

**REGDOC-2.11.1, Volume I: Comments received in advance of the workshop with civil society organizations and members of the public**

**REGDOC-2.11.1, tome I: Commentaires reçus en vue de l’atelier avec des organisations de société civile et les membres du public**

**Note:** Comments submitted, including names and affiliations are intended to be made public, in the official language in which they are received.

**Remarque :** Les commentaires reçus, y compris les noms et les affiliations, seront rendus publics, dans la langue officielle dans laquelle ils auront été reçus.

	<b>Organization / Organisation</b>	<b>Section</b>	<b>Comment / Commentaire</b>	<b>CNSC Response / Réponse la CCSN</b>
1.	Dr. Frank Greening		<p><b>Section 7.2 Waste Characterization</b>  <i>The licensee shall perform waste characterization at appropriate steps in the management of radioactive waste. Waste characterization shall include assessing the physical, mechanical, chemical, biological, thermal and/or radiological properties of the waste, as applicable. The licensee shall maintain detailed records of the relevant characteristics of the waste based on the characterization performed.</i>                      As someone who has worked for over 30-years as a radioanalytical chemist, I can say with certainty: <i>this license requirement is totally impractical.</i>                      Now, it <u>is</u> possible to carry out radiochemical analyses of selected CANDU feeder pipes, pressure tubes or end-fittings, and determine radionuclide concentrations that are applicable to many similar components, but a lot of CANDU waste is stored in plastic bags full of assorted “garbage” such as mop heads, rags, protective clothing, smears, plastic gloves, etc, etc. I would like to ask the CNSC how it proposes one should determine tritium, carbon-14, Cl-36, Ni-63, Sr-90, Tc-99, I-129, Pu-239, etc, in such waste. A simple “gamma-scan” won’t help because the radioactive species noted above are not gamma-active, and there are no instruments available that can non-destructively measure pure alpha or pure beta-active species <i>dispersed inside</i> large plastic bags.</p>	<p>REGDOC-2.11.1, Volume I requires that licensees implement and maintain associated programs and procedures to support the waste management program (e.g., waste characterization).</p> <p>Characterization serves to provide information relevant to the step in waste management or the stage in the facility lifecycle. At various stages of a facility or step in waste management, characterization that is more elaborate may be required and requested by the CNSC.</p> <p>In addition to the requirements stipulated in this REGDOC, additional requirements and guidance on waste characterization are provided in CSA 292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i>, which complements this REGDOC.</p> <p>CSA N292.0 outlines characterization methodologies, such as radioactivity measurements, radiochemical analysis and scaling factors that, as applicable, CNSC staff verify as part of licence application reviews and compliance inspections.</p> <p>As outlined in CSA N292.0, re-characterization shall be performed for existing radioactive material(s) in storage, in transition to storage or disposal,</p>

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			<p>To do a proper job, one has to carry out a complete combustion of an entire garbage bag, collect the off-gases, and analyze these gases as well as the remaining ash for their radionuclide content. It is true that this can be done for a few bags of waste – at great expense, (e.g. ~ \$1000 per bag) – but there are literally thousands of these bags <i>and they are all potentially quite different in chemical and radiochemical composition</i>. And besides, destructive analysis of radioactive waste defeats the purpose of its disposal. This has been a long-standing problem for CNL, OPG and Bruce Power, who have had to resort to highly uncertain “guesstimates” – frequently based on so-called <i>scaling factors</i> – to determine a waste facility’s radioactive inventory. But it should be noted that the <i>calculation</i> of an activity does not constitute <i>waste characterization</i> as I would read the intended meaning of item 7.2 above.</p> <p>However, using scaling factors to estimate radionuclide inventories is unacceptable for other reasons. Thus, consider the data presented in Tables 1 &amp; 2, below, which are based on <i>direct measurements</i> of smears collected on a variety of surfaces inside the vault of Bruce Unit 1 in 2008.</p> <p><b>Table 1: Radionuclide Activities Measured on Surfaces in the Bruce Unit 1 Vault</b> &lt;image001.png&gt;</p> <p><b>Table 2: Activity Ratios for Selected Radionuclides Listed in Table 1</b> &lt;image002.png&gt;</p> <p>The data in Table 2 show that many “difficult-to-measure” radionuclides such as tritium, C-14, Tc-99, Pu-239 and Am-241 exhibit highly variable activity ratios with respect to other easily analyzed, (i.e. gamma-active), species such as Co-60, and Cs-137. As a consequence, the scaling factor methodology of waste inventory determination for these radionuclides <i>is subject to very large uncertainties</i> and does not fulfill the requirements of Section 7.2 of REGDOC-2.11.1. – namely <i>to assess, (not assume!), the radiological properties of the waste</i>.</p>	<p>and in support of decommissioning, if existing information and records are insufficient (e.g., as specified in the Waste Acceptance Criteria-WAC of the receiving facility).</p> <p>REGDOC-2.11.1, <i>Waste Management, Volume III: Safety Case for Disposal of Radioactive Waste</i>, Version 2 states that uncertainties that remain in the safety case and that have implications on safety should be addressed through uncertainty and sensitivity analyses. Licensees or applicants are required to describe the treatment of uncertainty in the safety case and supporting assessment. For example, the uncertainty in the case of OPG DGR was handled by scenarios where the expected inventory is multiplied by orders of magnitude. The CNSC expects that the waste characterization provide confidence that the waste inventory, which acts as the source term in the safety case, is bounding the actual waste that will be emplaced.</p> <p>As a result of this comment, the requirement on waste characterization was revised to:  “‘The licensee shall perform waste characterization at appropriate steps in the management of radioactive waste. The characterization of radioactive waste shall include the principal radionuclides relevant to safety and assurance that the waste or waste package will meet the acceptance criteria for the appropriate steps in the management of radioactive waste. Waste characterization shall include assessing the physical, mechanical, chemical, biological, thermal and/or radiological properties, including dominant radionuclide content, of the waste, as applicable. The licensee shall maintain records of the relevant characteristics of the waste based on the characterization performed.”</p> <p>In REGDOC-2.11.1, Volume III, the safety case disposal system description requirements has been revised to explicitly include the waste acceptance criteria of the waste disposal system.</p>

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			<p>To illustrate just how unreliable the scaling factor approach to waste characterization is, consider the radionuclide inventory data published by OPG for its Deep Geological Repository in Report No. 00216-REP-03902-00003: <i>Reference Low-and Intermediate-Level Waste Inventory for the DGR</i>, issued December 2010. This OPG report provides tables of different types of radioactive waste packages and their radionuclide inventories determined either by direct measurement, typically by gamma spectrometry, or by the use of scaling factors.</p> <p>Table 3, below, provides examples of these waste packages and the proportion that were subject to direct analysis – the balance being characterized using scaling factors. It can be seen that in most cases over 95 % of the package activities were determined indirectly using scaling factors. However, OPG candidly admits that “<i>the validity of this approach is uncertain, ... and has not been confirmed</i>”.</p> <p><b>Table 3: Proportion of Waste Packages Analyzed Prior to Disposal in OPG’s DGR</b></p> <table border="1" data-bbox="604 857 1577 1377"> <thead> <tr> <th data-bbox="604 857 916 1045">Type of Waste</th> <th data-bbox="916 857 1220 1045">Number of Packages</th> <th data-bbox="1220 857 1486 1045">Number Analyzed</th> <th data-bbox="1486 857 1577 1045">Percent</th> </tr> </thead> <tbody> <tr> <td data-bbox="604 1045 916 1154">Bottom Ash (New)</td> <td data-bbox="916 1045 1220 1154">632</td> <td data-bbox="1220 1045 1486 1154">3</td> <td data-bbox="1486 1045 1577 1154">0.5</td> </tr> <tr> <td data-bbox="604 1154 916 1263">Baghouse Ash (New)</td> <td data-bbox="916 1154 1220 1263">172</td> <td data-bbox="1220 1154 1486 1263">3</td> <td data-bbox="1486 1154 1577 1263">1.7</td> </tr> <tr> <td data-bbox="604 1263 916 1377">Compact Waste</td> <td data-bbox="916 1263 1220 1377">1,383</td> <td data-bbox="1220 1263 1486 1377">7</td> <td data-bbox="1486 1263 1577 1377">0.5</td> </tr> </tbody> </table>	Type of Waste	Number of Packages	Number Analyzed	Percent	Bottom Ash (New)	632	3	0.5	Baghouse Ash (New)	172	3	1.7	Compact Waste	1,383	7	0.5	<p>As outlined in CSA N292.0, the WAC must consider the radionuclide content and radiological properties.</p> <p>REGDOC-2.11.1, Volume III requires that the limits, controls and conditions derived from the safety assessment for the waste include the waste acceptance criteria for individual packages as well as for the entire facility, and the acceptable waste inventory and/or the allowable concentration levels of radionuclides in the waste.</p>
Type of Waste	Number of Packages	Number Analyzed	Percent																	
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			Box Compacted	6,135	25	0.4				
			Non-Processible	22,591	85	0.4				
			Non-Processible Drummed	7,840	100	1.3				
			LL/ALW Resin	2,165	11	0.5				
			ALW Sludge	1,709	4	0.2				
			Moderator IX Resin	430	28	6.5				
			<p>But this brings us to another very important requirement of radioactive waste characterization – that of establishing <i>waste acceptance criteria</i> – an issue that is addressed in Section 7.3 of REGDOC-2.11.1. where we read:</p> <p><b>7.3 Waste Acceptance Criteria</b></p> <p><i>A licensee that receives waste shall develop waste acceptance criteria consistent with, and derived from, the site-specific safety case. The waste acceptance criteria shall specify the chemical, physical, radiological, mechanical, biological and other characteristics of the waste, waste forms, packages and unpackaged waste that will be accepted for handling, processing, storage, transport and/or disposal at the facility or location of the activity.</i></p> <p>Clearly, the radiochemical content of a waste package should constitute the basis of its acceptance, (or rejection!), by an interim waste storage or</p>							

