

# **Critical Flaws, Errors and Omissions in CNSC Staff's *Environmental Assessment Report* and Case to Approve the Chalk River Mound**

**February 25, 2022**

The Canadian Nuclear Safety Commission (CNSC) prepared a 590-page licensing document, CMD 22-H7, for a Part 1 hearing on February 22, 2022 on an application from Canadian Nuclear Laboratories (CNL) to amend its Chalk River Laboratories site licence to allow construction of a radioactive waste mound known as the "NSDF".<sup>1</sup> CMD 22-H7 includes an "*Environmental Assessment Report*" prepared pursuant to the *Canadian Environmental Assessment Act, 2012*. The CMD recommends that the CNSC's Commissioners approve the licence application.

This preliminary assessment of flaws, error and omissions has been prepared by Concerned Citizens of Renfrew County and Area, the Old Fort William Cottagers Association, and Ralliement contre la pollution radioactive.

## **Part A ~ CRITICAL FLAWS**

### **1. The report contains **virtually no information** about wastes that would go in the mound.**

Section 3 (1) (j) of the *General Nuclear Safety and Control Regulations* requires that an application for a licence provide, "***the name, quantity, form, origin and volume of any radioactive waste or hazardous waste***" to be disposed of. The NSDF *Environmental Impact Statement*<sup>2</sup> (EIS) only provides a list of 31 radionuclides that would go in the mound without describing in what waste types they are found (contaminated soils, demolition wastes, commercial wastes, etc.). The radionuclide list is incomplete. Dozens of radionuclides including decay products are missing from the list. There is also no information on quantity, form, origin or volume.

### **2. Astonishingly, the report makes no mention of long-lived radionuclides**

According to the International Atomic Energy Agency (IAEA), the characteristics of radioactive waste determine what strategies for disposal are acceptable. Significant quantities of "long-lived radionuclides" must be put underground in order to isolate them from the biosphere for the many millennia that they remain hazardous and radioactive.<sup>3</sup>

The proponent's partial list of radionuclides destined for the mound indicates that 25 of the 31 radionuclides are long-lived, with half-lives ranging from 1,600 to 14 billion years. They include uranium-233 and plutonium-239 produced for the U.S. nuclear weapons program.<sup>4</sup>

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<sup>1</sup> *Required Approvals for Construction of the Near Surface Disposal Facility (NSDF) at the Chalk River Laboratories (CRL) site*. Canadian Nuclear Safety Commission **CMD 22-H7**. 24 January 2022.

<https://www.nuclearsafety.gc.ca/eng/the-commission/hearings/cmd/pdf/CMD22/CMD22-H7.pdf>

<sup>2</sup> *Final Environmental Impact Statement for the Near Surface Disposal Facility Project (EIS)*.

<https://www.iaac-aeic.gc.ca/050/evaluations/document/139596>

<sup>3</sup> *Disposal of Radioactive Waste*. IAEA Safety Standards **SSR-5**. International Atomic Energy Agency, Vienna, 2011. [https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1449\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1449_web.pdf)

<sup>4</sup> EIS, p. 3-26, Table 3.3.1-2: NSDF Reference Inventory and Licensed Inventory

Failure to mention “long-lived radionuclides” or the inability of an above-ground mound to contain them for the duration of their hazard are critical omissions from CMD 22-H7 that make it impossible for Commissioners to make a sound, informed decision on licensing.

### **3. The report fails to mention Cobalt-60 commercial wastes.**

The term “disused sources” does not occur in CMD 22 H-7, despite the fact that the proponent plans to put large numbers of disused, highly radioactive Cobalt-60 sources in the mound. Cobalt-60 ( $9.06 \times 10^{16}$  Bq) alone will provide 98% of the initial radioactivity in the mound, even though its radioactivity will rapidly decrease thereafter. Disused sources are only briefly mentioned in the *NSDF Waste Acceptance Criteria*, the key document providing limits on quantities and radioactivity concentrations of radioactive substances destined for the mound.<sup>5</sup>

Lead shielding must be used to protect workers handling these wastes. Roughly 200 tonnes of lead shielding would be disposed of in the mound, leading to contamination of groundwater.<sup>6</sup> Risks to workers and contamination of groundwater with lead are not discussed in the CMD. Groundwater contamination post-closure is mentioned by CNSC staff but is not considered to be a serious adverse environmental effect.

