contaminated gas. • Second, since the landfill gas is likely to be mostly methane (from the anaerobic decomposition of the organics), the buildup of the explosive gas will result in an explosion and fire that will be accompanied by releases of more radioactively contaminated particulates

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91.	3-75	3.13.1	<p>CNL’s Safety Policies and Objectives</p> <p><i>“The following policies will be followed for all NSDF Project activities:</i></p> <ul style="list-style-type: none"> • <i>quality assurance;</i> 	<p>I regret to say that this document fails to meet simple quality assurance standards. A few examples come to mind.</p> <ul style="list-style-type: none"> • The list of references in Section 12 is incomplete. For example, CNL’s document describing the <i>Integrated Waste Strategy</i> is missing. (see also Comment 49 above). • The format used for the references is inconsistent • Design life for the mound is inconsistent (see Comment 52 above) • The Section 3.3.1, <i>Design Requirements</i> does not cite the IAEA design document, although it is cited as a reference elsewhere (see Comment 83 above). • Appendix 4.1 is missing (see Comment 109 below) • The lack of basic modelling QA demonstrating that the models chosen are appropriate for this project (see Comment 119 below) • Inappropriate use of significant figures (see Comment 121 below) • Depictions of the project footprint differ among the figures (see Comment 130 below). • Some references are wrong (see, for example, Comment 136 below) • The reference document, Performance Assessment, 232-509240-ASD-001, lacks even simple QA (see Comment 144 below). • The Performance Assessment document contains circular references to the EIS (see Comment 145 below) • Page 10-1 is missing from both the hard-copy and electronic versions of the EIS (see Comment 156 below).
92.	3-75	3.13.1	<p><i>”c) Releases of radiological substances to the environment will be first prevented, then mitigated, and then accommodated such that exposures are limited and are ALARA.”</i></p>	<p>See Section 6.4.4.4.2, and Table 6.4.4-5 in the EIS, and my corresponding Comment 141 below</p> <p>Given that the WAC are designed to be as broad as possible, prevention is not one of the safety objectives for this project. To quote from Section 3.2.2:</p> <p><i>“Radiological limits for WAC were determined in a manner designed to ensure that NSDF can meet safety objectives while maximizing potential range of suitable waste.”</i></p> <p>The authors need to ensure all project activities meet <i>CNL’s Safety Policies and Objectives.</i></p>

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93.	4-1	4.0	<p>Public and Aboriginal Engagement Activities</p>	<p>I note that nowhere in this section (nor in the appendices) does CNL address the comments received on the <i>Project Description</i> that are posted on the Canadian Environmental Assessment Registry.</p> <p>As part of the requirement to engage the public in proposed activities subject to an Environmental Assessment under CEAA 2012, all comments received are posted to the registry.</p> <p>I note that these comments raise significant issues with this proposed undertaking that essentially have been ignored in this report. In fact, they have been repeated word for word (as one example see Comment 28 above)</p> <p>This approach indicates that CNL is responsive to public comment it selects (specifically those that support their decision). For a radioactive disposal project with the potential for very long-term human health, environmental and socio-economic consequences, this attitude is not acceptable.</p> <p>The authors must revise this section to address the comments received on the <i>Project Description</i> document. At least acknowledge that there are significant technical issues with this proposed undertaking that an informed public has identified. To ignore these issues in this document is deliberately deceptive.</p>
94.	4-3	4.3.1.1.1	<p>Public Information Sessions</p> <p><i>“CNL also developed poster boards with the intent to educate and prompt discussion about the NSDF Project. Poster boards were developed for the following topics and are provided in Appendix 4.0-1”</i></p>	<p>I note that the Poster Boards in Appendix 4.0-1 appear to be a mixture of the Posters used at the Public Information sessions and those downloadable from the CNL website.</p> <p>Of the 7 posters from the June session, the 6th one is missing. Of the 10 posters from the October session, posters 1, and 5 are missing. Since none of the posters in this Appendix refers to the session in which they were used and several were not reproduced, it is not clear the purpose for including them.</p> <p>Since these posters could have been reproduced from those available on their website, CNL must have consciously decided as to what to include in this Appendix. I regret I can only conclude that this is a deliberate attempt to mislead. However, I am at a loss to determine what this accomplishes.</p>
95.	4-3	4.3.1.1.1	<p>“Additionally for the October public information sessions: ...</p> <ul style="list-style-type: none"> • <i>What will the facility look like?”</i> 	<p>Since the figures from the October session posters do not depict a mound, I suggest that CNL did not answer this question and show what the facility will look like.</p>

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96.	4-4	Table 4.3.1-1	Public Information Sessions Dates and Locations	<p>Two columns in this table are of special interest to me since I attended the four local sessions, the two in Deep River and the two in Chalk River. The two columns are, “Attendance” and “Comments Received”.</p> <p>CNL has chosen not to provide the details of the comments received, but has only summarized them along with other “feedback” in Figure 4.3.1-1 (which summarizes this feedback in using a bar graph).</p> <p>From my firsthand knowledge of one of these sessions (Deep River, June 21, 2016), I provided several CNL individuals, including a member of CNL’s Communications staff the comments on this project that I had submitted to the CNSC June 14th, 2016. I also provided an AECL staff member a copy of my CNSC submission.</p> <p>So, where would my comments appear in Figure 4.3.1-1? I am not sure, since they covered many topics, several of which are not listed in this figure. However, the last bar, entitled “Indicated dissatisfaction with information”, could summarize them all.</p> <p>If this is true, then this figure is deliberately misleading, since it makes no distinction regarding the details of any comment received. As one single example, in my comments to the CNSC on the March Project Description, I stated that the facility did not meet the 4 key points as given on CNL’s website at that time. (The website has been updated since the June session).</p>
97.	4-7	4.3.1.1.6	<p>Media Coverage</p> <p><i>“The local media reported on the NSDF Project fourteen times between May and December 2016, as documented in the Table 4.3.1-2. Local media coverage of the NSDF Project was generally favourable and contained facts informed by CNL’s communication products and subject matter experts.”</i></p>	<p>I find this statement disingenuous. Since the journalists were reporting on what was told to them by CNL and CNL’s subject matter experts, of course media coverage will be favourable. As far as I am aware, no local media have the technical experts to question CNL’s assertions regarding this proposal.</p> <p>Pushback on CNL’s assertions can only come from a public that is informed about the technical issues. As such, the comments received on the <i>Project Description</i> as posted on the Canadian Environmental Agency Registry is a better reflection of the issues that an uninformed public would present. (See Comment 93 above). Yet, the authors have failed to address those comments.</p> <p>The authors must revise the EIS to address all comments received, including those submitted on the Project Description.</p>