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			<p>permanent waste disposal facility. Certainly, the US approach to radioactive waste acceptance, as laid out in its regulatory document 10 CFR Part 61, is to set specific limits on the concentration of selected radionuclides in a waste container. However, OPG notes in its Deep Geological Repository Report: <i>Reference Low-and Intermediate-Level Waste Inventory for the DGR: There is some uncertainty associated with gamma activity measurements of both boxed and drummed non-processible (NP) wastes. While gamma dose measurements are available for all packages, there are only a limited number of gamma spectroscopy measurements.</i></p> <p>This reveals the unfortunate fact that the only “characterization” of many waste packages stored at OPG’s WWMF – waste that is ultimately destined for permanent disposal in a DGR – is a single gamma dose rate measurement. Such a measurement provides <i>no information</i> on the radionuclide content of the package and therefore is of no use in deciding if a waste package meets waste acceptance criteria with regard to the presence of pure alpha or beta emitters.</p> <p>Before concluding this discussion, it is important to also note that CNSC Regulatory Guide G-320 entitled “<i>Assessing the Long-Term Safety of Radioactive Waste Management</i>”, issued December 2006, identifies a number of requirements of a waste depository safety assessment, including:</p> <ul style="list-style-type: none"> <li>(i) <u>Measured values</u> of radionuclide inventories should be used, whenever possible, in safety assessments.</li> <li>(ii) <u>Conservative calculations</u> should be used to provide a margin of safety so that radioactive inventory predictions never <u>underestimate</u> the actual inventories or potential risks of a waste repository.</li> <li>(iii) All software and equations used in an assessment <u>should conform to accepted quality assurance (QA) standards</u>. This means the calibration, verification and validation of software should be carried out using procedures and protocols <u>that may be reproduced by a third party</u>.</li> <li>(iv) <u>Validation and verification of software</u> used to describe radioactive waste <u>should ensure that the mathematical equations in the computer models</u></li> </ul>	

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			<p>simulate, with reasonable <u>accuracy</u>, the processes and conditions they are supposed to represent.</p> <p>(v) <u>All adjustable parameters</u> used in the mathematical equations of a model <u>should be set to minimize the differences between the calculated and measured responses of a system.</u></p> <p>Because these items are <u>mandated</u> by the CNSC, they <u>must</u> be addressed in license applications for the construction and operation of radioactive waste repositories. However, a review of such documents leads to the following conclusions with regard to past “characterizations” reported for CANDU waste components such as pressure tubes:</p> <p>(i) In many instances, reported radionuclide inventories are <i>calculated</i> values. Furthermore, even when measures activities are available, calculated values of the inventories are used.</p> <p>(ii) Many radionuclide inventories reported by OPG have been significantly <u>underestimated</u> when compared to actual (measured) inventories.</p> <p>(iii) The calibration, verification and validation of software are <u>not</u> carried out in accordance with procedures and protocols that could be reproduced by a third party.</p> <p>(iv) Most calculated activities have <u>not</u> been checked for consistency with measured data.</p> <p>(v) When calculated activities have been checked, they generally prove to be significantly <u>lower</u> than measured data.</p> <p>Based on these five points alone, past Environmental Impact Statements for CANDU waste disposal facilities have been in non-compliance with the requirements of CNSC Regulatory Guide G-320.</p> <p><b>Conclusions and Recommendations:</b></p> <p>In this submission, Volume I of the CNSC’s REGDOC-2.11.1 entitled <i>Management of Radioactive Waste</i>, has been reviewed and <u>two</u> items have been identified as requiring significant revision: (i) Section 7.2 on <i>Waste Characterization</i> and (ii) Section 7.3 on <i>Waste Acceptance Criteria</i>.</p>	

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			<p>Both items (i) and (ii) use the terminology “<i>radiological properties/characteristics of the waste</i>”, but fail to provide a definition of this phrase which can unfortunately mean different things to different people. For example, to a health physicist it would probably mean the <i>type and intensity</i> of radiation – alpha, beta, gamma or neutron – emanating from a sample. On the other hand, to a radiochemist it would imply a sample’s radionuclide content. Then there is the complication that a package may be subject to out-gassing with continuous release of tritium or <sup>14</sup>CO<sub>2</sub>, as has been observed with many packages at OPG’s WWMF.</p> <p>The bottom line here is that the requirement of a waste disposal facility operator to “<i>characterize the radiological properties of its waste</i>” is too vague and allows the operator license to simply measure the gamma radiation intensity coming off each waste package and thereby consider it to have been “characterized”. Under such an ill-defined protocol we are left with a totally inadequate waste acceptance criterion; namely, that a package only has to measure a radiation field of less than <i>x</i> mSv/hr to be “acceptable”. This is simply not good enough since it provides no information on, or protection from pure alpha and/or beta activities in the package.</p> <p>It is therefore recommended that REGDOC-2.11.1 should be re-written to include a definition of what “waste characterization” means and also to include a license condition that a radioactive waste facility operator should submit a detailed waste acceptance criteria statement for approval by the CNSC before a license to operate that facility is issued.</p>	
2.	Concerned Citizens of Renfrew County and Area		<p>Q #1. Article 11(iv) of the IAEA’s <i>Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management</i> (to which Canada is a Party) requires that Canada have “due regard to internationally endorsed criteria and standards.” The IAEA recently issued a report based on a peer review of Canada’s nuclear safety framework in which peer reviewers experienced “difficulties to find exact wording when searching where and by what provision individual requirements of the IAEA Safety Standards are addressed.” Has the CNSC made a systematic analysis</p>	<p>As part of the development of REGDOC-2.11.1 Volume I, CNSC staff conducted a thorough analysis of a number of IAEA standards, including:</p> <ul style="list-style-type: none"> <li>● GSR-5, <i>Predisposal Management of Radioactive Waste</i></li> <li>● GSG-1, <i>Classification of Radioactive Waste</i></li> <li>● SSG-40, <i>Predisposal Management of Radioactive Waste from Nuclear Power Plants and Research Reactors</i></li> <li>● SSG-41, <i>Predisposal Management from Nuclear Fuel Cycle Facilities</i></li> </ul>

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			<p>of how the IAEA’s requirements for safe radioactive waste storage in GSR Part 5, and requirements for safe disposal of radioactive waste in SSR-5, are addressed in the REGDOC? Can the CNSC share this analysis? If not, could the CNSC please explain how IAEA requirements were addressed in developing this REGDOC?</p>	<ul style="list-style-type: none"> <li>● WSG-6.1, <i>Storage of Radioactive Waste</i></li> <li>● SSR-5, <i>Disposal of Radioactive Waste</i></li> <li>● SSG-15, <i>Storage of Spent Fuel</i></li> <li>● SSG-29, <i>Near Surface Disposal Facilities for Radioactive Waste</i></li> <li>● SSG-31, <i>Monitoring and Surveillance of Radioactive Waste Disposal Facilities</i></li> <li>● SSG-14, <i>Geological Disposal Facilities for Radioactive Waste</i></li> </ul> <p>CNSC staff assessed the requirements and guidance and mapped applicable clauses to the regulatory framework.</p> <p>The CNSC leveraged other regulatory documents and standards, such as CSA standard to maintain an efficient streamlined regulatory framework. As such, this REGDOC is complemented by other REGDOCs and CSA standards.</p> <p>Through the REGDOC analysis, it was determined that there were no gaps in the framework, however there were areas for improvement and clarity. These are included in this draft series of REGDOCs.</p>
3.	Concerned Citizens of Renfrew County and Area		<p>Q #2. Section 1.1 (“Purpose”) of the March 2019 version stated that “The purpose of this document is to provide requirements and guidance... related to CSA Group standards applicable to radioactive waste management.” This statement was removed from the February 2020 post-consultation version. Why was this statement removed? Who asked for it to be removed? For clarity and precision, does the CNSC consider CSA Nuclear Standards to be the definitive means by which it regulates the radioactive waste management activities of its licensees?</p>	<p>Based on comments received from public consultation, CNSC staff reviewed and revised the purpose and scope of the document. Following the incorporation of changes resulting from the public consultation, an editorial review was conducted to improve readability and clarity. Each of the three initial bullets from the public consultation version of the document are still covered in other sections of the current version of the document.</p> <p>CSA standards are part of the licensing basis for a licensee when they are referenced in a Licence or Licence Conditions Handbook. Once a CSA standard is included in the licence or LCH for a particular licensee, all applicable requirements in that CSA standard are enforceable by CNSC staff, similar to CNSC regulatory documents.</p>

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4.	Concerned Citizens of Renfrew County and Area		Q #3. In section 1.2, “Scope”, why was the statement that licensees are “subject to the requirements” of the REGDOC removed? How does this affect how CNSC will apply the REGDOC?	<p>Based on comments received from public consultation, CNSC staff reviewed and revised the purpose and scope of the document.</p> <p>That particular statement was removed for clarity and precision. A licensee is in fact not subject to the requirements of this REGDOC unless the document is referenced in their Licence or Licence Conditions Handbook.</p>
5.	Concerned Citizens of Renfrew County and Area		Q #4. In section 1.2 on “Scope”, the March 2019 version stated that “this regulatory document is complemented by other CNSC regulatory documents, such as REGDOC-3.2.1, <i>Public Information and Disclosure</i> [2], and REGDOC-3.2.2, <i>Aboriginal Engagement</i> [3].” Why was this statement deleted (and references to these two “complementary” REGDOCs removed from the References section)?	<p>Based on comments received from public consultation, CNSC staff reviewed and revised the purpose and scope of the document.</p> <p>The particular statement was revised to: “Furthermore, this regulatory document is complemented by other CNSC regulatory documents.”</p> <p>This REGDOC is complemented by all other applicable CNSC regulatory documents. To avoid potential confusion, examples were removed as the examples may not apply to all licensees.</p>
6.	Concerned Citizens of Renfrew County and Area		Q #5. Section 1.3 (“Relevant Legislation”) lists provisions of the <i>Nuclear Safety and Control Act</i> and the regulations made under it that “are relevant to” this document. The March 2019 REGDOC referenced all of section 26 of the <i>Nuclear Safety and Control Act</i> . The post-consultation version narrows the scope to sections 26(e) and (f) of the <i>Act</i> . Who asked for this change? How was it decided that other sections of section 26 of the <i>Nuclear Safety and Control Act</i> are not relevant to the REGDOC?	<p>The application of the requirement for a licence under section 26 of the NSCA is not limited by this REGDOC.</p> <p>Based on comments received from public consultation, the current version of the document has been revised to include paragraph 24(5) and section 26 of the NSCA.</p>
7.	Concerned Citizens of Renfrew County and Area		Q #6. Several other changes were made to section 1.3 on “Relevant Legislation”. Did the CNSC carry out a systematic analysis to determine what legislation and regulations are relevant to the REGDOC? Can the CNSC share this analysis? Given that the REGDOC contains references to high-level waste and nuclear fuel, how was it determined that the <i>Nuclear Fuel Waste Act</i> is not relevant to the REGDOC?	<p>Based on comments received from public consultation, CNSC staff reviewed and revised this section of the document.</p> <p>The reference to the <i>Nuclear Fuel Waste Act</i> was removed as the list of applicable pieces of legislation referenced was incomplete. All CNSC licensees are required to comply with all applicable acts and regulations, and those pieces of legislation take precedence over the CNSC’s regulatory documents. In addition, no other legislation outside the NSCA and its regulations were referenced.</p>