The IAEA says that disused Cobalt-60 sources can go into a true near surface disposal facility only if they are below a certain concentration of radioactivity<sup>7</sup> (see item 3 in Part C below for more on the definition of “near surface disposal”). This is a complex matter that is completely ignored by CNSC staff in CMD 22 H-7 (see item 1 under Part C below for more on this.)

### **4. Requirements for “waste characterization,” a key step in ensuring safety, are essentially non-existent in the proposed licence.**

At three places the *Environmental Assessment Report* says “Under CNSC licence, Canadian Nuclear Laboratories (CNL) would also have to comply with the CNSC waste characterization requirements as outlined in CNSC Regulatory Document, REGDOC-2.1.1.1 (sic), volume 1.” The document referred to, REGDOC-2.11.1, Volume 1, is not included in the licence, so CNL would NOT have to comply with it. And even if it were included in the licence, it contains no substantial requirements for waste characterization, stating only that the licensee shall characterize “principal” radionuclides “as applicable”.<sup>8</sup>

### **5. The report fails to note deficiencies in the proponent’s siting process**

The siting process did not include consideration of any locations other than Atomic Energy of Canada (AECL) properties at Chalk River and Rolphton (which are immediately adjacent to the Ottawa River, a drinking source for millions of Canadians), and AECL’s Whiteshell Laboratories on the Winnipeg River. The IAEA says siting is a “fundamentally important activity in the disposal

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<sup>5</sup> *Waste Acceptance Criteria* Canadian Nuclear Laboratories 232-508600-WAC-003 Revision 4. [https://www.cnl.ca/wp-content/uploads/2021/03/Near-Surface-Disposal-Facility-Waste-Acceptance-Criteria-Rev-4\\_EN.pdf](https://www.cnl.ca/wp-content/uploads/2021/03/Near-Surface-Disposal-Facility-Waste-Acceptance-Criteria-Rev-4_EN.pdf)

<sup>6</sup> *Waste Acceptance Criteria*, Table 11, Estimated Quantity of Metals in ECM at Closure.

<sup>7</sup> *Classification of Radioactive Waste*. IAEA General Safety Guide No. **GSG-1**. Table III–1. Disused Sealed Radioactive Sources. [https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419\\_web.pdf](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf)

<sup>8</sup> *REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste*. Section 7.2, Waste characterization. CNSC 2021. [https://www.nuclearsafety.gc.ca/pubs\\_catalogue/uploads/REGDOC-2-11-1-volume-I-management-of-radioactive-waste.pdf](https://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/REGDOC-2-11-1-volume-I-management-of-radioactive-waste.pdf)

of radioactive waste.”<sup>9</sup> It appears that proximity to contaminated structures awaiting demolition at AECL’s Chalk River Laboratories—not environmental protection—was the priority in the siting of the NSDF.

The proponent and CNSC staff failed to seriously consider alternative sites that would avoid rapid discharge of radioactive and hazardous substances to a major water body, and avoid placing wastes in an area with a high water table.<sup>10</sup>

The southern portion of the mound would be underlain by a feature categorized in 1994 as a “high-probability” fracture zone,” ten meters wide and over a kilometer long – a potential groundwater flow pathway with “permeability values several orders of magnitude greater than bulk rock mass.”<sup>11</sup> This feature should have eliminated the proposed site from further consideration during the site evaluation stage.

Original site selection criteria announced by the proponent would have excluded any site with more than a 10% slope. The criterion was changed to 25% to allow the chosen site – which lies on the side of a hill, surrounded on three sides by wetlands that drain into Perch Creek 50 metres from the base of the hill.<sup>12</sup> Perch Creek drains into the Ottawa River one kilometre away. Risks of building the NSDF on a hillside - an area of steep slope - are not addressed in CMD 22 H-7.