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98.	4-7	4.3.1.1.6	<p>Media Coverage <i>“It should be noted that the four letters to the editor noted here did not support the NSDF Project. The author of the first letter also attended two public information sessions, discussed their views on the NSDF Project Description and formally provided comments to the CNSC. The other authors of letters also attended information sessions”</i></p>	<p>Although I appreciate that I was not identified by name, I am the one that submitted that letter to the editor. Somewhat disingenuously, CNL did not state that I provided them copies of my submission to the CNSC at that time (See Comment 96 above).</p> <p>Of all the letters to the editor identified in Table 4.3.1-2, only one was not included in Appendix 4.0-14, and that is the first letter <i>“Disposal’ projects will have long term consequences.”</i></p> <p>Further, the author of the other letter also voiced their opposition to the project and also submitted comments to the CNSC.</p> <p>The authors must revise this paragraph to address the mistaken connotation that objections to this project are limited to a few individuals.</p>
99.	4-7	4.3.1.1.6	<p><i>“CNL collaborated with these stakeholders to establish a workshop agenda and date for a Technical Meeting designed to permit these authors direct access to NSDF Project subject matter experts for a Q&A session and discussion. This Technical Meeting was held on January 19, 2017.”</i></p>	<p>I am most disappointing that CNL has chosen not to summarize the results of this Technical Meeting. I along with others attended this meeting. I note that a facilitator conducted this session, and notes were taken. In other words, CNL should have had no problem in producing a summary of that meeting.</p> <p>Note: On Jan 20th, CNL staff committed to producing a summary of that session (email reference available on request). About 5 months later, (May 15th) CNL Communications provided a summary of the session to the participants.</p> <p>Many of the technical issues raised by various organizations and individuals through their comments on the <i>Project Description</i> (and posted on the CEA Registry web site) were raised during this session. Comparing the May 15th summary to the EIS, none of the technical issues have been addressed in the EIS.</p>

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100.	4-8	Table 4.5.4-2	Media Coverage for the NSDF Project (May to December 2016)	<p>This table lists various media coverage articles with respect to the proposed undertaking. Further, Appendix 4.0-14 provides the details with respect to most of what is listed in this table.</p> <p>That said, one letter to the editor of the North Renfrew Times (Row 4 (June 29, 2016) entitled “<i>Disposal’ projects will have long term consequences</i>”) is not included in the Appendix.</p> <p>If one parses the first few sentences of the paragraph quoted below, I can only conclude that this omission was deliberate.</p> <p><i>“It should be noted that the four letters to the editor noted here did not support the NSDF Project. The author of the first letter also attended two public information sessions, discussed their views on the NSDF Project Description and formally provided comments to the CNSC. The other authors of letters also attended information sessions”</i></p> <p>Whether or not the authors of the EIS are aware of all the writers of those letters to the NRT, I should point out the same person that wrote the June 29th letter also wrote the November 23rd and the December 7th letters (and I should know because I was the author of all three).</p> <p>Since the June 29th letter posed several questions with respect to this proposed undertaking, I take its omission as more evidence that the authors are not interested in engaging in public dialogue.</p>

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101.	4-8	4.3.1.1.7	Newsletters	<p>I note that a copy of the June 2016 Contact is included in Appendix 4.0-15. On page 2 of that newsletter, the following is a quote from the section that provides examples of “Proven Technology”</p> <ul style="list-style-type: none"> • <i>Fernald Preserve, Hamilton, Ohio, USA</i> • <i>Integrated Disposal Facility, Richland, Washington, USA</i> • <i>Low Level Waste Repository, Cumbria, United Kingdom</i> • <i>Centre de L’Aube, France</i> <p>Since the examples of “Proven Technology” cited by the authors is always changing, I suggest that the authors cannot find any suitable examples. Therefore, any example can be used in the hopes that no one will check. (See also Comment 44 above).</p> <p>I take this as more evidence that the authors do not understand what is actually being proposed. Further, they have not submitted their documents to appropriate quality assurance.</p> <p>The inconsistencies in the examples provided among all the documents, represent a desperate attempt to support the authors’ assertion that what is being proposed “is proven”. Any case that remotely resembles an engineered containment mound can be cited as proof that preferred option is correct.</p> <p>With respect to the quality issue, this is even more disturbing. Who is checking to see whether the examples cited are in anyway similar to the proposed mound? I cannot accept that if the appropriate QA were in place, the authors (who represent a reputable consulting firm) would not have done the appropriate checks. However, this is evidence that the QA associated with the production of this document is non-existent.</p>
102.	4-8	4.3.1.1.9	Fact Sheets	<p>I note that neither version of these Fact Sheets (See Appendix 4.0-17) discuss the classes of radioactive wastes destined for disposal in this facility. This is of concern since IAEA guidance states a mound facility is not suitable for the disposal of LLW and ILW. (see Comment 16 above).</p> <p>They both provide the justification for this undertaking as “... accelerate a significant reduction in liabilities on CNL sites ...”</p> <p>Both claim the project is “... proven, environmentally sound safe ...” However, the evidence to support that assertion has yet to be provided.</p> <p>In other words, these are fact sheets are mislabelled. They are “assertion sheets”</p>

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103.	4-9	4.3.1.2	<p>Summary of Issues Raised and Responses Provided</p> <p><i>“A more detailed description of the feedback received to date and CNL’s responses are provided in Appendix 4.0-22.”</i></p>	<p>I note that this section does not represent a comprehensive summary of the issues raised, since it does not address the comments on the <i>Project Description</i> posted on the CEA Registry website. Nor does it address the issues identified during the Jan 19 Technical Meeting. (See Comments 93 above and 99 above)</p>
104.	4-9	4.3.1.2.1	<p>Pubic Feedback</p> <p>“The main themes of the feedback received to date ... include</p> <ul style="list-style-type: none"> • <i>Engineering containment mound construction materials (clay),,,”</i> 	<p>Actually, this statement is incorrect. Unless I am mistaken, the mound will be constructed of the wastes emplaced therein.</p> <p>I am not aware of where CNL proposes to obtain the clay. It certainly is not available on the CRL site.</p> <p>According to the report <i>Subsurface Geotechnical Survey of the Proposed Near Surface Disposal Facility at Chalk River Laboratories</i> (CNL Document number 232-10180-ASD-001), the soils at the CRL site consist of topsoil, fine sand and silty sand, and sandy silt to silty sand till.</p> <p>The authors must correct this assertion.</p>
105.	4-9 and 4-10	4.3.1.2.1	<p><i>“The main themes of the feedback received to date ...”</i></p>	<p>I note that the main themes listed in this section do not match those in Figure 4.3.1-1. The authors must be consistent.</p>
106.	4-10	Figure 4.3.1-1	<p>Written Comments Received for the Near Surface Disposal Facility Project.</p>	<p>This figure is misleading since it represents a frequency distribution only (a count of the number of comments received according to a “Theme” classification).</p> <p>Just because there were 8 comments that supported the project plan is not related to the technical, safety and potential environmental impacts of the proposed undertaking.</p> <p>For example, one comment concerned “Highly Enriched Uranium”. This comment has no meaning with respect to the wastes that are proposed for the ECM. Therefore, it may be of interest, but it is not relevant.</p> <p>For a true comparison among the comments, CNL must apply a weighting factor.</p> <p>The authors must delete this figure, as it is meaningless.</p>

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107.	4-12 to 4-22	4.3.2	Aboriginal Engagement	<p>The considerable number of First Nations engagement events is very impressive. However, a perusal of descriptions of these events given in Table 5.3.2-1, and the Appendices indicate that their intent was to announce the project, not engage the participants in any serious discussions.</p> <p>In other words, the First Nations engagement activities are all quantity with very little quality.</p> <p>The authors must truly engage First Nations in determining their issues, not just providing information about the project.</p>