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				Reference to the <i>Nuclear Substances and Radiation Devices Regulations</i> was included for completeness.
8.	Concerned Citizens of Renfrew County and Area		Q #7. The title of section 2 (“The CNSC’s Policy and Guiding Principles for the Management of Radioactive Waste”) has not been changed from the March 2019 version. A reviewer suggested this title should be changed, noting that “It is not the role of the Canadian Nuclear Safety Commission (CNSC) to create policy. The <i>Radioactive Waste Policy Framework</i> states that “federal government has the responsibility to develop policy.”” What is the CNSC’s role in developing and implementing radioactive waste policy? Does the CNSC’s “Policy for the Management of Radioactive Waste” fully reflect federal policy? If not, how does the CNSC’s policy differ from federal policy?	<p>Natural Resources Canada is responsible for creating policy regarding the management of radioactive waste.</p> <p>The CNSC is responsible for creating a regulatory framework on the basis of policy, and enforcing that framework.</p> <p>REGDOC-2.11, <i>Framework for Radioactive Waste Management and Decommissioning in Canada</i> outlines the radioactive waste policy in Canada.</p> <p>As a result of this comment, the section was revised as follows:</p> <p><b>Section 2 “The CNSC’s waste management framework”</b>  REGDOC-2.11, <i>Framework for Radioactive Waste Management and Decommissioning in Canada</i> [3], describes the national framework and the philosophy underlying the CNSC’s approach to regulating the management of radioactive waste.</p> <p>In addition to this regulatory document, the CNSC’s regulatory framework for waste management includes [...]”</p> <p>REGDOC-2.11 supersedes the CNSC regulatory document P-290, <i>Managing Radioactive Waste</i>. REGDOC-2.11 provides the principles the CNSC considers when making regulatory decisions about the management of radioactive waste.</p>
9.	Concerned Citizens of Renfrew County and Area		Q #8. Section 2 of the March 2019 version stated that “Under Canada’s <i>Radioactive Waste Policy Framework</i> ... waste owners are required to ensure the safe and secure management of radioactive waste and to make arrangements for its long-term management.” This language was replaced by language stating that “Under Canada’s <i>Radioactive Waste Policy Framework</i> ... waste producers and owners are responsible, in accordance	<p>Natural Resources Canada is the government agency responsible for radioactive waste management policy. Policy making is not within the CNSC’s mandate.</p> <p>REGDOC-2.11, <i>Framework for Radioactive Waste Management and Decommissioning in Canada</i> outlines the radioactive waste policy in Canada.</p>

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			<p>with the principle of “polluter pays”, for the funding, organization, management and operation of disposal and other facilities required for their wastes.” Canada’s <i>Radioactive Waste Policy Framework</i> also states that the federal government will “...ensure that radioactive waste disposal is carried out in a safe, environmentally sound, comprehensive, cost-effective and integrated manner”; and will ensure that waste producers and owners “meet their funding and operational responsibilities in accordance with approved waste disposal plans.” Are these provisions of Canada’s <i>Radioactive Waste Policy Framework</i> also part of the CNSC’s policy? Why does the REGDOC not describe the content of and approval process for waste disposal plans? Why does the REGDOC not explain how the CNSC will ensure that waste disposal plans are environmentally sound?</p>	<p>As a result of this comment, the section was revised as follows:  <b>Section 2 “The CNSC’s waste management framework”</b>  REGDOC-2.11, <i>Framework for Radioactive Waste Management and Decommissioning in Canada</i> [3], describes the national framework and the philosophy underlying the CNSC’s approach to regulating the management of radioactive waste.  In addition to this regulatory document, the CNSC’s regulatory framework for waste management includes...”</p> <p>This document is not a licence application guide, rather it is meant to provide requirements and guidance for all licensees managing radioactive wastes. Specifically it addresses:</p> <ul style="list-style-type: none"> <li>● the management of radioactive wastes</li> <li>● radioactive waste storage and disposal facilities</li> </ul> <p>This REGDOC contains requirements for both: disposal as a waste management activity; and those applicable for a radioactive waste disposal facility.</p> <p>This REGDOC includes the requirement to conduct the safety case and safety assessment. It is complemented by other REGDOCs that provide details on the additional information required to be submitted in support of an application.</p> <p>REGDOC-2.11.1, <i>Waste Management, Volume III: Safety Case for Disposal of Radioactive Waste</i> provides CNSC’s expectation for the safety case of a disposal facility.</p>

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				All applicants are required as part of a licence application for a disposal facility to submit a safety case and supporting safety assessment that demonstrate the protection of people and the environment.
10.	Concerned Citizens of Renfrew County and Area		Q #9. Section 2.1 (“The CNSC’s waste management framework”) says CSA nuclear standards “complement the CNSC’s regulatory framework regarding waste management.” The CSA Group says its “standards are integrated into the national regulatory framework, referenced in regulatory documents, licenses and compliance handbooks for nuclear facilities across Canada.” CNSC staff members play a very active role on the CSA waste management committees, serving as chairs or vice-chairs, with nearly all other members representing the nuclear industry. The IAEA requires that regulatory bodies such as the CNSC remain independent from the nuclear industry. How does the CNSC ensure that the process for creating nuclear standards remains independent from the nuclear industry? Which has primacy, a CNSC REGDOC or a CSA standard?	<p>CNSC staff develop regulatory documents independent from the nuclear industry. Industry is provided the same opportunity to comment on the regulatory documents as other stakeholders during the public consultation phase of developing a regulatory document. CNSC staff consider and disposition all comments received.</p> <p>CSA standards are consensus documents developed by government, industry, and other subject matter experts with input from interested members of the public and Indigenous peoples through its public consultation process. The CNSC contributes to the CSA standards and provides CNSC regulatory requirements and expectations, as well as technical expertise.</p> <p>The CNSC maintains an efficient and streamlined regulatory framework by making appropriate use of industry standards and may impose additional requirements if it determines that these are needed.</p> <p>As many other CNSC REGDOCS, the suite of waste management and decommissioning REGDOCs are complemented by the CSA standards. Together the waste REGDOCs and CSA standards provide a complete framework for waste management.</p>
11.	Concerned Citizens of Renfrew County and Area		Q #10. IAEA GSR Part 5 requires that “characterization and classification” be considered as the second step in management of radioactive waste, immediately after waste generation, noting that “relevant characteristics of the waste have to be recorded to facilitate its further management” (such as processing, storage, transport and disposal). However, section 3 (“Background”) of the REGDOC omits waste characterization and classification as a “step” in radioactive waste management. This is	<p>The REGDOC includes waste classification and waste characterization as activities. These activities may be conducted at multiple steps in the management of radioactive waste.</p> <p>This REGDOC does contain requirements and guidance for both waste classification and waste characterization. For example, section 7.2 states that</p>

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			important in the context of the REGDOC's "General Requirements" in section 5, because three requirements pertain to the "steps" in radioactive waste management ("optimize the steps," "take into account interdependencies among all steps," "produce and/or maintain records for each of the steps.") Was the omission of characterization and classification as a "step" deliberate? Why is characterization and classification of radioactive waste not considered to be a "step" in radioactive waste management?	waste characterization shall be performed at the appropriate steps in the management of radioactive waste.  In addition, CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> provides that waste characterization should be performed at the point of waste generation, but may be conducted at any time during all steps of radioactive waste management.
12.	Concerned Citizens of Renfrew County and Area		Q #11. A new section 4 ("The Graded Approach") has been added to the REGDOC, with the following new language: "With a graded approach, all requirements shall apply, but to varying degrees depending upon the safety significance and complexity of the work being performed." The IAEA, in <i>Use of a Graded Approach in the Application of the Management System Requirements for Facilities and Activities</i> (IAEA-TECDOC-1740) uses "graded approach" in the specific context of how to manage different classes of waste (e.g., for long-lived and higher-activity wastes, "a greater degree of control will need to be applied to an increasing number of factors such as site selection, inventory control, cooling, containment and secure storage"). An industry comment was that "the REGDOC would be clearer if the graded or risk-based approach is referred to when requirements vary with the types of wastes and types of facilities or activities (e.g. storage facilities and disposal facilities)." Why has a section on "The Graded Approach" been added to the REGDOC that lacks information on different waste types and facility types?	A section on the graded approach was added to this REGDOC to address comments received from industry during the public consultation phase.  All of the requirements in sections 4, 5, 6, 7, 8, and 9 of this REGDOC apply regardless of the type of waste. It is the level of detail required to satisfy the requirement that varies depending on safety significance and complexity. This regulatory document contains specific requirements for radioactive waste storage (section 9) and disposal (section 10) facilities, and so applying the graded approach to a facility type is included.
13.	Concerned Citizens of Renfrew County and Area		Q #12. In section 5 ("General Requirements"), the March 2019 version required licensees to manage their radioactive waste in a manner that would not impose a permanent burden on future generations. A nuclear industry comment on this section was that language was "overly vague, subjective, or open to interpretation, such as 'undue burden'." The CNSC responded "As a result of this comment, the document was revised for clarity and precision: the terminology such as "undue burden" was removed."	During the public consultation stage, both CSOs and industry raised concerns on the use of the terminology "undue burden".  This language was removed from this document to avoid duplication as the principle is covered in REGDOC-2.11, <i>Framework for Radioactive Waste Management and Decommissioning in Canada</i> : "The measures needed to prevent unreasonable risk to present and future generations from the hazards