#### **6. The report fails to address alternative facility types that would better contain the wastes.**

According to the IAEA, a disposal facility at or near the surface is “susceptible to processes and events that will degrade its containment and isolation capacity over much shorter periods of time.”<sup>13</sup> Such a facility is not suitable for long-lived radioactive materials. These, according to the IAEA, are “intermediate-level waste” (ILW).<sup>14</sup> The IAEA notes that “Owing to the presence of non-negligible amounts of long lived alpha emitters, waste from research facilities [such as the Chalk River Laboratories] generally belongs to the ILW class and even, in some circumstances, to the HLW class.”<sup>15</sup> However, 95% of the ILW at Chalk River was recently reclassified as low-level waste, presumably to allow its disposal in the mound.<sup>16</sup>

Thus the proposed facility would not be in compliance with international safety standards/practice for radioactive waste disposal. The facility would violate a key principle of radioactive waste management that the radioactive inventory must decay to an internationally accepted level within the design life of the facility to allow release from regulatory oversight.<sup>17</sup> The report does not address alternative facility types that would better contain the wastes and not expose them to rain, wind, and snow; and that would not require unproven water treatment or “weather cover structure” technologies.

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<sup>9</sup> *Near Surface Disposal Facilities for Radioactive Waste*. IAEA Specific Safety Guide No. **SSG-29**. Appendix I Siting of Near Surface Disposal Facilities. (p. 83) [https://www-pub.iaea.org/MTCD/publications/PDF/Pub1637\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/Pub1637_web.pdf)

<sup>10</sup> CMD 22-H7, Section 3.2, Design Options Evaluation.

<sup>11</sup> EIS, p. 5-109, Section 5.3.1.4.2.1 Regional Geological Conditions – Bedrock

<sup>12</sup> *Near Surface Disposal Facility Site Selection Report* 232-10300-TN-001 Revision 2. CNL Oct. 2016.

<sup>13</sup> SSG-29, p. 18

<sup>14</sup> GSG-1, p. 6

<sup>15</sup> GSG-1, p. 38

<sup>16</sup> *Questions about Canada’s Seventh Report to the Joint Convention ~ letter to IAEA from CCRCA* <https://concernedcitizens.net/2021/07/12/questioning-information-in-canadas-seventh-report-to-the-joint-convention-letter-to-iaea-from-ccrca/>

<sup>17</sup> SSR-5, p. 26, Requirement 8: Containment of radioactive waste

**7. There is relatively little about human health risks in the document, beyond the unsupported assertion that radiation doses will be within “acceptable limits.”**

These assertions are based on non-transparent models with numerous built-in assumptions. Use of these models results in large uncertainties in assessments of risks and doses. The *International Nuclear Workers’ Study* (INWORKS) suggests radiation risks are greater than previously understood and exist even at very low doses.<sup>18</sup>

The report also fails to consider future human exposures to nuclear waste packages containing plutonium and other long-lived alpha-emitting substances that will remain dangerously radioactive for tens of thousands of years.

**8. The report contains no discussion of “end state” objectives.**

Long-lived radionuclides proposed for disposal in the mound - if present in packaged wastes at maximum permitted limits - would not decay to clearance levels for thousands to millions of years.

At 1,600 years post-closure, the entire contents of the mound would exceed unconditional clearance levels by more than five-fold, even if all radionuclides were evenly distributed throughout. Hence removal from regulatory control would not be possible for millennia.

CNSC's *Environmental Assessment Report* is supposed to cover all licensing stages, including decommissioning and abandonment (removal from regulatory control). But it contains absolutely no mention of an end-state report. This is a fatal omission in the environmental assessment.<sup>19</sup>

**9. Possible threats to the mound’s integrity, including earthquakes, floods, fires, tornadoes, malfunctions, and accidents were dismissed as “not significant” with no credible analysis.**

The Ottawa River is a major fault line and the Chalk River Laboratories property is completely within the Western Quebec Seismic Zone.<sup>20</sup> The Ottawa Valley has become tornado prone<sup>21</sup> in recent years and climate change is increasing the frequency of extreme rainfall events, floods and fires. None of these threats was seriously assessed in the report.

**10. The report fails to address the potential for scavenging by future populations.**

Human intrusion after an Institutional Control Period is usually the safety-limiting factor for a near-surface disposal facility. The *Environmental Assessment Report* includes two scenarios for inadvertent human intrusion, but is mute on the much more likely scenario of scavengers digging into the mound for scrap metal. The NSDF is expected to contain an estimated 33 tonnes of aluminum, 178 tonnes of lead, 3,520 tonnes of copper, and 10,442 tonnes of iron.<sup>22</sup> There is no discussion in the report of the need to prevent scavenging of these materials.