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108.	5.1	5.0	Environmental Effects	<p>This section essentially reiterates the requirements of the CEAA and the CNSC guidance document.</p> <p>However, a cursory examination of the figures presented in this section suggest that the location chosen for the mound is not the optimum spot. Below are five examples that demonstrate why the location chosen is not appropriate. This list is by no means exhaustive.</p> <ul style="list-style-type: none"> • Figure 5.3.1-1 (page 5-87) depicts the chosen location as actually bring in a wetland (or as a minimum surrounded by wetlands), and yet most of the site is not near wetlands. In fact, the chosen location is about 50 meters from a surface stream that discharges directly into the Ottawa River. (see Figures 5.3.1-14, 5.3.2-3, 5.4.1-1, 5.4.1-2, 5.4.1-3, and many others) • Figure 5.6.4-5 (page 5-305) depicts the Canada Warbler Habitat for the complete laboratory site. I note that this bird frequents the location for the mound. As depicted in this figure, this bird does not frequent large areas of the CRL site. Therefore, the rationale for choosing this location for the mound escapes me. From the figure, the western end of the site would be much better. Why was this location not considered? • Figure 5.6.4-9 (page 5-321) depicts the habitat for the Golden-Winged Warbler. I note that there are several locations on the laboratory site that are not frequented by this bird. Yet again, the location selected for the mound is likely habitat for this bird. • Figure 5.6.4-11 (page 5-329) depicts the habitat for bats. Again, there are large areas of the site that are shown in this figure that are not bat territory. Again, the location chosen for the mound is bat habitat. • Figures 5.6.4-13 and 5.6.4-14 depict the critical habitat for the Blanding’s Turtle. It is somewhat disturbing that 65% (i.e. 22 ha/34 ha) of footprint of the proposed facility is critical habitat for this species. Although it is not clear from Figure 5.6.4-13, other locations on the Chalk River site are likely be less disruptive of the habitat of this endangered species. I am very disappointed that the authors did not conduct a more thorough investigation of alternative locations with the goal to minimize any potential impact to this turtle. A cursory examination of these figures suggest that there are locations for which the impact would be less than 22 ha. <p>I am surprised that the authors (who represent a reputable consulting firm) would not have noticed that, with respect to these species, the location chosen for the mound is not optimal.</p> <p>Since the location selected for the mound is not optimal, I can see no benefit to reviewing this section.</p> <p>This is an example that supports the conclusion that reviewing the Environmental Effects section is essentially meaningless.</p>

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109.	5-2	5.1.1	<p>Scope of the Assessment <i>“Input from engagement for the NSDF Project is used to identify the key issues that were raised during the engagement process (Section 4.0). Issues identified during community information sessions and considered in the development of the EIS are summarized in Appendix 4.1. Comments received, the responses prepared, and the degree to which these comments are considered resolved are also presented in Appendix 4.1. These issues and the response to these issues are presented in the ‘Scope of the Assessment’ heading within each discipline section, and helped to guide the scope and development of the assessment for each discipline.”</i></p>	<p>I regret that I cannot find Appendix 4.1.</p> <p>I take this example as further evidence of the lack of a quality assurance process. (See also Comment 91 above).</p> <p>Since this Appendix is missing, it is impossible to verify that any comments received during the “engagement process” have been addressed.</p> <p>This is another example that supports the conclusion that reviewing this EIS report is futile.</p>

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110.	5-13	5.1.3.1	<p>Spatial Boundaries Local Study Area (LSA)</p>	<p>The authors use several definitions of the boundaries for the various study areas. The Local Study Area (LSA) is essential to the evaluation of potential impacts to the workers. Therefore the LSA must include those areas where the building to be decommissioned and the contaminated soils are located'</p> <p>Apparently the authors have completely ignored the fundamental reason for this project</p> <p>For example, many of the buildings to be decommissioned contain both radiological and non-radiological contaminants. Destroying and/or dismantling these buildings will be a significant source of contaminated dusts. As such these activities present a risk to the workers charged with decommissioning the buildings. In addition, transporting the wastes to the waste disposal facility, and dumping the wastes into the mound, are also a source of these contaminated particulates.</p> <p>Depending on the methods used to clean-up contaminated sites, the likelihood of generating contaminated particulates is higher. Excavation and transportation activities associated with cleanup are a significant source of particulates.</p> <p>I suggest that the authors have deliberately selected the activities to be included in the EIS to minimize the potential adverse effects from the implementation of this project. If these decommissioning and site clean-up activities are not within the scope of the project, then this undertaking cannot be justified. These activities are fundamental to the scope of the project. Without these, there is no need for this undertaking.</p> <p>The authors need to expand the project scope to include all waste generation activities.</p>
111.	5-15	5.1.3	See quote in Comment 110 above.	<p>In this definition, the authors focus on “future decommissioning and reclamation activities” as “Reasonably Foreseeable Developments”. However, the environmental effects of this project will occur from the current “decommissioning and reclamation activities”. They are, after all, the real reason for this undertaking. (See also Comment 117 below)</p> <p>Yet, the authors do not include these current activities as part of the assessment of project including cumulative effects.</p> <p>Since the authors’ assessment of cumulative effects is lacking a significant contribution to the impacts of this undertaking, the overall conclusions of the EIS are suspect.</p>

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112.	5-15	5.1.3.1	<p>Definition of RSA</p> <p>“Regional Study Area (RSA): the RSA is defined as the area within which the <u>maximum geographical extent of potential indirect effects of the Project</u> may interact with the effects of other existing or reasonable foreseeable projects.”</p>	<p>From Clause 5.2.2 of the CNSC guideline, Generic Guidelines for the Preparation of an Environmental Impact Statement, May 2016:</p> <p><i>“The EIS will describe the spatial boundaries, including local and regional study areas, of each VC to be used in assessing the potential adverse environmental effects of the project and provide a rationale for each boundary. Spatial boundaries will be defined by taking into account, but not limited to, the following criteria:</i></p> <p><i>a) the physical extent of the proposed project, <u>including any offsite facilities or activities</u> ...” [emphasis added]</i></p> <p>To quote from Section 1.1, <i>Project Overview</i>:</p> <p><i>“A few percent of the waste volumes to be placed in the ECM will be from offsite sources (e.g., <u>Whiteshell Laboratories</u>, commercial sources such as hospitals and universities).”</i></p> <p>Then there is Section 2.2.2, <i>Intermediate Level Waste & Low Level Waste</i> where it states:</p> <p><i>“At Whiteshell Laboratories (WL), and the Douglas Point and Gentilly-1 prototype reactor sites, these wastes will be segregated, packaged to meet transport requirements, and shipped to CRL for either disposal at the NSDF or placement in long-term storage pending availability of the ILW Repository ...”</i></p> <p>My understanding of the CNSC guideline is that the packaging at and transportation of the wastes from these sites destined to be disposed of at the proposed disposal facility would be considered “offsite activities”. Therefore, the boundaries of the Regional Study Area must include the segregation and packaging activities at the Whiteshell, Douglas Point and Gentilly-1 sites, and the associated transportation routes.</p> <p>As far as I can determine, the boundary of the RSA as provided in the EIS report, does not include these “<i>offsite facilities or activities</i>.” This omission renders the conclusions of the assessment contained in the EIS report questionable.</p>