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			However, CSA Standard N292.0 ( <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> ) contains the exact wording that was removed from the REGDOC. Furthermore, in the <i>Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management</i> , Article 11 (“General Safety Requirements”) requires that “Each Contracting Party shall take the appropriate steps to... avoid imposing undue burdens on future generations.” Why is language found in a CSA standard insufficiently clear and precise to include the REGDOC? Will CNSC require licensees to manage radioactive waste so as not to impose an undue burden on future generations? Should Canada comply with the requirements of the <i>Joint Convention</i> in this matter?	of radioactive waste are developed, funded and implemented as soon as reasonably practicable.”  Also, the requirement and language is currently found in CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> which complements this REGDOC.
14.	Concerned Citizens of Renfrew County and Area		Q #13. In section 5, the requirement that “All licensees that manage radioactive waste shall... track the waste inventory under their control” has been removed. The detailed comments table for the REGDOC has no comments requesting the removal of this requirement. Why was it removed? Does this mean that waste owners will no longer be required to keep records of wastes transferred off site, or to keep records of the destination(s) of the transferred wastes? Without this requirement, how will Canada meet its obligation under Article 32 of the <i>Joint Convention</i> to submit national reports that include “(iv) an inventory of radioactive waste that is subject to this Convention that (a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities; (b) has been disposed of; or (c) has resulted from past practices?”	The requirement was not removed, it was moved to a more appropriate section. The requirement can now be found in Section 6, Waste Management Program:  “The waste management program shall: ...require records of the waste inventory under control and maintain those records.”
15.	Concerned Citizens of Renfrew County and Area		Q #14. In section 5, the requirement that “All licensees that manage radioactive waste shall... provide the CNSC with information about the ownership of radioactive waste in their possession” has been removed. The detailed comments table for the REGDOC contains no comments requesting its removal. What is the rationale for removing this requirement? Without this information, how will the CSNC hold waste owners responsible, “in accordance with the principle of "polluter pays", for the funding, organization, management and operation of disposal and other facilities	Information about the waste in a licensee’s possession must be maintained by the licensee. Upon request, the CNSC expects licensees to provide information about the ownership of waste in their possession.  Section 5 states: “All licensees who manage radioactive waste shall: [...] produce and/or maintain records for each of the steps in the management of radioactive waste for which they are responsible.”

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			required for their wastes?” How will the CNSC address risks that waste may be lost or deliberately abandoned?	<p>Further, clause 4.7.3 of CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> states: “While following operational processes and procedures, records management protocols shall be used for logging information on the following aspects of the waste: a) the origins; b) the history; and c) the characteristics.”</p> <p>As well, clause 4.7.6 of CSA N292.0 states: “Records related to the waste’s origin, history, and characteristics shall be provided to subsequent organizations when waste is transferred.”</p> <p>Additionally, all licensees are required to maintain financial guarantees to ensure that all decommissioning activities, including disposal of all radioactive waste, can be safely completed should the licensee not be able to do so.</p>
16.	Concerned Citizens of Renfrew County and Area		Q #15. In section 6 (“Waste Management Program”), the phrase “Where a licensee is required by its licence to implement and maintain a waste management program...” has been added to the section’s preamble. However, the REGDOC provides no indication as to which CNSC licensees are required to implement waste management programs and which are not. Why was this language added? How does the CNSC decide whether or not a licensee is required to implement and maintain a waste management program? Why is this not explained in the REGDOC?	<p>The requirement to implement and maintain a waste management program is a licence condition, which if required, will be a part of a licence.</p> <p>The inclusion of the licence condition for a waste management program is based on the licensed activities and commensurate with risk.</p> <p>The preamble to this section of the regulatory document was added because if a licence does not include the requirement for a waste management program, then this section would not be applicable to that particular licensee.</p>
17.	Concerned Citizens of Renfrew County and Area		Q #16. The term “waste hierarchy” – which appears in both sections 6 and 8 - is not defined. This was noted in comments on the REGDOC. The CNSC responded that “The definition for ‘waste hierarchy’ will be added to REGDOC-3.6, <i>Glossary of CNSC Terminology</i> .”). However, this term is not currently found in the CNSC Glossary (or in the IAEA Glossary). Furthermore, although the April 2019 version of the REGDOC did provide a rather vague description of “waste hierarchy” in the section on “Waste Generation” -- “prevent generation, reduce volume and radioactivity	A definition for “waste hierarchy” will be added to the glossary of REGDOC 3.6, <i>Glossary of CNSC Terminology</i> .

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			content, reuse and recycling of materials and components, and disposal” – it was removed. Why is the term “waste hierarchy” included in the REGDOC? Why was the limited language clarifying the meaning of this term removed?	
18.	Concerned Citizens of Renfrew County and Area		<p>Q #17. Several reviewers commented (#50, #57 and #58 in Table B; #29 in Table C) on the lack of clarity and precision in section 7.1 (“Waste Classification”). Apart from rearranging of paragraphs, this section remains unchanged. In response to these comments the CNSC stated that “IAEA safety standard GSG-1 explains that the quantitative boundaries between the classes for different facilities may differ in accordance with scenarios, geological, and technical parameters and other parameters that are relevant to the site specific safety assessment.” However, this IAEA standard, not referenced in the REGDOC, contains additional important information on the relationship of different waste classes to different types of waste facilities. Rather than adopting the IAEA standard classification (or indeed any standard waste classification), the REGDOC requires licensees to implement their own system.</p> <p>Furthermore, Industry comment #101 in Table B noted that whereas the section on waste classification contained some information on methods of waste disposal, the section on waste disposal facilities only referenced one facility type, deep geological repositories. This comment said “Licensees would like to see statements here referring to other methods of waste disposal, especially as earlier sections mention near surface and intermediate depth disposal.” However, the CNSC’s response to the previous industry comment #57 in Table B was “...the document was revised for clarity and precision... the sentences on disposal options were removed... text on types of disposal facilities was removed.”</p> <p>Why does the REGDOC require licensees to implement a classification system without indicating what system they should implement? Why does the REGDOC quote selectively from IAEA standard GSG-1 without</p>	<p>The classification system provided in REGDOC-2.11.1, Volume I was developed using the classification system from IAEA GSG-1, <i>Classification of Radioactive Waste</i> as the basis in combination with the information found in CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i>.</p> <p>CSA N292.0 includes additional requirements and guidance contains a list of parameters that must be used in classifying the waste. This REGDOC requires that licensees implement a radioactive waste classification system, and that the system be based on the four general classes of wastes as defined. CNSC staff are taking this opportunity to ensure that the waste class definitions align with the IAEA safety standard, for example, where appropriate disposal paths are suggested.</p> <p>Licensees may incorporate additional information into their classification system such as quantitative boundaries between the classes that takes into account the site-specific safety case and supporting safety assessment.</p> <p>As a result of this comment, the following has been included in low-level waste classification description:  “LLW requires isolation and containment for periods of up to a few hundred years <u>and is suitable for disposal in near surface facilities</u>”</p> <p>In addition, a reference to GSG-1, <i>Classification of Radioactive Waste</i> has been included in the REGDOC.</p>

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			referencing that standard? Why was information on the relationship between different disposal options and types of disposal facilities and waste classification removed from the REGDOC? Who decided to remove this information? How does removal of this information add “clarity and precision”?	
19.	Concerned Citizens of Renfrew County and Area		<p>Q #18. In section 8 (“Steps in the Management of Radioactive Waste”), the first “step” discussed is “Generation” (section 8.1). The pre-consultation version of the REGDOC contained the following clear and simple statement: “The licensee shall, as far as practicable, minimize the generation of radioactive waste.” This statement was removed. The CNSC explains that this was done in response to a nuclear industry comment, although the nuclear industry did not specifically request deletion of this statement (detailed comment table, Table B, #70). Furthermore, with the elimination of the description of “waste hierarchy” from this section (see Q #16), the remaining language gives the impression that waste minimization need only be considered <u>after</u> waste has been generated, whereas waste minimization is an important consideration in all stages of a facility, including design, operation and decommissioning.</p> <p>Why was the requirement for waste minimization removed from the REGDOC?</p>	<p>This clause was not removed, but rather expanded on. The second clause in subsection 8.1, Generation states the following:</p> <p>“The licensee shall consider measures to control the generation of radioactive waste in terms of both volume and radioactivity content as early as possible prior to the commencement of licensed activities and on an ongoing basis.”</p>
20.	Concerned Citizens of Renfrew County and Area		<p>Q #19. In the pre-consultation REGDOC the section on “Transport” stated “The licensee shall transport radioactive waste in accordance with the <i>Packaging and Transport of Nuclear Substances Regulations, 2015</i>.” Section 8.4 of the post-consultation REGDOC changes this to “The <i>Packaging and Transport of Nuclear Substances Regulations, 2015</i> and the <i>Transportation of Dangerous Goods Regulations</i> apply to the transport of radioactive waste. As a result of this change, which is not referenced in the detailed comments table, application of the transport regulations for nuclear substances and dangerous goods is no longer expressed as a requirement for licensees. Why was the requirement to transport radioactive waste in</p>	<p>The <i>Packaging and Transport of Nuclear Substances Regulations</i> and the <i>Transportation of Dangerous Goods Regulations</i> apply whether there is a requirement in this REGDOC or not.</p> <p>Inclusion of the requirements may give the impression that this regulatory document was the reason that the regulations applied. The text was removed to avoid potential confusion.</p>

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			accordance with regulations removed from the REGDOC? Who requested this change?	
21.	Concerned Citizens of Renfrew County and Area		Q #20. A new section 8.5.1 (“Decay storage”) includes language not found in the previous version: “This waste may be stored for decay over a limited period of time of up to a few years.” This language, which was not requested during the comment period, lacks clarity and precision. With regard to waste destined for decay storage, IAEA Safety Guide No. WS-G-6.1, <i>Storage of Radioactive Waste</i> , says “The activity concentration of the waste should be carefully determined... Representative measurements should be carried out on samples taken and analysed prior to the removal of each batch from control. In taking samples, workers should be protected against both radiological and nonradiological hazards.” This Safety Guide adds that “Practical experience shows that storage for decay is suitable for waste contaminated by radionuclides with a half-life of less than about 100 d.“ Why was unclear and imprecise language on decay storage added to the REGDOC? Who requested this?	The following was added to the very short lived low-level radioactive waste section “In general, the management option of storage for decay for VSLW section should only apply to radionuclides with a half-life of 100 days or less.” Additional guidance on decay storage is found in CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> .
22.	Concerned Citizens of Renfrew County and Area		Q #21. Section 9 (“Waste Packages”) now states “Where applicable, the licensee shall use engineered waste packages to contain radioactive waste in accordance with applicable regulations...” The words “Where applicable” did not appear in the April 2019 version. They create a lack of clarity and precision. Why was this language added? Who requested it? Are there cases where the CNSC does not require licensees to use packages in accordance with applicable regulations?	Change was made as a result of a comment received during consultation that not all licensees engineer their own packages; and/or not all packages are required to be engineered. That reviewer also noted that not all containers will be for storage <i>and</i> disposal as it seemed to imply. The requirements is aligned with IAEA GSR Part 5, <i>Predisposal Management of Radioactive Waste</i> .
23.	Concerned Citizens of Renfrew County and Area		Q #22. In section 10 (“Radioactive Waste Storage Facility”) and in section 11 (“Radioactive Waste Disposal Facility”), a new heading “(Site preparation)” has been added to encompass the activities of “Site characterization” and “Facility design”. The common sense meaning of “site preparation” involves preparation of a site prior to construction of a facility (e.g., clearing vegetation, grading, building access roads, providing storm water drainage). The definition of “site preparation” in the CNSC Glossary (“The act of establishing basic infrastructure to support the future	Changes were made as a result of comments received that clarity should be added around requirements that apply to facilities at various times in their lifecycle. As a result headings in the storage and disposal facility specific sections were added to align with lifecycle stages.