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<sup>18</sup> Laurier, Dominique, et al. "The international nuclear workers study (INWORKS): a collaborative epidemiological study to improve knowledge about health effects of protracted low-dose exposure." *Radiation Protection Dosimetry* 173.1-3 (2017): 21-25.

<sup>19</sup> *CNSC’s EA report for the Chalk River Mound – failure to consider “end state objectives”*. <https://concernedcitizens.net/2022/02/15/cnscs-ea-report-for-the-chalk-river-mound-failure-to-consider-end-state-objectives/>

<sup>20</sup> *Western Quebec Seismic Zone*. [https://en.wikipedia.org/wiki/Western\\_Quebec\\_Seismic\\_Zone](https://en.wikipedia.org/wiki/Western_Quebec_Seismic_Zone)

<sup>21</sup> *Has eastern Ontario become a tornado hot spot?* <https://www.cbc.ca/news/canada/ottawa/eastern-ontario-tornado-ottawa-gatineau-1.5674117>

<sup>22</sup> *Waste Acceptance Criteria*, Table 11, Estimated Quantity of Metals in ECM at Closure.

## 11. The report poorly describes the expected degradation of the mound through a process of “normal evolution”

A *Performance Assessment*<sup>23</sup> prepared by the proponent describes the mound’s eventual degradation after 300 years.<sup>24</sup> At that time the mound would still contain large quantities of dangerous long-lived radioactive materials as well as all of the hazardous wastes disposed of during operation. During the mound’s degradation and disintegration, mixed radioactive and hazardous industrial wastes (lead, arsenic, beryllium, mercury, benzene, dioxins, PCBs, etc.) would leak into the Ottawa River, essentially forever. Long-lived radionuclides flowing out of the degraded mound would include plutonium, americium, neptunium and many others.

The *Environmental Assessment Report* does not adequately describe how degradation of the top cover, bottom liner, and waste packages will affect the release of the mound’s contents. Neither the *Performance Assessment* nor the *Environmental Assessment Report* accounts for more rapid mound degradation with more extreme weather events caused by climate change.

The inevitable disintegration of an above-ground mound due to normal and extreme weather, erosion, plant growth, burrowing animals etc. is why landfill type facilities are not suitable for much of the waste that is proposed for this facility.

## Part B ~ SERIOUS ERRORS

### 1. The report includes a **large error** comparing radioactivity in local uranium ore samples to radioactivity in the proposed mound.

CNL **overestimated** radioactivity in local ore samples by 1000 times and incorporated this error in its Safety Case<sup>25</sup> in a comparison of risks of ingesting ore samples and NSDF waste.<sup>26</sup>

CNSC staff then repeated this mistake in Slide 23 of the presentation that accompanies CMD 22 H-7<sup>27</sup>. This slide suggests that radioactivity in the mound would be less than radioactivity in local rocks a few decades after closure. In fact, high-radioactivity waste containers in the mound would exceed levels in surrounding rocks for thousands of years. **This error indicates a need to revise the “Licensed Inventory.”**<sup>28</sup>

### 2. The report says that “only low-level radioactive waste” would go in the mound.

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<sup>23</sup> *Performance Assessment for Near Surface Disposal Facility to Support the Environmental Impact Statement*. CNL, March 2017 232-509240-ASD-001 Revision 0

<sup>24</sup> *Consortium’s study appears to show the Chalk River mound would disintegrate*.