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113.	5-14, 5-85, 5-193, & 5-447	5.1.3.1	<p>Spatial Boundaries Regional Study Area (RSA)</p>	<p>The Regional Study Area (RSA) is essential to the evaluation of potential impacts to the public. Therefore, the RSA must include areas off the CRL site (see Comment 112 above). Apparently, from the various definitions given for the RSA in the EIS, that is not the case.</p> <p>The following four examples are not intended to be complete listing.</p> <p>On Page 5-14 the definition of RSA is given as:</p> <ul style="list-style-type: none"> • <i>Regional Study Area (RSA): the RSA is defined as the area within which the maximum geographical extent of potential indirect effects of the Project may interact with the effects of other existing or reasonable foreseeable projects.</i> <p>On Page 5-85 it is given as:</p> <ul style="list-style-type: none"> • <i>Regional Study Area (RSA): The RSA is defined as the area within which the potential effects of the NSDF Project may interact with the effects of other existing or reasonably foreseeable projects. The RSA for geology is determined by the spatial extent of the Perch Creek watershed, and includes the Perch Lake and Perch Creek basins to be consistent with the other aquatic disciplines.</i> <p>Then on Page 5-193 a slightly different definition is given</p> <ul style="list-style-type: none"> • <i>Regional Study Area (RSA): The RSA is defined as the area within which the potential effects of the NSDF Project may interact with the effects of other existing or reasonably foreseeable projects. The RSA for hydrology is determined by the spatial extent of the Perch Lake watershed, and includes Perch Lake and its tributaries, and Perch Creek. Although the Ottawa River near the mouth of Perch Creek is included in the RSA, the river beyond this location lies outside the boundary of the assessment.</i> <p>Then on page 5-447 it has this definition</p> <ul style="list-style-type: none"> • <i>Regional Study Area (RSA): The RSA is defined as the area within which the potential effects of the NSDF Project may interact with the effects of other existing or reasonably foreseeable projects. Non-human biota near the engineered containment mound (ECM) could be exposed to airborne and waterborne emissions as well as direct gamma radiation from the waste. Residual contaminants from the Waste Water Treatment Plant (WWTP) effluent will be most concentrated with the East Swamp Stream due to dilution in Perch Lake, Perch Creek and the Ottawa River. Doses to non-human biota exposed to the aquatic habitat of East Swamp Stream were calculated to provide a bounding estimate of potential exposure. Therefore, the RSA was adapted from the air quality study area as this is the largest extent of potential cumulative effects on ecological health; the air quality RSA is defined as an approximate 10 kilometre (km) by 10 km rectangle surrounding the LSA, and oriented parallel to the Ottawa River. The listing above is not exhaustive, but it is indicative of a</i>
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				<p><i>problem with this EIS. It appears that the spatial boundaries change to suit the environmental effects being evaluated.</i></p> <p>This latter definition is the most egregious of the examples, since it proves the authors have not appropriately defined the RSA. This is especially since true several tables (such as Table 5.7.4-3) report results of measurements “Beyond Regional Study Area”. Further, these “Beyond Regional Study Area” locations are all within the circular boundary for estimating the site Derived Release Limit (DRL) in accordance with the Site License.</p> <p>By restricting the RSA to this 10 km rectangle (see Figure 5.7.3-1), the authors have deliberately excluded assessing the potential environmental impact to residents that live downstream from the proposed location of the mound. This is unacceptable, since any accidental spill of contaminated liquids will reach Perch Creak and be discharged directly into the Ottawa River.</p> <p>To be consistent with the Site License, the authors must reassess the potential environmental effects of this undertaking to meet the DRL requirements of that license.</p> <p>Since the authors change the definition of the RSA to suit whatever argument they wish to present, it is very difficult to assess the environmental effects of the project. For example, the RSA does not match the region included evaluated in the DRL model (i.e. normal operations at the site). Therefore, I can see no benefit to reviewing these sections.</p> <p><u>Note:</u> Figures 5.7.4-4 and 5.7.4-5 depict the region monitored to ensure doses are below the public dose limit (i.e. the DRL). Most of the monitoring points shown in these figures are outside the 10 km boundary of the RSA (Figure 5.7.3-1).</p>

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114.	5-15	5.1.3.	<p>Assessment Cases “Reasonably Foreseeable Developments (RFD) Case – <i>this scenario represents predictions of the cumulative effects of the Application Case, which includes the Base Case, plus projects that are currently under application review or that have officially entered a regulatory application process, and are therefore, considered reasonably foreseeable. In addition, effects from the future decommissioning and reclamation activities to be completed at the CRL site are also considered as part of the RFD Case.</i></p>	<p>I can understand why the authors wish to limit an assessment of cumulative effects to developments that are reasonably foreseeable. However, what is reasonably foreseeable to one group may not be the same as that for another. That said, the authors have not even identified a development to which they refer.</p> <p>Figure 2.2-1, Overview of Canadian Nuclear Laboratories Integrated Waste Strategy depicts several “Disposition Routes” for the various “Waste Types”. In this figure, CNL specifically identifies an ILW Repository.</p> <p>(Although I suggest that the IWS depicted in this figure is inadequate, (See Comments 17, 18, and 21 to 24 above), for this section and all sections that refer to the Reasonable Foreseeable Developments, I will take this figure as a given.)</p> <p>Therefore, the Intermediate Level Waste Repository must be considered as one of the “Reasonably Foreseeable Developments.”</p> <p>However, in reviewing these RFD sections, the authors make no mention of this repository. Since the authors never refer to a ILW repository as a RFD, any assessment of “cumulative effects” must be considered incomplete, inadequate and deliberately misleading.</p> <p>The authors need to revise their assessment of “cumulative effects” to include, as a minimum, the ILW repository.</p> <p>This is another example as to why reviewing the EIS report is somewhat pointless.</p>

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115.	5-16	5.1.5	<p>General Comment</p> <ul style="list-style-type: none"> • Identification of Project Interactions and Mitigation lacking. 	<p>All the wastes originate from somewhere. About 76% of these wastes will be will be soils from site remediation activities and construction type wastes from decommissioning activities. (See Section 3.2.1.1, <i>Waste Types</i> and Table 3.2.1-1, <i>Phase 1 and 2 Waste Types and Volumes</i>)</p> <p>However, the authors have chosen to ignore these activities in their in their pathway analysis. Although I can understand this omission, if one does not include the waste generation in the scope of the project. However, this appears to be disingenuous.</p> <p>According to the authors' definition of <i>Reasonably Foreseeable Developments</i> (Section 5.1.3.3), these activities would be included, specifically in the assessment of cumulative effects.</p> <p>Since these activities must be included in the assessment of cumulative effects, then the identification of project interactions and the associated mitigation measures must address these activities.</p> <p>Since the identification of project interactions and mitigation measures is incomplete, the overall conclusions of the EIS are dubious.</p>
116.	5-17	5.1.5	<p>Project Interactions and Mitigation</p> <p>Last paragraph last sentence</p> <p><i>“A matrix table is included in Appendix 5.1-1 summarizing Project interactions for each VC that are determined to be no linkage, secondary, or primary, after consideration of environmental design features and mitigation.”</i></p>	<p>A simple parsing of Table 5.1-1-1: <i>Project Interactions with Valued Components – Biophysical Environment and Human Health</i> from Appendix 5.1-1 suggests at least two omissions.</p> <ul style="list-style-type: none"> • First, the <i>Site Security</i> in the column <i>Key Project Component/Activity</i> is only related to one project phase, <i>Construction</i>. My understanding is that <i>Site Security</i> has to be in place throughout the complete project up until the end of Institutional Control. • Second, the table does not include the phase, post institutional control. This is a critical aspect of considering residual effects, since that is the eventual end-state of the facility. <p>In other words, the authors have not considered all potential interactions. As such, the identification of mitigation measures is unlikely to be complete.</p> <p>Since the identification of mitigation measures is incomplete, the overall conclusions of the EIS are questionable.</p>