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			construction and operation of a nuclear facility”) has a similar meaning. Why was the heading “site preparation” added to the REGDOC? What is meant by this term? Who requested its addition?	
24.	Concerned Citizens of Renfrew County and Area		<p>Q #23 Section 11 (“Radioactive Waste Disposal Facility”) lacks information on the siting of waste disposal facilities (i.e., finding an appropriate location). IAEA Specific Safety Guide SSG-29, <i>Near Surface Disposal Facilities for Radioactive Waste</i> states that “Siting is a fundamentally important activity in the disposal of radioactive waste.” SSG-29 recognizes four stages in the siting process: (1) A conceptual and planning stage; (2) An area survey stage, leading to the selection of one or more sites for more detailed consideration; (3) A site investigation stage of detailed site specific studies and site characterization; and (4) A site confirmation stage. Similar details are contained in IAEA Specific Safety Guide SSG-14, <i>Geological Disposal Facilities for Radioactive Waste</i>. The companion draft REGDOC-2.11.1, Volume 3 (<i>Safety Case for the Disposal of Radioactive Waste</i>) also lacks information on siting. Why is there no consideration of waste disposal facility siting in REGDOC-2.11.1, Volume 1 or REGDOC-2.11.1, Volume 3?</p>	<p>This REGDOC is complemented by the following REGDOCs and CSA standards that include requirements and guidance on site selection:</p> <ul style="list-style-type: none"> <li>- REGDOC 1.2.1, <i>Guidance on Deep Geological Repository Site Characterization</i></li> <li>- CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i></li> <li>- CSA N292.6, <i>Long-Term Management of Radioactive Waste and Irradiated Fuel</i></li> </ul> <p>In addition, CSA N292.7, <i>Disposal of radioactive waste and irradiated Fuel</i> (proposed title) is currently underdevelopment.</p> <p>CNSC have verified that these requirements for site characterization and design are inline with IAEA safety standard SSR-5, <i>Disposal of Radioactive Waste</i>.</p>
25.	Concerned Citizens of Renfrew County and Area		<p>Q #24. Section 11.1 (General Requirements”) under “Radioactive Waste Disposal Facility” says “The licensee shall site, design, construct, commission, operate and close the disposal facility i) in such a way that safety is ensured by passive means to the fullest extent possible, ii) so as to minimize the need for actions to be taken after closure of the facility. Requirement #22 of SSR-5, <i>Disposal of Radioactive Waste</i> states that “The long term safety of a disposal facility for radioactive waste has not to be dependent on active institutional control.” The IAEA requirement is definitive. The CNSC REGDOC language is equivocal (“fullest extent possible” and “minimize the need.”)</p> <p>A disposal facility requiring long-term institutional control would place an undue burden on future generations in the form of ongoing costs,</p>	<p>The language in the safety standard does not consider institutional control as a safety feature with respect to mines and mills. REGDOC-2.11.1, <i>Waste Management, Volume II: Management of Uranium Mine Waste Rock and Mill Tailing</i> explains that for uranium mine and mill waste, the large volume of the waste and the longevity of some of the radionuclides might necessitate longer periods of institutional control as a means of providing safety.</p> <p>REGDOC-2.11.1, <i>Waste Management, Volume III: Safety Case for Disposal of Radioactive Waste, Version 2</i> includes additional requirements and guidance on institutional controls. It states that the “presence of institutional controls should not be used to justify a reduction in the level of design of the containment and isolation system.”</p>

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			<p>environmental risks, and health risks. These risks would increase if licensees were allowed to place wastes in sub-standard disposal facilities requiring ongoing controls that were not designed to contain and isolate wastes if institutional control were to cease.</p> <p>The companion draft REGDOC-2.11.1, Volume 3 (<i>Safety Case for the Disposal of Radioactive Waste</i>) also does not state clearly that safety of a disposal facility should not be dependent on institutional control. It says “Reliance on such longer-term institutional control (beyond a few hundred years) should be justified.”</p> <p>Would the CNSC licence a disposal facility requiring long term institutional controls? Is it appropriate to allow radioactive waste to be disposed of in a facility that does not conform to international safety requirements? How would the CSNC ask a licensee to “justify” such a facility?</p>	<p>REGDOC-2.11.1, Volume III also states that long term safety should not be dependent on institutional control and that institutional control should be used to confirm the disposal system is performing as designed and should be limited to only a few hundred years.</p> <p>The CNSC expects licensees to submit their institutional control plans for disposal facilities to the CNSC for review prior to licensing.</p>
26.	Michael Stephens		<p>Can we also discuss REGDOC 3.6, the Glossary of CNSC Terminology? In particular, I think that the definition of “storage” is inadequate and really must be improved to something closer to the IAEA definition. One of my long-standing pet peeves in radioactive waste management is inadvertent (or deliberate?) confusion between “disposal” and “storage”:</p> <p>The CNSC Glossary (REGDOC 3.6) contains the definitions:</p> <ul style="list-style-type: none"> <li>· <b>disposal (<i>évacuation or élimination</i>)</b> The placement of radioactive waste <u>without the intention of retrieval</u></li> <li>· <b>storage (<i>stockage</i>)</b> With respect to nuclear substances and radiation devices, possession for storage only. (Note that intended retrieval is not mentioned, and storage is defined in terms of itself, which should not be done in a definition!).</li> </ul> <p>In contrast, The 2003 IAEA Radioactive Waste Management Glossary contains the following definitions (with my added underlining):</p>	<p>Given time constraints, the REGDOC 3.6, <i>Glossary of CNSC Terminology</i> will not be part of the workshop but CNSC staff will consider your comments as part of the next revision of the Glossary. This will be done after the suite of five REGDOCs is published in order to incorporate the changes in definitions that were included in those documents.</p> <p>Please note that we are always seeking greater alignment with IAEA definitions but the scope of workshop does not include comments on the glossary or other CNSC REGDOCs as well.</p>

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			<ul style="list-style-type: none"> <li>· <b>disposal.</b> Emplacement of waste in an appropriate facility <u>without the intention of retrieval</u>. Some countries use the term disposal to include discharges of effluents to the environment.</li> <li>· <b>storage.</b> The holding of spent fuel or of radioactive waste in a facility that provides for its containment, <u>with the intention of retrieval [3]</u>. Storage is by definition an interim measure, and the term interim storage would therefore be appropriate only to refer to short term temporary storage when contrasting this with the longer term fate of the waste. Storage as defined above should not be described as interim storage. <i>(Reference [3] is the IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, INFCIRC/546, IAEA, Vienna (1997).)</i></li> </ul> <p>I think the IAEA definition of storage is clear as regards intended retrieval. The CNSC glossary definition isn't clear. Worse, I see widespread confusion between the terms "long-term waste management" and "disposal". For example:</p> <ul style="list-style-type: none"> <li>· Is "long-term waste management" just another term for "long-term" (i.e., greater than ~50 years?) <u>storage, from which waste is planned to be retrieved</u> – and <u>not disposal</u>? Are the new Port Hope and Port Granby "long-term waste management" facilities considered/licenced to be storage or disposal? See <a href="https://www.phai.ca/en/home/port-hope-project/new-long-term-waste-management-facility.aspx">https://www.phai.ca/en/home/port-hope-project/new-long-term-waste-management-facility.aspx</a> I have heard people who should know disagree on the point. If these facilities are qualified/licensed only as storage, what is the plan to eventually retrieve the waste for disposal elsewhere or qualify the current facilities for disposal?</li> </ul> <p>Then there is the subtle question of whether or not a <u>closed</u> waste disposal repository is still a "waste management" facility? I always thought it was, even though there may be no further need or plans for active human involvement.</p>	

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			I spent a decade of my career at AECL on teams doing safety cases for disposal, so I am sensitive to these issues. I currently live upstream and downstream from two CNL disposal projects.	
27.	Ralliement contre la pollution radioactive		<p>We are extremely frustrated with the cavalier manner in which the staff of the Canadian Nuclear Safety Commission (CNSC) responded to our worries with one or two short sentences during this last phase of public consultation. Their answer falsely suggests that we are wrongly concerned since this redefinition of the classes would only formalize the status quo.</p> <p>On the contrary, this regulatory process obviously aims to surreptitiously increase the level of radioactivity and the risk of radioactive waste admissible in a surface nuclear landfill. These new provisions already apply to the first above-ground dump that the Government of Canada is trying to set up in Chalk River. They thus muddy any public debate, even before being formally adopted.</p> <p>This is an obvious violation of the CNSC's legal obligation to provide the population with objective and credible information on nuclear energy and on its regulations, under section 9 (b) of the Canada's Nuclear Safety and Control Act.</p> <p>This harsh judgment is based on an analysis of the CNSC's consultation procedure and its little known international context.</p>	<p>The CNSC's public consultation process on its draft regulatory documents is targeted towards industry, CSOs and members of the public and Indigenous communities that would be impacted by the implementation of the regulatory document. CNSC staff read and take into careful consideration each comment that is submitted on its draft regulatory documents. Each comment is dispositioned in writing and made publicly available to further ensure that the process of developing regulatory documents remains transparent.</p> <p>The classification system provided in REGDOC-2.11.1, Volume I was developed using the classification system from IAEA GSG-1, <i>Classification of Radioactive Waste</i> as the basis in combination with the information found in CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i>.</p>
28.	Ralliement contre la pollution radioactive		<p>The Ralliement contre la pollution radioactive (RCPR) is among only three citizen organizations that have participated in this debate so far. It alone brings together mainly French-speaking citizens. Here is why our involvement in this debate was so late, at the end of the last consultation:</p> <ul style="list-style-type: none"> <li>• First, there did not appear to be any significant issues. The CNSC has itself downplayed the importance of its initiative. In 2016, its consultation document DIS- 16-03 Radioactive Waste Management and Decommissioning was talking about simply "modernizing the vocabulary" and about "formally adopt the four main waste categories as defined in CSA N292.0-14, which are in turn, based on the International Atomic Energy Agency's GSG-1 Classification of Radioactive Waste." They said they</li> </ul>	<p>Discussion paper DIS-16-03, <i>Radioactive Waste Management and Decommissioning</i> was used to solicit early public feedback from stakeholders to improve the regulatory framework for waste management and decommissioning. The paper presented several proposed changes such as defining waste categories, increasing clarity of requirements for waste management programs and new regulatory on the waste hierarchy. The proposed categories in the discussion paper were based on CSA N292.0-14, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> and GSG-1, <i>Classification of Radioactive Waste</i>, which was revised in 2019.</p>