<https://concernedcitizens.net/2020/11/04/the-proponents-own-study-shows-that-the-chalk-river-mound-will-disintegrate/>

<sup>25</sup> *Safety Case*, Revision 2, p.59 CNL, January 2021. 232-03610-SAR-001 [https://www.cnl.ca/wp-content/uploads/2021/03/Near\\_Surface\\_Disposal\\_Facility\\_Safety\\_Case\\_Rev\\_2.pdf](https://www.cnl.ca/wp-content/uploads/2021/03/Near_Surface_Disposal_Facility_Safety_Case_Rev_2.pdf)

<sup>26</sup> *Safer to eat radioactive waste than local rocks?* <https://concernedcitizens.net/2022/02/20/safer-to-eat-radioactive-waste-than-local-rocks/>

<sup>27</sup> *CNSC Staff Presentation* Commission Hearing, Part 1 February 22, 2022 CMD 22-H7.A <https://www.nuclearsafety.gc.ca/eng/the-commission/hearings/cmd/pdf/CMD22/CMD22-H7-A.pdf>

<sup>28</sup> *Waste Acceptance Criteria*, Table 13, NSDF Licensed Inventory

Wastes with significant quantities of long-lived radionuclides or shorter-lived, high-activity radionuclides are categorized as intermediate-level waste (ILW) by the IAEA.<sup>29</sup> The assertion made in October 2017 by Canadian Nuclear Laboratories (CNL) that the NSDF would “only contain low-level radioactive waste,” is misleading and should be corrected.<sup>30</sup> CNL contradicted this in June 2019 when it told the CNSC: “There are current plans to place ILW in aboveground mounds.”<sup>31</sup> Again, IAEA says wastes such as these need to be disposed of underground.

### **3. The report fails to acknowledge that the mound would be a landfill, not a true “near surface disposal facility”.**

The internationally accepted definition of “near surface disposal” is “Disposal in a facility consisting of engineered trenches or vaults constructed on the ground surface or up to a few tens of metres below ground level.”<sup>32</sup> The misnamed “NSDF” would be “similar to a municipal landfill”<sup>33</sup> -- an above-ground mound 60 feet in height. The IAEA says that landfills are only suitable for “very low level waste.” The IAEA says that if artificial radionuclides are to be put in a landfill, they should be short-lived, with limited total activity, and “levels of activity concentrations one or two orders of magnitude above the levels for exempt waste.”<sup>34</sup>

However, the NSDF “*Waste Acceptance Criteria*” would allow unlimited activity concentrations in cobalt-60 packaged wastes, even though the Co-60 exemption level in the *Nuclear Substances and Radioactive Devices Regulations* is 0.1 Bq/g. It would allow 10,000 Bq/g of cesium-137 in packaged wastes, one thousand times its exemption level of 10 Bq/g; 10,000 Bq/g of long-lived chlorine-36, ten thousand times its exemption level of 1 Bq/g; and 10,000 Bq/g of very long-lived iodine-129, one million times its exemption level of 0.01 Bq/g.<sup>35</sup>

## **Part C ~ OMISSIONS AND OTHER PROBLEMS THAT NEED TO BE ADDRESSED**

### **1. The Waste Acceptance Criteria document is incomplete**

According to IAEA TRS-436 guidance<sup>36</sup> and Table III-1/Fig. III-1 in IAEA GSG-1, sources of cobalt-60 having a radioactivity lower than 10E+7 Bq are “low-level wastes” that can be placed in a near surface disposal facility. CNL has promised that their *Waste Acceptance Criteria* document will be corrected so that only radioactive sources that have reached the regulatory exemption level within 100 years after closure could be accepted into the NSDF. However a revised version of the *Waste Acceptance Criteria* was not available for the hearing starting February 22, 2022.

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<sup>29</sup> GSG-1, p.7, Fig. 1, Conceptual illustration of the waste classification scheme.

<sup>30</sup> CNL updates NSDF Waste Inventory, October 26, 2017 [https://www.cnl.ca/success\\_stories/cnl-updates-nsdf-waste-inventory/](https://www.cnl.ca/success_stories/cnl-updates-nsdf-waste-inventory/)

<sup>31</sup> Canadian Nuclear Laboratories comments on draft REGDOC-2.11.1, *Waste Management, Volume 1: Management of Radioactive Waste*. <https://www.nuclearsafety.gc.ca/eng/pdfs/REGDOC-comments-received/Comments-REGDOC-2-11-1-v1-CNL.pdf>

<sup>32</sup> SSR-5, p. 4

<sup>33</sup> EIS, p. 1-5

<sup>34</sup> GSG-1, p.11

<sup>35</sup> *Waste Acceptance Criteria*, Table 4, Radionuclide Concentration Limits in NSDF Waste.