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117.	5-25	5.2.1.1	<p>Atmospheric Environment Scope of the Assessment <i>“The indicator compounds emissions from the NSDF Project include suspended particulate matter (SPM), particles nominally smaller than 10 µm in diameter (PM10), particles nominally smaller than 2.5 µm in diameter (PM2.5), carbon monoxide (CO), sulphur dioxide (SO2), nitrogen oxides (NOx) expressed as nitrogen dioxide (NO2).”</i></p>	<p>I note that spatial boundaries for this assessment do not include the destruction, demolition and dismantling of the over 100 buildings on the Chalk River site. Further, the clean-up of the contaminated soils (the volume of which as given Table 3.2.1-1 is 370,000 m³) will be a much larger source of particulates than anything listed in Table 5.2.1-9</p> <p>As such, this evaluation of the project’s impact on the atmospheric environment cannot be valid.</p>
118.	5-17	5.1.6	<p>General Comment</p> <ul style="list-style-type: none"> Without specifics about mitigation measures, one cannot assess Residual Effects. 	<p>I am puzzled. Without identifying the specific mitigation measures, I cannot determine whether there are any residual effects. (See Comment 47 above)</p>

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119.	5-19	5.1.7	<p>Prediction Confidence and Uncertainty</p>	<p>A critical aspect of predicting through models is the processes and procedures to calibrate, verify and validate the models used. (See Section 7.6.2 of the CNSC Regulatory Guide, G-320, <i>Assessing the Long Term Safety of Radioactive Waste Management</i>.)</p> <p>Another essential aspect of modeling is sensitivity testing (that is, determining which of the model parameters contribute to the largest changes to the output).</p> <p>I am aware that the authors have chosen two models RESRAD and IMPACT to predict potential effects. However, they have provided no evidence that demonstrates that these are the best models for the scenarios subject to this impact evaluation. This is not acceptable.</p> <ul style="list-style-type: none"> • First: the authors need to discuss the criteria used to select these models, along with the results from the testing of these and several other predictive models against those criteria. In other words, they need to prove the chosen models are the best for the situation being modelled. • Second: the authors must provide the results of the basic quality assurance tests to which the models were subjected. The assertion, “<i>Numerical uncertainty in the selected models has been evaluated through model validation</i>”, (which is repeated in several tables) is not sufficient. There is no evidence that the tests used to validate the models are in anyway comparable to the scope of this project. <p>The authors (who represent a reputable consulting firm) must know that since each project is unique, the modelling requirements will be project specific. As such, the verification and validation of any off-the-shelf model must be tested against those distinctive aspects of the particular project. Without that project specific testing, all the author’s conclusions are suspect.</p> <p>This is another example of why reviewing this EIS report is a waste of time.</p>
120.	5-25	5.2	<p>Atmospheric Environment</p> <p>“... <i>Particulates emissions, which are also referred to as fugitive dust, can also be a nuisance issue over which the public is concerned. ...</i>”</p>	<p>I am surprised that the authors (who represent a reputable consulting firm) would suggest that particulates are “nuisance issue”. PM₁₀ and PM_{2.5} are significant health issues.</p>

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121.	5-37	Table 5.2.1-5	2014 Air Emission Totals for Industries within 25 km of the Local Study Area	<p>Although there are several other tables in the document that point to a real problem. The numbers in this table are reported to three decimal places. To obtain this accuracy is virtually impossible.</p> <p>In order to verify these numbers, I tried to obtain the EIS reference identified as ECCC 2016. In Section 12 of the EIS, this references is given as:</p> <p><i>Environment and Climate Change Canada (ECCC). 2016. National Pollutant Release Inventory Pollution Data and Reports. http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1</i></p> <p>The problem is, the link that is given in that reference is to the 2015 report (not the 2014 report as stated in the EIS). Further, the results are reported to typically 2 significant figures, nowhere near the 5 as reported in this table.</p> <p>As the authors state, these numbers are only estimates, calculated using emission factors. The authors need to correct these estimates.</p> <p>It appears the authors do not understand the meaning of “Significant Figures”. Nor do they seem to care that when reporting results, the number of figures is critical to understanding the difference between results obtained from actual measurement and those generated using emission factors.</p> <p>This is another example of the lack of quality.</p>
122.	5-49	Tables 5.2.1-9 & 5.2.1 -10	<p>Summary of Average Emission Rates during the Construction Phase &</p> <p>Summary of Maximum Emission Rates during the Construction Phase</p>	<p>In the first table, the average emission rate (in kg/day) for the particulates for the construction activities is SPM – 3.11, PM₁₀ – 1.56, PM_{2.5} – 0.23.</p> <p>In the second table, the maximum emission rate (in kg/day) for the same particulates for the construction activities is SPM – 3.11, PM₁₀ – 1.56, PM_{2.5} – 0.23.</p> <p>Not quite sure how a maximum is equal to the average unless there is only one measurement.</p> <p>This is another example of the lack of quality.</p>

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123.	5-56	5.2.1.7	Prediction Confidence and Uncertainty	<p>The greatest contributor to any prediction confidence and uncertainty is the changes to technology. According to the authors, this facility will be operational for 50 years.</p> <p>Let us consider what that 50-year timeline means to technology changes. If one takes the year 1967 as representative of a starting point to assess the impact of time to technology development, then one can expect that in 50 years from now the available technology will not be the same. Further, changes to that technology will significantly impact on any releases to the atmosphere.</p> <p>Extrapolating from the previous 50 years to the next 50 years, I expect the greatest impact will be on transportation and heavy equipment use.</p> <p>The authors need to reassess their predictions to include an evaluation of technology change.</p>
124.	5-64	5.2.1.10	<p>Conclusions</p> <p><i>“The predicted residual effects air quality were estimated to increase because of the NSDF Project. <u>Vehicle exhaust and fugitive dust from unpaved roads is the largest contributor to particulate matter (SPM, PM₁₀, and PM_{2.5}) during both the construction and operations phases.</u>”</i></p>	<p>Since the authors have essentially ignored the dumping of wastes and contaminated soils on the mound, they consider that “<i>the largest contributor to particulate matter</i>” is “<i>Vehicle exhaust and fugitive dust from unpaved roads.</i>” Surely, the dumping of decommissioning wastes and contaminated soils into the mound is a much larger source of particulates.</p> <p>Further, the demolition of the buildings and the cleanup of the contaminated sites is another source of particulates that will be much higher than vehicle exhaust and roads.</p> <p>Then, the authors have chosen not to include these activities within the scope of the project. This is not acceptable.</p>
125.	5-64	5.2.1.10	<p><i>“Vehicle exhaust and fugitive dust from unpaved roads is the largest contributor to particulate matter (SPM, PM₁₀, and PM_{2.5}) during both the construction and operations phases.”</i></p>	<p>See Comment 123 above. Changes to transportation technology will likely result in changes to vehicle exhaust.</p>
126.	5-66	5.2.2	<p>General Comment</p> <ul style="list-style-type: none"> <i>The authors continually use emission rates when evaluating GHG emissions</i> 	<p>The use of emission rates when evaluating the impact of greenhouse gas emissions is deliberately misleading. It is not the rate at which the gases are emitted, it is the total mass emitted that produces the climate change.</p> <p>As such, all conclusions related to the evaluation of the GHG emissions are questionable.</p>

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127.	5-67	5.2.2.2	<p>Valued Components <i>“Greenhouse gases was selected as a VC as there is a potential for the NSDF Project activities to release GHG emissions that could contribute incrementally to climate change ...”</i></p>	<p>I am puzzled. I do not understand how greenhouse gases could be considered a valued component. This suggests that increasing this valued component would be a benefit. However, that is clearly not the case.</p> <p>This statement points to the authors’ confusion with respect to their evaluation of the environmental impacts of greenhouse gas emissions from the mound.</p>
128.	5-69	5.2.2.3.2	<p>Temporal Boundaries (Top of page) <i>“For the purposes of the GHG assessment, only the construction and operation phases have been considered.”</i></p>	<p>Since the evaluation of greenhouse gases emissions must be related to the total mass released (see Comment 126 above), the temporal boundary must be expanded to include the closure, post-closure and institutional control phases.</p>
129.	5-79	Table 5.2.2-12	<p>Classification of Predicted Residual Adverse Effects on Greenhouse Gases for the Application Case</p>	<p>The authors need to explain why, after the Greenhouse Gases have been released, the predicted residual adverse effects are reversible.</p>
130.	5-489	Figure 5.7.4-11	<p>Existing Surface Contamination in the Perch Lake Wetland West and South of the NSDF Project Site</p>	<p>This figure shows the footprint for the mound project that is considerably different from the other figures in the report (see for example Figure 5.7.4-7).</p> <p>The authors need to ensure that when a figure includes a depiction of the footprint for the project that these representations are consistent across all figures.</p> <p>This is another example of the authors’ disregard of for the quality of their document.</p>