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			<p>wanted to formalize the traditional distinction between low and intermediate level radioactive waste in Canada, by ensuring that the classes of radioactive waste remain based on their intrinsic radioactive characteristics:  Low-level waste does not give off any heat and "it is not particularly dangerous to handle," explained the CNSC: At worst, a person might receive a dose rate of 2 milliSieverts per hour (2 mSv/h) if he/she touches this waste without protective packaging or shielding.  On the contrary, intermediate-level waste is radioactive enough to spontaneously release up to 2 000 watts of heat per cubic meter and its radiation is too dangerous for it to be handled without shielding.  At that date, at the end of 2017, we had many other fish to fry. The Canadian Nuclear Laboratories had just announced that they would avoid placing any intermediate-level waste in their future radioactive dumping ground in Chalk River, leaving only "low-level waste". For its part, the CNSC had just published a summary of all the comments made by government experts (its own and those of other federal or provincial departments). It was also about to do the same with all the public comments that seemed worthy of note. Although no one has ever made it clear, these two summaries listed the countless issues that are still the subject of intense secret negotiations between the CNSC and Canadian Nuclear Laboratories.</p>	<p>In December 2017, the CNSC published a What We Heard Report that provided a summary of stakeholder comments in themes. Also published on the CNSC website are all the comments received and feedback on comments.</p> <p>On March 29, 2019, a draft version of REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste was issued for public consultation until June 30th. The consultation submissions were then posted for feedback on comments from July 18 to August 1, 2019. On February 19, 2020, the revised REGDOCs and comment disposition tables were sent to CSOs who had provided comments on the REGDOCs.</p> <p>The specifics of the CNL projects are outside the scope of this REGDOC.</p>
29.	Ralliement contre la pollution radioactive		<p>Brutal awakening on July 29, 2019, when an activist told us that Canadian Nuclear Laboratories explicitly admitted, in their comments on REGDOC 2.11.1, that they still intend to put intermediate level waste in their aboveground dump. They even seem to ask the CNSC to change its regulations in order to allow anybody to pile up such radioactive waste in a near-surface landfill. Naturally, we immediately checked the consultation documents about the REGDOC 2.11.1 project. LNC effectively write: "There are current plans to place ILW in aboveground mounds". This document has even been endorsed by the entire Canadian nuclear industry, which has asked with one voice to be allowed to dispose of their ILW (intermediate level waste) in a near-surface landfill. Secondly, we re-</p>	<p>The classification system provided in REGDOC-2.11.1, Volume I was developed using the classification system from IAEA GSG-1, <i>Classification of Radioactive Waste</i> as the basis in combination with the information found in CSA N292.0-19, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i>.</p> <p>GSG-1 no longer provides that a contact dose rate of 2 mSv/h be used to distinguish between low and intermediate level waste, which is now based primarily on long term safety considerations. However, contact doses remain an element that has to be considered in the handling and transportation of nuclear waste, and for operational radiation protection purposes at waste</p>

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			<p>examined the REGDOC2.11.1 itself. It quickly became apparent to us that the redefinition of the radioactive waste classes appears to be a maneuver to allow the disposal of much more radioactive waste in nuclear near-surface landfills, without alarming the public too much. In order to do this, the CNSC writes inconsistent definitions for intermediate and low-level waste. It eliminates any precise border between the two classes. Most importantly, it eliminates any requirement that low-level waste will be harmless enough for it to be safely handled.</p> <p>Second surprise: the nuclear industry agrees with CNSC's objective but disagrees with the method: Yes, it wants to place more hazardous waste in future nuclear near-surface landfills. But no, the nuclear industry refuses to distort the definitions. There is also no question of eliminating the traditional limit between low and intermediate level waste; it wants to keep the contact dose rate threshold of 2 mSv/hr. Since we had barely two days left to react, we joined the industry to demand that they keep the 2 mSv threshold. On the other hand, we have denounced the idea of adding "intermediate level" nuclear waste in a simple near-surface landfill, especially if this waste were to remain dangerous many centuries after the dump had disintegrated, according the new draft REGDOC definition.</p>	<p>management and disposal facilities, but is not necessarily a determining factor for the ultimate disposition of the waste and the long term safety of a disposal facility.</p> <p>As a result of this comment, the following phase which had been previously been omitted has been included in low-level waste classification description: <u>"LLW requires isolation and containment for periods of up to a few hundred years and is suitable for disposal in near surface facilities"</u></p> <p>In addition, a reference to GSG-1 has been included in the REGDOC.</p>
30.	Ralliement contre la pollution radioactive		<p>Our effort was totally wasted! The CNSC simply made its definitions even more vague, rejecting collective requests both from the nuclear industry and from the three groups of citizens who are still asking for more precise standards. The CNSC therefore discards the results of its own "public consultation"! the CNSC even hosted a half-day webinar to "explain" its decisions on February 26. This webinar held in English was aborted due to technical difficulties and was due to be repeated on March 26. This is why we were asked to submit this document before March 24. CNSC staff also suggested that we should read carefully all the responses already provided to stakeholders.</p> <p>What have we been told, by the way?</p>	<p>See response to 29 in Table D.</p> <p>The CNSC takes a non-prescriptive approach to the classification of waste and the appropriateness of the waste disposition method that corresponds to each type.</p> <p>An applicant for a disposal facility must demonstrate in the safety case that the system, including the engineered and natural barriers, will contain the waste until the radioactive inventory is reduced to levels comparable to either background and/or natural analogues such as uranium deposits. If this level can be achieved in periods of a few hundred years, shallow management can be considered. However, it must be demonstrated in a safety case, that</p>

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			<ul style="list-style-type: none"> <li>• About the type of radioactive waste that can (or cannot) be placed in a near surface landfill, we are told that it is up to the dump promoter to prove that his installation can safely contain all the waste he wants to put in: (our translation) «Within the framework of the non-prescriptive Canadian regulatory context, it is the responsibility of the applicant to ensure that the safety assessment specific to the proposed facility for waste management supports and justifies the proposed waste inventory.» Word for word, the same answer also provided to the Quebec Ministry of Health and Social Services!</li> <li>• On the vague definition of low and intermediate activity waste and on the elimination of the 2mSv/hour threshold for the waste contact dose rate, they simply dodge the issue: (our translation) “The definition of intermediate activity radioactive waste remains unchanged so that the Canadian regulatory framework remains faithful to the definition found in the CSA N292.0 standard and to the IAEA orientation. ”</li> </ul>	<p>includes for both normal evolution and human intrusion scenarios, that the natural and engineered barriers are stable and fulfill their confinement function for hundreds of years, and that the impact on human health and confinement is below acceptance criteria. If the danger posed by waste continues for more than hundreds of years, which may preclude the presence of ILW in the waste inventory as it requires isolation and containment for longer timeframes, in-depth management would be appropriate.</p> <p>As a result of this comment, the following phrase which had been previously omitted, has been included in low-level waste classification description: LLW requires isolation and containment for periods of up to a few hundred years “<u>and is suitable for disposal in near surface facilities</u>”</p> <p>In addition, a reference to GSG-1 has been included in the REGDOC.</p>
31.	Ralliement contre la pollution radioactive		<p>However, the draft regulation is actually NOT in CONFORMITY with the traditional definition of CSA N292.0 that the CNSC had outlined in its 2016 document! To better understand the issues, we therefore turned to the IAEA document GSG-1 Classification of Radioactive Waste since the CNSC often refers to it in its responses to other stakeholders. And there, we went from one surprise to another!</p> <ul style="list-style-type: none"> <li>• First, this GSG-1 document is only available in Russian, Spanish and English. Although the CNSC has claimed to have consulted with Canadian citizens since 2016 on how Canada should apply this guide, no one has ever seen fit to make it available in French. We asked for a french version in vain, both from the IAEA office in Toronto and from the CNSC staff in Ottawa.</li> <li>• Contrary to what the CNSC still claims, <u>the recommendations in the GSG 1 document are completely incompatible with the Canadian standard CSA N292.0 that our nuclear industry wants to keep.</u> The CSA N292 standard was rather inspired by a previous version of the GSG-1 document, published in 1994. This old document was completely redone on a different footing in</li> </ul>	See response to comment #46 in Table D.