<sup>36</sup> *Disposal Options for Disused Radioactive Sources*, IAEA Technical Reports Series No. 436. [https://www-pub.iaea.org/MTCD/publications/PDF/TRS436\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/TRS436_web.pdf)

As noted above, the NSDF *Waste Acceptance Criteria* does not prescribe any radioactivity per unit mass limit for short half-life radionuclides in “leachate-controlled” waste packages.<sup>37</sup> This could enable highly radioactive materials with short half-lives to be disposed of in the mound, by placing them in “leachate-controlled” waste packages.

The proponent provided no description of the leachate-controlled packages to CNSC and the packages are not mentioned or described in CMD 22 H-7. There is no evidence provided that “leachate-controlled” waste packages” would stand up to compaction in the mound or prevent water entry. CNL’s calculation of the stress on packages accounted only for the weight of overlying waste, but not compaction by rollers or other heavy equipment.<sup>38</sup>

## **2. The report contains limited analysis of the impacts of the loss of 30 hectares of high-quality mature forest.**

High-quality mixed forested and wetland habitat would be lost if the NSDF Project is approved. There is no information about **the fate of the tens of thousands of trees** that would be sacrificed for this project. These trees are home for four bat species, three (Little Brown Myotis, Northern Myotis, the Tri-Coloured Bat) protected under the federal *Species at Risk Act* and another (Eastern Small-Footed Myotis) protected provincially. Federally protected bird species in this forest area include Canada Warbler, Eastern Whip-Poor-Will, Wood Thrush, and Golden-Winged Warbler. No effective mitigation measures are proposed to address the loss of habitat for these species.<sup>39</sup> Will the trees be piled and burned? The report is silent on this. These trees are already contaminated with tritium and carbon-14 from years of radioactive gas releases at Chalk River. Will these contaminants now be spread further? What are the impacts of clear-cutting a large forest area on surface and groundwater movement?

## **3. The report fails to mention the truckloads of radioactive demolition waste piled up in shipping containers at Area H that CNL plans to directly abandon in the mound.**

There is no evidence that the contents of these intermodal shipping containers<sup>40</sup> have been properly analyzed. This would represent an extraordinary means of disposal of radioactive waste, never done before at any disposal facility anywhere in the world.

## **4. Risks of transporting wastes to the facility have not been considered.**

Indigenous communities are on record as opposing transport of radioactive materials through their territories.<sup>41</sup> An Ottawa City Council resolution in April 2021 opposed importation of radioactive waste into the Ottawa Valley.<sup>42</sup> Legacy federal wastes from three provinces are destined for the mound along with commercial wastes from many locations. Risks associated with transportation;

<sup>37</sup> *Waste Acceptance Criteria*, Table 4, Radionuclide Concentration Limits in NSDF Waste.

<sup>38</sup> *Calculated pressure on packaged containers inside the ECM*. CNL ID REA # 217388 June 2019.

<sup>39</sup> CMD 22-H7, Section 7.2.1, Migratory bird habitat loss and alteration.

<sup>40</sup> EIS, Section 3.3.1.1, NSDF Waste Types

<sup>41</sup> *Joint Declaration between the Anishinabek Nation and the Iroquois Caucus on the transport and abandonment of radioactive waste*. <https://www.anishinabek.ca/2017/05/02/joint-declaration-between-the-anishinabek-nation-and-the-iroquois-caucus-on-the-transport-and-abandonment-of-radioactive-waste/>

<sup>42</sup> *Resolution – Canadian Nuclear Laboratories Chalk River Nuclear Waste Near Surface Disposal*. City of Ottawa, May 2021. <https://iaac-aeic.gc.ca/050/documents/p81624/139087E.pdf>

including accidents, worker exposures, public exposures and double-handling; are not addressed in the report.

**5. The report does not acknowledge or adequately address the serious problem that the groundwater table is at the surface**

CMD 22-H7 says “slope depressurization accompanied by rock blasting will be needed to drain groundwater within the rock mass and lower groundwater elevations.”<sup>43</sup> Prior to rock blasting, horizontal drains will be drilled in the rock mass to lower the water table”. This is an admission that the **groundwater table at the surface is a serious problem** with the chosen site. Nothing about slope depressurization or horizontal drains can be found in the environmental impact statement. There is no definition in the report of a “horizontal drain” and there are no references. There is no indication that this concept has been reviewed by a hydro-geologist.