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131.	5-607	5.10	Socio-economic Environment	<p>I am very uncomfortable with this element of the EIS, especially since the authors focus on the short-term aspects of the project (the construction and operations, approximately 50 years). Since this is a proposal for a disposal site, the long-term aspects are considerably more important (the 300 years of institutional control and beyond). I recognize an assessment of the socio-economic environment over this time frame is extremely difficult. However the authors do not even acknowledge this difficulty, focusing only on the short-term.</p> <p>Then there is another disturbing aspect. The reason for this project is will likely result in a significant decrease in the employment at the Chalk River Site. To quote from Section 2.3:</p> <p><i>The purpose and urgency of the NSDF Project is rooted in the requirements established by Atomic Energy of Canada Limited (AECL), on behalf of the Government of Canada, to substantially reduce the risks associated with the CNL legacy wastes ... liabilities and the cost of laboratory operations to taxpayers in the 10-year period 2016 to 2025, and to create the conditions for the revitalization of the CRL property.</i></p> <p>From this statement, I deduce that this project is integral to the implementation of this overall purpose. The result of which I suggest will be a reduction in the staffing levels at Chalk River.</p> <p>That said, recall that the revitalization of the site would fall within the authors, definition of a “Reasonable Foreseeable Development”, and yet this aspect is ignored in this particular assessment.</p> <p>If the employment at the site is significantly reduced as a result, the socio-economic impact to the local communities may make these communities unsustainable past the 50-year operational window of the proposed undertaking.</p> <p>The authors cannot ignore the long-term “cumulative” effects on the socio-economic environment resulting from the decommissioning of the over 120 buildings on the Chalk River site.</p> <p>Until the authors address the long-term consequences to the socio-economic environment of this proposed undertaking, reviewing this section has little benefit.</p>

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132.	6-1	6.1	<p>Regulatory Context</p> <p>The Canadian Nuclear Safety Commission (CNSC) Regulatory Policy P-290 (CNSC 2004) includes the following requirements:</p> <ul style="list-style-type: none"> • <u>the management of radioactive waste is commensurate with its radiological,</u> chemical and biological hazard to the health and safety of persons and the environment and to national security; and, • <u>the measures needed to prevent unreasonable risk to present and to future generations from the hazards of radioactive waste are developed, funded and implemented as soon as reasonably practicable.</u> 	<p>I note the quote from the CNSC document P-290 that is included in the EIS misses a significant policy requirement. To quote:</p> <p><i>5.0 Policy Statement</i></p> <p><i>When making regulatory decisions concerning the management of radioactive waste, it is the policy of the Canadian Nuclear Safety Commission to consider the extent to which the owners of the waste have addressed the following principles:</i></p> <p><i><u>The generation of radioactive waste is minimized to the extent practicable by the implementation of design measures, operating procedures and decommissioning practices ...</u></i></p> <p>I cannot find any information in the EIS as to how CNL is minimizing the wastes that require management (which in this case is disposal).</p> <p>What measures are proposed to reduce the volume of the wastes that need to be disposed of in the ECM?</p> <p>(See also Comments 23 above & 24 above)</p> <p>With respect to the managing the wastes in a manner that is commensurate with its hazards, I cannot understand why CNL decided to use its self-defined waste types instead of using the waste classes as defined by international best practice, IAEA, GSG-1, <i>Classification of Radioactive Waste</i>. (See Comment 67 above) The five IAEA waste classes are based on their radiological hazard, whereas the CNL waste types are not.</p>
133.	6-4	6.3.2	<p>Identification of Hazards</p>	<p>In their identification of potential malfunctions and accidents, the authors have reviewed many projects and guidance documents. However, their review was limited to the identification of hazards. By limiting the review to hazards, the authors missed identifying events.</p> <p>One obvious event that occurs on a somewhat regular frequency in this area that is missing in this Section is a power failure.</p> <p>The authors must ensure the accidents and malfunctions they have identified for assessment includes rather obvious ones such as power failures.</p>

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134.	6-5	Table 6.4.1-1	Bounding Hazard Scenarios for Assessment	<p>I note that all transportation accidents subject to assessment listed in this table occur “onsite”. Yet, the authors state that some of the wastes to be emplaced in the mound will originate from locations are several hundred to thousands of kilometers distant from the Chalk River site (see Comments 112 above and 137 below).</p> <p>The authors need to expand the “Bounding Hazard Scenarios” to include the offsite hazards.</p> <p>Otherwise, the conclusions from this assessment are questionable.</p>
135.	6-6	Table 6.4.1-1	Row - Criticality	<p>If the wastes to be emplaced in the mound are limited to VLLW, LLW and some ILW, then fissile materials will be excluded. If they are excluded, the authors need to explain how a critically accident can occur.</p> <p>In other words, a criticality accident is not credible. (See also Comment 149 below)</p>
136.	6-7	6.4.3	<p>“... For this assessment, the dose criteria from the IAEA Safety Requirements (IAEA 2012) are used ...”</p>	<p>The reference provided here (IAEA 2012) is wrong. The actual reference should be IAEA. 2011. <i>Disposal of Radioactive Waste</i>. IAEA SSR-5. April 2011. ISBN 978-92-0-103010-8</p>

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137.	6-8	6.4.4.1	<p>Fire Engulfing Radioactive Waste Packages During the Handling and Emplacement of Wastes within the Engineered Containment Mound</p>	<p>The authors provide the following as the accident scenario.</p> <ul style="list-style-type: none"> • a transportation vehicle carrying ten radioactive waste packages is involved in a postulated fire; • the fire lasts for one hour; and, • the nearest public receptors are assumed to 3 kilometres (km) away from the scene, which is the distance from the proposed NSDF Project site to closest cottage residents. <p>Several aspects of this scenario are somewhat problematic</p> <ul style="list-style-type: none"> • First – the transportation accident is only related to incidents on the Chalk River site. However, in Section 2.2.2, the authors state that wastes from external sites such as Whiteshell, Douglas Point, Gentilly will likely be disposed of in the Mound facility. Therefore the assessment of accident scenarios must address offsite transport accidents (see also Comment 112 above) • Second – on what basis is the estimated duration of the fire “one hour”? • Third – if the accident occurs on the offsite transportation routes, then the nearest public receptor could be within several meters of the event, including the emergency personnel. It is extremely unlikely these personnel would be considered “Nuclear Energy Workers”. <p>I suggest that this accident scenario is inadequate. Thus, the results of assessment as described in the EIS are incomplete.</p>
138.	6-9 & 6-18	6.4.4.2 & 6.5.3.2	<p>Fire in Temporary Waste Accumulation Area</p>	<p>I am a bit surprised that there could be a fire in the temporary waste accumulation area since I cannot find anywhere in the project description where this area is defined.</p> <p>This leads me to wonder whether there are other omissions in the project description. Since the project description does not identify this area, the authors have not provided a complete description of the undertaking. Therefore, any conclusions as to the potential environmental impacts of the project are incomplete.</p>
139.	6-9 & 6-18	6.4.4.2 & 6.5.3.2	<p>General Comment</p> <ul style="list-style-type: none"> • The authors fail to include all aspects of the project. 	<p>See Comment 138 above. Where is this temporary waste accumulation area? How large is this “facility”? What are the potential impacts to the health and safety of persons, and to the environment? Etc.</p> <p>What are the other “facilities” that the authors have yet to identify?</p>