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			<p>2009. And the draft Canadian regulation is now in line with this "new" incompatible text.</p> <p><del>(Here is our translation of)</del> Here are two crucial paragraphs from the new GSG-1 document. They shed light on the radical turn of 2009 as well as the hidden issue of REGDOC 2.11.1:</p> <p>“Low level waste (LLW) 2.21. In previous classification schemes, low level waste was defined to mean radioactive waste that does not require shielding during normal handling and transport. Radioactive waste that requires shielding but needs little or no provision for heat dissipation was classified as intermediate level waste. A contact dose rate of 2 mSv/h was generally used to distinguish between the two classes of waste. Contact radiation dose rate is not used to distinguish waste classes in the present, revised classification scheme, which is based primarily on long term safety. However, it remains an issue that has to be considered in handling and transporting the waste, and for operational radiation protection purposes at waste management and disposal facilities but is not necessarily a determining factor for the long-term safety of a disposal facility. 2.22. In the classification scheme set out in this Safety Guide, low level waste is waste that is suitable for near surface disposal. This is a disposal option suitable for waste that contains such an amount of radioactive material that robust containment and isolation for limited periods of time up to a few hundred years are required. This class covers a very wide range of radioactive waste. It ranges from radioactive waste with an activity content level just above that for VLLW, that is, not requiring shielding or particularly robust containment and isolation, to radioactive waste with a level of activity concentration such that shielding and more robust containment and isolation are necessary for periods up to several hundred years.”</p> <ul style="list-style-type: none"> <li>• Note the beginning of paragraph 2.22: In this new classification of the IAEA, " low level waste is waste that is suitable for near surface disposal".</li> </ul>	

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			<p>This lies at the heart of the 2009 changes. They no longer define low-level waste according to its intrinsic properties, as the CNSC claimed to do in its 2016 consultation document, but rather according to the characteristics of the near-surface landfill that should receive it. It is no longer because a low-level waste is harmless that it can be discarded in a near-surface landfill; it's the opposite: As soon as the CNSC accepts that a waste may be discarded in a near-surface landfill, it becomes ipso facto "low activity waste", whatever its hazard level!</p> <p>This explains why Canadian Nuclear Laboratories are planning to place deadly cobalt60 radioactive sources of in their near-surface landfill at Chalk River, while repeating to Canadians that they will only place "low level waste" in accordance with the guidelines for the IAEA! As for the CNSC, they never protest! Rather, they dismiss our own protests with their usual langue de bois: (our translation) "The definition of intermediate level radioactive waste remains unchanged so that the Canadian regulatory framework remains faithful to the definition found in the CSA N292.0 standard and to IAEA orientation," they write.</p>	
32.	Ralliement contre la pollution radioactive		<p>The text of the draft REGDOC 2.11.1 on radioactive waste management closely aligns with the formulations proposed in this IAEA document GSG-1, despite the protests from the nuclear industry and those from the rare citizen groups who spoke out on the issue. Meanwhile, the CNSC President reiterates everywhere the need to "harmonize" Canadian regulations with international standards and boasts of working hand in hand with the US NRC.</p>	<p>The CNSC maintains an efficient and streamline regulatory framework by making appropriate use of international and national standards.</p> <p>The CNSC has harmonized these REGDOCs with the IAEA safety standards which are consensus standards at an international level.</p>
33.	Ralliement contre la pollution radioactive		<p>On the one hand, the CNSC has rejected many proposals under the guise of respecting the status quo and remaining faithful to the CSA-N292 standard which, it says, will still be in force.</p> <p>On the other hand, article 1.2 of the first volume specifies nevertheless that the REGDOC will henceforth take precedence; the CSA standard will only be a complement. "This document is complemented by the requirements and</p>	<p>The CNSC maintains an efficient and streamline regulatory framework by making appropriate use of industry standards.</p> <p>The waste suite of REGDOCs are complemented by the CSA standards. Together the waste REGDOCs and CSA standards provide a complete framework for waste management.</p> <p>The text was revised to :</p>

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			<p>guidance in CSA N292.0, General Principles for the Management of Radioactive Waste and Irradiated Fuel", says the English version. (To add to the confusion, the French version of REGDOC erroneously states the exact opposite: « Le présent document constitue un complément aux exigences et à l'orientation de la norme CSA N292.0 », says the French text. It also contains several other inaccuracies. Even its numbering is offset from that of the English text!)</p>	<p>“This document is complemented by the requirements and guidance in CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> [1]. Together, this REGDOC and CSA N292.0 provide requirements and guidance for the management of radioactive waste. Furthermore, this regulatory document is complemented by other <a href="#">CNSC regulatory documents</a>.”</p> <p>The text in the French version has not yet undergone final editing and will be corrected accordingly.</p>
34.	Ralliement contre la pollution radioactive		<p>In popular parlance and in their traditional definition in Canada, low-level waste is almost harmless waste that can be safely touched. This traditional meaning has been completely obliterated in the new definition. No way of being able to touch it. No attempt to quantify its radiotoxicity for a human being (in milliSieverts/hour). Even more serious, the CSSN regulations purport to define the level of "activity" of radioactive waste, <b>when this is not the case</b>. (The activity of an element designates its number of radioactive disintegrations per second, measured in becquerels.) However, the new definition of low activity or intermediate activity waste eliminates any reference to their radioactive activity!</p> <p>The only remaining criterion is the duration of this waste, according to article 7.1 of the draft regulation: “Low-Level radioactive waste (LLW) (...) generally has limited amounts of long-lived activity. LLW requires isolation and containment for periods of up to a few hundred years. ”</p> <p>There is a problem: the longer or shorter "period" of a radioactive material does not define its level of radioactivity or danger; it just defines its lifespan. If the period is long, it will disappear slowly and its activity will generally be weak, with a small number of disintegrations per second. This definition of a low-level waste therefore becomes quite <b>contradictory</b>: It requires to LIMIT long-lived radionuclides (the most persistent), that is to say those which would have LOW activity and which decay slowly! This is how we</p>	<p>As a result of this comment, “long-lived activity” has been revised to “long-lived radionuclides” in the low-level waste classification description. It now reads as follows:</p> <p>“Low-level radioactive waste (LLW) contains material with radionuclide content above established unconditional clearance levels and exemption quantities (set out in the <i>Nuclear Substances and Radiation Devices Regulations</i>), but generally has limited amounts of long-lived <u>radionuclides</u>.”</p>

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			<p>end up with a Chalk River landfill dominated 98% by the radioactivity of cobalt-60 alone, an radionuclide whose period is very short.</p> <p>Moreover, even if the definition requires a limited quantity of persistent elements, it at the same time underlines the importance of confining them for ... a few hundred years! And in the very same definition, they manage to use the word "period" many times, with two different meanings. Sometimes it means "a radioactive half-life"; sometimes it just means a time length.</p> <p>How can the CNSC and Canada's best nuclear professionals <b>confuse</b> concepts and definitions so much? Why does the CNSC derail any intelligent public debate in this way, when the law entrusts it with the mission of providing the public with objective scientific information on nuclear energy?</p>	
35.	Ralliement contre la pollution radioactive		<p>The only likely explanation is that the new definition of low-level waste does not really relate to what it claims to define, but rather to the type of radioactive waste that can be placed in a nearsurface landfill, like in Chalk River. The CNSC applies the far-fetched definition we quoted earlier from the IAEA's GSG-1 document: "low level waste is waste that is suitable for near surface disposal."</p> <p>Here we must remember that the main weakness of a near surface site is its short useful life. It is vulnerable to weathering, erosion and plant, animal or human intrusions (to recycle precious metals for example), etc. Waste should therefore never be placed a landfill if it remains dangerous for much longer than the useful life of the dump itself. And for the waste to disappear quickly, its radionuclides must have a short period (i.e. a short half-life).</p> <p>In the same way, they no longer define "Intermediate-Level Waste" according to the intensity of their activity or their radiotoxicity but rather according to their much longer persistence, which compels us to confine them will force them to be confined for "periods greater than several hundred years". Here again, they confuse concepts and public debate.</p>	<p>See response to comment #46 in Table D.</p> <p>The specifics of the CNL projects are outside the scope of this REGDOC.</p>
36.	Ralliement contre la		<p>The redefinition of low and intermediate level waste therefore eliminates all the old distinctions. Since they don't want to impose new constraints on</p>	<p>See response to comment #46 in Table D.</p>

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	pollution radioactive		<p>themselves, they also eliminate any specific limit on acceptable "low-level waste" in a surface landfill such as at Chalk River.</p> <p>Admire the precision of the vocabulary! "Low-Level waste (...) generally (but not always) has limited amount (what quantity, exactly? 1%? 4%? 15%?) of long-lived radionuclides (how long? The period of a radionuclide is often said to be 'long' when it lasts more than 30 years, but the regulations avoid specifying it). LLW requires isolation and containment for periods of up to a few hundred years (how many centuries? 2? 10?)". The same is unclear for intermediate-level waste which must be confined for "periods greater than several hundred years". (how much more than how many centuries, exactly?) And if LLW goes up to "a few" hundred years and ILW start at "several" hundred years, what happen between a few and several centuries? All answers are good!</p> <p>No wonder the CNSC must now organize webinars to clarify things for the nuclear industry! What else will it take to be sure the general public understands clearly?</p>	
37.	Ralliement contre la pollution radioactive		<p>The Ralliement contre la pollution radioactive submits that Canada should adopt the same classification system as France for radioactive waste. Not only has this classification stood the test of time, but it has the immense advantage of being clear, complete and nuanced. Above all, it always distinguishes the definition of a class of radioactive waste and the description of the type of long-term storage they require.</p> <p>This system provides for four classes according to the level of activity (high, intermediate, low and very low) and for three other classes according to the period length (long-lived, short or very short). These classes do also intersect to define up to twelve distinct classes of waste (high activity with short life, for example). Such a system allows for clear and nuanced public discussion, with well-defined concepts, and there is no reason why Canada could not learn from it.</p> <p>More fundamentally, we submit that no one has the slightest advantage in making the waste definitions so blurry and confusing like CNSC is trying to</p>	See response to comment #48 in Table D.

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			<p>do in Canada, insofar as the real criteria for acceptance of waste will henceforth depend only on the “safety case” specific to each installation, as explained in the third volume of this REGDOC.</p> <p>This is what the CNSC itself pointed out to us when our Ralliement contre la pollution radioactive objected to the possibility of discarding ILW in a near-surface landfill: "(our translation) In the non-prescriptive Canadian regulatory context, it is the responsibility of the applicant to ensure that the safety assessment specific to the proposed waste management facility supports and justifies the proposed waste inventory. "</p> <p>The RCPR recognizes that this "safety case" concept could possibly provide an interesting flexibility to decide which kind of waste would be acceptable in each particular waste facility, without being constrained by a priori technical solutions.</p> <p>The most important thing is to never compromise security and our next chapter will examine how this essential objective could be confidently ensured.</p>	
38.	Ralliement contre la pollution radioactive		The RCPR requests that the new REGDOCs on radioactive waste, on their management and on decommissioning, be thoroughly reworked before their adoption by the CNSC.	See response to comment #44 in Table D.
39.	Ralliement contre la pollution radioactive		<p>The RCPR requests that the CNSC broaden the consultation of Canadian citizens in both official languages by first explaining clearly :</p> <ul style="list-style-type: none"> <li>a. the problems that its draft regulations would solve;</li> <li>b. the potential conflicts between IAEA rules and Canadian practices, including CSA standards;</li> <li>c. the pros and cons of the major strategies under study;</li> <li>d. the consequences sought through each of its new regulatory provisions.</li> </ul>	<p>REGDOC 2.11.1, Volume I was developed as part of CNSC’s commitment to modernizing its waste management and decommissioning regulatory framework based on evolving international best practices and lessons learned.</p> <p>The purpose of the document is to provides requirements and guidance for licensees managing radioactive wastes.</p> <p>As part of the development of REGDOC-2.11.1 Volume I, CNSC staff conducted a thorough analysis of a number of IAEA standards, including:</p>