**6. Neither the *Licensed Inventory* nor the *Waste Acceptance Criteria* is included in the draft licence**

The NSDF *Licensed Inventory* and the *Waste Acceptance Criteria* would place limits on total quantities and concentrations of individual radionuclides to be disposed of in the mound.<sup>44</sup> The failure to include these as new conditions in an amended licence for the Chalk River Laboratories raises doubts as to whether they would be enforced.

**7. Environmental impacts of a pipeline to discharge treated leachate directly to Perch Lake are omitted from the report.**

This pipeline to the lake would be in use when the ground is frozen or covered with water and treated wastewater cannot be discharged into adjacent wetlands.<sup>45</sup> The *Environment Assessment Report*, which calls this a “mitigation measure”, fails to note that the pipeline would directly discharge partly treated contaminants, including large quantities of tritium, into a water body that drains into the Ottawa River, 1 km away. Tritium cannot be removed by leachate treatment.

The report fails to identify potential impacts of constructing the pipeline, which could include disturbance of overwintering habitat for at-risk Blanding’s Turtles, disruption of fish spawning habitat, removal of wetland vegetation, and release of drilling mud.<sup>46</sup>

**8. A late add-on to the project, referred to as a “weather cover structure,” still remains in the design stage**

It is impossible to assess whether or not a “weather cover structure” would have a meaningful impact in protecting the wastes from precipitation and high winds during operation of the facility. Plans for activities with impacts during the construction phase such as the *Blasting Safety Plan* and the *Construction Quality Control Plan* have yet to be completed. Other key documents such as *Safety Analysis Report*, *Waste Acceptance Criteria*, and *Post-Closure Safety Assessment* (including its contaminant transport model) are still under revision.<sup>47</sup>

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<sup>43</sup> CMD 22-H7, p. 7

<sup>44</sup> *Waste Acceptance Criteria*, Table 13, NSDF Licensed Inventory

<sup>45</sup> *Environmental Assessment Report: Near Surface Disposal Facility Project*, p.71 (part of CMD 22-H7)

<sup>46</sup> *Consolidated Commitment Lists*, p. 42 of 105. CNL 232-513440-REPT-001 Revision R0

<sup>47</sup> *Licensing Regulatory Actions, Licensing Phase: Construction. Draft*. January 2022 CNSC Canadian Nuclear Laboratories Program Division (Licensing Division):



**9. The report contains no assessment of migration of the existing contaminant plumes owing to construction activities**

The report gives no attention to impacts on nearby wetlands during the construction phase. The route of the pipeline would pass through the already-contaminated Perch Lake wetlands. Construction of a so-called “exfiltration gallery” to discharge wastes from the mound into the adjacent contaminated East Swamp Wetland could also have adverse environmental impacts, further adding to the pulse of radioactive and hazardous substances into the Ottawa River.<sup>48</sup>

**Omitting an assessment of migration of the existing contaminant plumes owing to construction activities,**<sup>49</sup> and the migration of these plumes owing to changes in surface and groundwater movement after construction, is a serious flaw in the *Environmental Assessment Report*.

**10. The report does not discuss a proposed “mitigation” measure, described in the “Consolidated Commitment Lists,” of bringing additional Port Hope wastes to Chalk River for disposal in the NSDF.**<sup>50</sup>

**11. The report contains no mention of Thorium-232, the radionuclide that would be present in the largest amount (mass) in the mound.**

Thorium-232 is the radionuclide that would be present in the largest amount (mass) in the mound, according to the *Licensed Inventory* found in the *Waste Acceptance Criteria*.<sup>51</sup> CMD22 H-7 contains not one single mention of this isotope, or its origin in Chalk River wastes generated by efforts to produce U-233 for nuclear weapons (through neutron bombardment of Th-232).

The proponent’s Licensed Inventory includes roughly six tonnes of thorium-232, which decays through radium-228, actinium-228, thorium-228, radium-224, radon-220, polonium-216, bismuth-212, polonium-212, and thallium-208. Of these nine decay products, none are included in the inventory.