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140.	6-12	6.4.4.4	<p>General Comment</p> <ul style="list-style-type: none"> The two “intrusion” events are not credible. 	<p>This section discusses two intrusion events, one from drilling and one from a farmer living on top of the mound. Both these events are not credible.</p> <p>All one has to do is to compare the human activities at the Chalk River location about 300 years ago, (i.e. in the year 1700) with those occurring today. Extrapolating from today to 300 years from now is essentially the same process only in reverse.</p> <p>It is not for me to speculate on what will be the situation at the mound site 300 years from now, but it is extremely unlikely that it will be drilling or farming as we know it today (see also Comment 143 below).</p>
141.	6-14	6.4.4.4.2	<p>Chronic Exposure from Living in a House and Farming on Top of the Engineered Containment Mound</p> <p><i>“In the event of an inadvertent human intrusion from living and farming on top of the ECM during the Post-Institutional Control period (i.e., after the year 2400), ...”</i></p>	<p>I am confused. How does an “<i>inadvertent ... intrusion</i>” result in a chronic exposure?</p> <p>As I understand the term “inadvertent”, this is an accidental event resulting in an acute exposure.</p> <p>I am surprised that the authors (who represent a reputable consulting firm) would suggest that an “inadvertent” intrusion could be considered chronic. The use of the term “inadvertent” for a chronic exposure is deliberately misleading (see also Comment 142 below).</p>
142.	6-14	6.4.4.4.2	<p>Chronic Exposure from Living in a House and Farming on Top of the Engineered Containment Mound</p> <p><i>“In the event of an inadvertent human intrusion from living and farming on top of the ECM during the Post-Institutional Control period (i.e., after the year 2400), ...”</i></p>	<p>I am surprised that the authors (who represent a reputable consulting firm) would suggest that an “inadvertent” intrusion would occur after the site was released from all control measures. The use of the term “inadvertent” in this context is deliberately misleading.</p> <p>The rationale for suggesting an intrusion event occurring after all controlled access to the site ceases is given in the reference, CNL, <i>Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement</i>, 232-509240-ASD-001 Revision R0, 2017. In Section 2.4, <i>Inadvertent Intrusion</i>, it states:</p> <p><i>Neither the legal dose limit of 1 mSv/y nor the licensing dose limit of 0.3 mSv/y to members of the public apply to doses resulting from inadvertent human intrusion.</i></p> <p>While this may be true when access to the site is controlled, it cannot be true when site assess is not secured.</p> <p>Thus to make the claim that the legal limit does not apply to evaluating an intrusion event, the authors need to assert that any intrusion occurring after the site has been released must be considered “inadvertent” (or accidental). This assertion is just not credible. No controlled access means all access (including intrusion) is possible.</p> <p>The authors must revise this scenario to be more credible. Intrusions can only be “inadvertent” during the period when access to the site is controlled.</p>

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143.	6-14	6.4.4.4.2	Exposures to others besides farmers. What about archeologists?	<p>I note the scenario addresses a single occupation that of a farmer living on top of the mound. However, I suggest that a farmer may not be the appropriate representative person. Since this is a mound, I suggest that one occupation that would be more attracted to a waste mound is the archeologist. That occupation would be excavating the mound for historic artefacts.</p> <p>The authors need to consider potential exposures to other credible occupations such as an archeologist. Note any intrusion by an archeologist will be intentional.</p>
144.	6-14	6.4.4.4.2	<p>The reference - CNL, Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement, 232-509240-ASD-001 Revision R0, 2017.</p>	<p>Although this comment could be considered outside the scope of the EIS, I have included it because it points to a very disturbing trend with this whole proposal. I am referring to the lack of simple quality assurance in the reference cited in this section. That reference is: CNL, <i>Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement</i>, 232-509240-ASD-001 Revision R0, 2017.</p> <p>Essentially the QA in this reference is non-existent. For example, Table 6.4.4-5 in the EIS is almost an exact copy of Table 8-10 provided in the reference. The authors of that document claim that the results were calculated using the modeling software RESRAD 3.1.</p> <p>What is most troubling is that the author of the Performance Assessment did not provide a sample calculation such that their results can be confirmed independently. For example, what were the input parameters (such as, the chemical, radiological and physical characteristics of the wastes)?</p> <p>Given these calculated results feed into decisions regarding what is necessary to protect the health and safety of persons and the environment well after access to the site is no longer restricted, this lack of QA is not acceptable</p> <p>An additional example of the disregard for simple QA comes from perusal of the reviews list given on the two pages after the cover page. The author is also listed as a reviewer. Sorry, but that is just not appropriate. Authors cannot review their own work.</p>

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145.	6-14	6.4.4.4.2	<p>The reference - CNL, Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement, 232-509240-ASD-001 Revision R0, 2017.</p>	<p>Further, several references are circular. It is not clear to me how the EIS report can refer to a performance assessment document that then includes the reference back to the EIS report: The following are the circular references from the Performance Assessment report.</p> <p><i>[1-5] Environmental Impact Statement for the NSDF Project. 232-509220-REPT-001</i></p> <p><i>[3-4] Environmental Impact Statement for the NSDF Project. 232-509220-REPT-001.</i></p> <p><i>[8-3] Environmental Impact Statement for the NSDF Project. 232-509220-REPT-004. 2017 March.</i></p> <p>I note that the publication date for the PA document is March 2017, the same as the EIS.</p> <p>This circular reference scheme puts into question the evaluations and the resultant conclusions contained in both the EIS and the PA reports.</p> <p>The credibility of the authors is questionable.</p>

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146.	6-15	Table 6.4.4-5	Dose to Farm Resident from Chronic Exposure	<p>I note that the resident would receive this annual dose from an “inadvertent” (or accidental) intrusion after all site access controls have ceased. However, as stated in Comment 141 above, this scenario is not credible.</p> <p>Are these estimated exposures As Low As Reasonably Achievable (ALARA)? I doubt it. To meet the ALARA principle I would expect to see the authors propose some credible mitigation measures. Those I found are:</p> <p><i>“... the NSDF Project will be designed to provide a range of protective measures, including:</i></p> <ul style="list-style-type: none"> • <i>site recognition;</i> • <i>waste recognition;</i> • <i>markers and placards; and,</i> • <i>passive barriers.</i> <p>I regret to say, that none of these “passive” measures will last 10 years let alone the hundreds to thousands of years listed in the table. In other words, this is not ALARA. None of these will result in any reduction in an exposure.</p> <p>Maybe if the authors were serious in ensuring exposures to this hypothetical farmer are ALARA, then they be addressing the required protection up front. Since the WAC for the facility are not yet defined, the authors can address predicted emissions and exposures by ensuring the WAC address the long-term safety of persons beyond the institutional control period.</p> <p>(See also Comment 77 above)</p>
147.	6-15	Table 6.4.4-5	Dose to Farm Resident from Chronic Exposure	<p>Other ways to ensure the hypothetical farmer does not receive a dose above the public dose limit would be to extend the “Institutional Control” period to a time in which that dose limit would not be exceeded. However, from the table, that period would have to exceed 100,000 years. An institutional control period beyond several hundred years is just not credible.</p> <p>My only conclusion is, if the authors wish to license this facility, then they must revisit their proposed undertaking and implement appropriate mitigation measures to ensure the public dose limit is met beyond the period when access to the site is no longer controlled.</p>