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				<p>GSR-5, <i>Predisposal Management of Radioactive Waste</i>; and GSG-1, <i>Classification of Radioactive Waste</i>.</p> <p>Through the analysis that precedes the development of a REGDOC, it was determined that there were no gaps in the framework, however there were areas for improvement and clarity. These are included in this draft series of REGDOCs.</p> <p>The CNSC leveraged other regulatory documents and standards, such as CSA standard to maintain an efficient streamline regulatory framework. As such this REGDOC, is complemented by other REGDOCs and CSA standards.</p> <p>As all regulatory documents, REGDOC 2.11.1 volume I is intended to form part of the licensing basis for all CNSC licensees to who it applies. This REGDOC will be incorporated into their licence condition handbooks. The implementation plans and timelines would be established through discussions and consultations between CNSC staff and licensees and according to the CNSC's management system process for the implementation of REGDOCs and included in the individual LCHs.</p>
40.	Ralliement contre la pollution radioactive		<p>The RCPR requests that the regulations be inspired by France's classification system to provide short definitions for each radioactive waste class, based on their own physical characteristics, so as to clarify the public debate and, particularly:</p> <p>a. Expand the number and variety of these classes;</p> <p style="padding-left: 20px;">i. according to the level of radiation activity (number of radionuclide disintegrations in Bq, their absorption in the human body or their dose factor in milliSieverts and their heat generation);</p> <p style="padding-left: 20px;">ii. according to their persistence (period, required protection length, etc.);</p> <p>b. That the subclasses be organized logically within each waste class;</p>	<p>See responses to comments #45, 46, 48 and 50 in Table D.</p> <p>As part of the development of the REGDOC, CNSC staff did undertake a benchmarking of waste classification systems existing in other jurisdictions, including the classification used in France. Following this benchmarking, the CNSC opted to harmonize the waste classification system with the IAEA safety standards, which are consensus standards at an international level.</p>

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			c. That the boundary values between classes and between subclasses be defined as precisely as possible.	
41.	Ralliement contre la pollution radioactive		The RCPR recommends that the identification of the types of containment (geological or surface storage for example) required for various waste classes should not be included in the definition of each waste class; these specifications should rather appear in separate articles for each type of radionuclide.	See response to comment #45 and 46 in Table D.  The REGDOC and CSA N292.0, <i>General Principles for the Management of Radioactive Waste and Irradiated Fuel</i> currently outline that because of its long-lived radionuclides, ILW generally requires a higher level of containment and isolation than can be provided in near-surface repositories.
42.	Mike Wilton, Algonquin-eco-watch		Several years ago, I participated in discussions regarding the storage of low-medium radiation waste at Bruce Nuclear. To the best of my knowledge, that problem is as yet unresolved. Now (all of a sudden), we seem to be approaching finality regarding the possible storage of high radiation waste, also in south western Ontario. To the best of my knowledge, there has as yet been no “guaranteeable” storage facility completed <u>anywhere in the world</u> . With research such as the attached coming to light at regular intervals, it seems to me that we are a long way from nearing a knowledge level that can justify proceeding with construction of an “acceptable” storage facility. “Is it time for a moratorium on Nuclear Power?” I am suggesting this as a topic at the CNSC webinar, to be held on February 26 <sup>th</sup> , which I look forward to attending.	The acceptability of storage and/or disposal facilities for the management of radioactive waste is outside the scope of this REGDOC.  The CNSC does not promote or prescribe waste disposition paths. Any proposed waste management storage or disposal facilities and activities will be assessed by the CNSC to ensure the protection of the health and safety of the public and the environment.  For a waste management facility, the regulations require applicants to submit comprehensive information on their programs (e.g , safety analysis, fitness for service, etc) the design and components of the proposed facility, the manner in which the facility is expected to operate, facility operating manuals and procedures, and any potential impacts on the site or surrounding environment.  Applicants are required to identify the manner by which the facility may fail to operate correctly, predict the potential consequences of such a failure and establish specific engineering measures to mitigate the consequences to acceptable levels.  CNSC staff review all submissions to determine if the proposed waste management safety and control measures described in the application and the

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				documents that support the application are adequate and meet the applicable requirements.
43.	Mike Wilton, Algonquin-eco-watch		<p><b>Current model for storing nuclear waste is incomplete Study finds the materials -- glass, ceramics and stainless steel -- interact to accelerate corrosion</b>  <i>Date:</i> January 27, 2020  <i>Source:</i> Ohio State University  <i>Summary:</i>  The materials the United States and other countries plan to use to store high level nuclear waste will likely degrade faster than anyone previously knew, because of the way those materials interact, new research shows. The findings show that corrosion of nuclear waste storage materials accelerates because of changes in the chemistry the nuclear waste solution, and because of the way the materials interact with one another.  The materials the United States and other countries plan to use to store high-level nuclear waste will likely degrade faster than anyone previously knew because of the way those materials interact, new research shows.  The findings, published today in the journal <i>Nature Materials</i>, show that corrosion of nuclear waste storage materials accelerates because of changes in the chemistry of the nuclear waste solution, and because of the way the materials interact with one another.  "This indicates that the current models may not be sufficient to keep this waste safely stored," said Xiaolei Guo, lead author of the study and deputy director of Ohio State's Center for Performance and Design of Nuclear Waste Forms and Containers, part of the university's College of Engineering. "And it shows that we need to develop a new model for storing nuclear waste."  The team's research focused on storage materials for high-level nuclear waste -- primarily defense waste, the legacy of past nuclear arms production. The waste is highly radioactive. While some types of the waste have half-lives of about 30 years, others -- for example, plutonium -- have a half-life</p>	<p>See response to comment #58 in Table D.</p> <p>Draft REGDOC-2.11.1, Volume I and CSA standards N292.0, <i>General principles for the management of radioactive waste and irradiated fuel</i>, N292.2, <i>Interim dry storage of irradiated fuel</i> and N292.3, <i>Management of low and intermediate level radioactive waste</i> together provide detailed requirements regarding the design of waste containment systems, including requirements regarding material selection and material compatibility.</p>

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			<p>that can be tens of thousands of years. The half-life of a radioactive element is the time needed for half of the material to decay.</p> <p>The United States currently has no disposal site for that waste; according to the U.S. General Accountability Office, it is typically stored near the plants where it is produced. A permanent site has been proposed for Yucca Mountain in Nevada, though plans have stalled. Countries around the world have debated the best way to deal with nuclear waste; only one, Finland, has started construction on a long-term repository for high-level nuclear waste. But the long-term plan for high-level defense waste disposal and storage around the globe is largely the same. It involves mixing the nuclear waste with other materials to form glass or ceramics, and then encasing those pieces of glass or ceramics -- now radioactive -- inside metallic canisters. The canisters then would be buried deep underground in a repository to isolate it.</p> <p>In this study, the researchers found that when exposed to an aqueous environment, glass and ceramics interact with stainless steel to accelerate corrosion, especially of the glass and ceramic materials holding nuclear waste.</p> <p>The study qualitatively measured the difference between accelerated corrosion and natural corrosion of the storage materials. Guo called it "severe."</p> <p>"In the real-life scenario, the glass or ceramic waste forms would be in close contact with stainless steel canisters. Under specific conditions, the corrosion of stainless steel will go crazy," he said. "It creates a super-aggressive environment that can corrode surrounding materials."</p> <p>To analyze corrosion, the research team pressed glass or ceramic "waste forms" -- the shapes into which nuclear waste is encapsulated -- against stainless steel and immersed them in solutions for up to 30 days, under conditions that simulate those under Yucca Mountain, the proposed nuclear waste repository.</p>	

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			<p>Those experiments showed that when glass and stainless steel were pressed against one another, stainless steel corrosion was "severe" and "localized," according to the study. The researchers also noted cracks and enhanced corrosion on the parts of the glass that had been in contact with stainless steel.</p> <p>Part of the problem lies in the Periodic Table. Stainless steel is made primarily of iron mixed with other elements, including nickel and chromium. Iron has a chemical affinity for silicon, which is a key element of glass.</p> <p>The experiments also showed that when ceramics -- another potential holder for nuclear waste -- were pressed against stainless steel under conditions that mimicked those beneath Yucca Mountain, both the ceramics and stainless steel corroded in a "severe localized" way.</p>	
44.	Ralliement contre la pollution radioactive		<p>The REGDOCS require licensees to implement a classification system without indicating what system they should implement. Don't you think the licensees could do that easily when the definitions of the nuclear waste categories are so vague? This is not realistic and it will create even more confusion.</p> <p>Could you consider the following practical suggestion? It would be useful to have in the REGDOC a list of all the radionuclides and their individual class as very low level, low level, intermediate level, high level activity radionuclide and to include their period and their number of mSV/h on contact. Also the threshold of 2mSV/h for intermediate level waste is a must for the public. It is clear and easily understandable. Even if the wastes are a mix of radionuclides I contribute to lift the confusion. A lack of clarity leads to misunderstanding of requirements and their reasons by licensees, the regulator and the public.</p>	See response to comment #17, 45 and 46 in Table D.
45.	Ralliement contre la pollution radioactive		<p>The condition that <i>all licensees who manage radioactive waste shall... track the waste inventory</i> under their control. has been removed in the REGDOC. How will waste owners ensure the safe and secure management of radioactive waste and make arrangements for its long-term management</p>	The requirement was not removed, it was just moved to a more appropriate section. The requirement can now be found in Section 6, Waste Management Program:

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			<p>(Under Canada's Radioactive Waste Policy <i>Framework</i>) if they do not track the inventory? No tracking, no inventory, no responsibility? We have discovered in the past that the CNL did not have a complete inventory of the nuclear waste transiting in and out at Chalk River because it was presumed to be the only responsibility of the licensees who transport the wastes. It has taken 6 months to obtain this list because CNL did not have it. How do you insure that radioactive wastes are not lost if you do not track them thoroughly?</p> <p>There is not reference in the REGDOC, to the IAEA standard that contains important information on the relationship of different waste classes to different types of waste facilities. If the CNSC cannot define clearly the waste classes and the types of disposal for each of them, how do you think that the licensees could do that?</p>	<p>“The waste management program shall: ...require records of the waste inventory under control and maintain those records.”</p> <p>As a result of this comment, a reference to GSG-1 has been included in the REGDOC.</p>