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148.	6-15	Table 6.4.4-5	<p>General Comment</p> <ul style="list-style-type: none"> All doses exceed the licensing limit of 0.3 mSv/year and the public dose limit of 1 mSv/year 	<p>An examination of the numbers under the column “Total dose (mSv/year)” suggests some unsettling issues the authors fail to consider.</p> <ul style="list-style-type: none"> First – all doses exceed the public dose limit before the site is released from control. What are the expected doses before that release? Given the 500 years of radioactive decay that would occur before that release, I suspect they would likely be higher. Second – over the period listed here, there is an increase in dose to a maximum occurring after 66,000 years. The only sources for these doses is the wastes within the mound. Since there is only one source (all be it, heterogeneous), what would be the cause of this increase? I suspect it is the long-lived radionuclides. If this is true, then the wastes being proposed for disposal in mound are unacceptable (see Comments 3 and 14 above). There can be no justification for these levels of exposure after the institutional control period. Third – the authors state that this facility is designed to accept LLW with a small volume of ILW. From the IAEA definition of LLW, this waste consists of primarily radionuclides with relatively short half-lives. The total activity from these nuclides should have decayed away to much lower than the public dose limit by the time access to the site is no longer controlled. Yet, the doses are increasing. This suggests to me that this “small volume” of ILW is actually a large source of long-lived radioactive nuclides. <p>I regret to say, the authors (who represent a reputable consulting firm) do not appear to take their responsibilities seriously. As a member of the public, I find their lack of responsibility extremely troubling.</p>
149.	6-16	6.4.4.5	<p>Criticality</p>	<p>My understanding is that a criticality event will require fissionable materials to be present in relatively high concentration. If the WAC are defined appropriately, and the concentration of the nuclides in the wastes confirmed that they meet these WAC, then the concentration of these fissionable materials in the mound will not meet the requirement for a criticality event.</p> <p>In other words, a criticality event in the mound is not a credible accident.</p> <p>The fact the authors have decided to assess this even as credible speaks to the lack of believable waste acceptance criteria.</p> <p>The authors need to explain how fissionable materials will end up in the mound.</p>

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150.	6-21	6.6	Emergency Preparedness	<p>As stated above (see Comments 112 and 137 above), wastes to be emplaced in the proposed facility will be transported from locations several hundreds to several thousand kilometers from the Chalk River site.</p> <p>In the list of procedures and programs listed in this section, there is one glaring omission. Which of these programs are set up to respond transportation accidents in some of the remote locations through which the wastes will be transported?</p> <p>The authors must address the potential for offsite transportation accidents and malfunctions.</p>
151.	7-2	7.3.1	Atmospheric Environment <i>”... environment Regional Study Area (RSA) (i.e., within 10 kilometres (km) of the CRL site) ... “</i>	<p>This paragraph is misleading. For example it states that the RSA is limited to within 10 km of the site, except in assessment of Greenhouse gas emissions, Section 5.2.2.3.1 states: <i>The spatial boundaries for the GHG assessment are considered to be beyond regional as the predicted residual adverse effect of GHG emissions <u>is considered global in nature</u>,</i></p>
152.	7-8	7.3.9	Socio-economics	<p>The focus this cumulative effects assessment is on the short-term impacts of this project on the socio-economics of the local region (see Comment 131 above). This is totally inadequate. Further, the only “reasonably foreseen development” case considered is the NPD project. Not quite sure why, since in Table 7.2-1, this is only one of the six projects listed.</p> <p>The authors need to ensure that all RFD projects are assessed for their cumulative effects to the socio-economics of this locality.</p>
153.	8-1	8.0	Summary Of Significance Of Residual Effects	<p>Since the comments above are evidence that the assessment of the environmental impacts from the proposed waste mound is inadequate, the credibility of any “residual effects” is questionable. Therefore, there can be no benefit from reviewing this section.</p> <p>The authors must adequately address the flaws within the EIS before they can expect reviewers to spend their time evaluating the “residuals”.</p>
154.	9-6	9.2	Forest Fires	<p>Although forest fires are a rare event, over the life-time of the project (300 to 500 years depending on the timeframe chosen, see Comment 12 above), that rare event becomes a certainty.</p> <p>I would suggest that at least one of those events will be similar to the wildfire at Fort McMurray. As such, the assessment provided in this section is totally inadequate.</p>

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#	Page	Sect'n	EIS Quote or Reference	Comment/Question
155.	8-12	9.5	Glaciation	The authors state that the cover will fail in 300 years (see Comment 12 above). At that point, the wastes will no longer be contained in the mound. Thus, any assessment of glaciation events beyond this date are meaningless, unless the wastes within the mound exceed clearance levels. However, according to the footnote on Page 3-14, that is exactly what the authors state (see also Comment 12 above).
156.	10-1	10	Page 10-1 is missing	In both the electronic and hard copy versions, this page is missing. This is another example of the lack of quality in this document. NOTE: This page was distributed via email from the CNSC, May 25 th , after the original comment closing date of May 17 th .
157.		The EIS	General Comment <ul style="list-style-type: none"> • The EIS would not pass for a quality high school report 	<p>As the reader of my comments above will discern, I have found reviewing the EIS very frustrating. I sometimes wonder whether a document like this would even pass for a quality high school report (although the pictures are pretty).</p> <p>As a former teacher, I can confidently state that this report would not be acceptable. There are just too many discrepancies (see Comment 91 above).</p> <p>Therefore, providing further comments is unlikely to be of any benefit.</p> <p>The proponent must cease this farce and go back to the very beginning.</p>

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158.		The EIS	<p>General Comment</p> <ul style="list-style-type: none"> • There can be no justification for the President and CEO of CNL to denigrate those who may not agree with CNL's proposed undertaking during the review period. 	<p>In his talk to the Petawawa Town Council (early May 2016), Mr. Lesinski, President and CEO of CNL, is quoted as saying, "<i>There have been out there some non-scientific alternative truths.</i>" (See the full report at - http://www.thedailyobserver.ca/2017/05/04/nsdf-will-be-a-safe-operation-council-hears).</p> <p>I find it especially disturbing that a President and CEO of a company would publicly disparage those who are questioning what his company is proposing in the middle of a review process.</p> <p>His statement about "non-scientific alternative truths" goes well beyond normal ethical behaviour. By his statement, he is questioning the whole review process, including the role of the affected public, and especially the role of the CNSC.</p> <p>So, if the President and CEO of CNL cannot support an unbiased review process, then what is the benefit to participating in that process? Mr. Lesinski has publically stated he will consider all observations that do not support his assertions as "non-scientific alternative truths".</p> <p>Thus reviewing the EIS and the pretense of hosting and participating in public engagement activities is a huge waste of everyone's time and of taxpayer's money.</p> <p>Therefore, I can no longer take part in CNL's charade by further commenting on the EIS. However, I will participate in the review of the CNSC's EA report, and any subsequent hearings.</p> <p>In conclusion, I suggest that Mr. Lesinski's statement demonstrates his willingness to sacrifice anything (including safety) to obtain his objective.</p> <p>Thus, in order for the CNSC to fulfill its motto. "<i>We will never compromise safety</i>", I urge the regulator to intervene in this process, and call a halt.</p>