The history of production of weapons-grade plutonium and uranium-233 at Chalk River is critical to understanding the origins (and risks) of the wastes that would go in the NSDF.<sup>52</sup> CNSC's failure to consider waste origins - despite section 3(1)(j) of the *General Nuclear Safety and Control Regulations* - invalidates its assessment of the NSDF.

**12. Commercial/industrial wastes are not discussed in the report**

Given that Chalk River is Canada's only licensed storage facility for commercial radioactive wastes,<sup>53</sup> it would be reasonable to expect a discussion of commercial and industrial wastes in CMD 22 H-7. The taxpayers of Canada are paying for commercial waste storage at Chalk River, and they will be paying for the disposal of these wastes in some type of disposal facility when one

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<sup>48</sup> *Environmental Assessment Report: Near Surface Disposal Facility Project*, p.54 (part of CMD 22-H7)

<sup>49</sup> *Environmental Assessment Report: Near Surface Disposal Facility Project*, p.71 (part of CMD 22-H7)

<sup>50</sup> *Consolidated Commitment Lists*, pp. 38 of 105 and 73 of 105

<sup>51</sup> *Waste Acceptance Criteria*, Table 13, NSDF Licensed Inventory

<sup>52</sup> *Canada’s Role in Atomic Bomb Drama*. <https://www.cns-snc.ca/media/history/1945Aug13PressReleasePart1.pdf>

<sup>53</sup> *The Government of Canada’s Radioactive Wastes: Costs and Liabilities Growing under Public-Private Partnership*. <https://concernedcitizens.net/2020/10/06/the-government-of-canadas-radioactive-wastes-costs-and-liabilities-growing-under-public-private-partnership/#comments>

becomes licensed at some point in the future. The many important questions around industrial and commercial wastes include risks of transport, long-lived radioisotopes, high-activity wastes, risks to workers, and risks to humans during the post closure period. Indigenous communities and the City of Ottawa are on record as opposing importation of radioactive waste into the Ottawa Valley. These issues should be part of a comprehensive *Environmental Assessment Report*.

### **13. No independent assessment of cost**

CMD 22-H7 states that CNSC staff did not factor "facility lifecycle costs" into their review of the NSDF.<sup>54</sup> Canadian taxpayers would be on the hook for CNL's estimated \$750 million cost for the NSDF.<sup>55</sup> The CNSC's decision on approval will be made with no independent review of this cost estimate or whether the NSDF would provide "value for money". Maintaining an above-ground mound and a waste treatment facility (to deal with leachate from wastes exposed to snow and rain) could result in long-term costs far exceeding those of a properly designed in-ground facility.

### **14. International safety standards (IAEA SSR-5) require maintaining information on a disposal facility, and prohibit reliance on institutional controls for extended periods of time**

There is no discussion in the report of requirement 22 in IAEA Safety Standard SSR-5 that plans shall be made for "the arrangements for maintaining the availability of information on the disposal facility."<sup>56</sup> Waste should not be abandoned.

SSR-5 also says that "the long term safety of a disposal facility for radioactive waste has not to be dependent on active institutional control."<sup>57</sup> The NSDF would rely on institutional controls during the 300 year "institutional control period." But CMD 22-H7 also states that "The Post-Institutional Control Period... continues indefinitely, subject to either federal or provincial regulatory control."<sup>58</sup>

This absurd contradiction – regulatory control during a post-institutional control period - is clearly at odds with international safety standards. Perpetual institutional control would represent an infinite liability for future generations of Canadians.

### **15. The report includes a "Consolidated Commitment Lists" document that is essentially a list of 856 unenforceable empty promises**

CMD 22-H7 claims that a "Consolidated Commitment Lists" document prepared by CNL "captures all mitigation measures" and would "become an enforceable condition that is set out in the Commission's decision."<sup>59</sup> Most of these 856 "commitments" merely repeat statements found in CNL's 1661-page EIS, but some are new, such as the provision that any Port Hope waste left over the closure of the two mounds there would be sent to Chalk River for disposal. This would worsen, not mitigate, the environmental impacts of the NSDF. These so-called "mitigation measures" are largely unenforceable, empty promises.

### **16. The report contains no references.**

It is impossible to verify statements in the *Environmental Assessment Report* unless references are provided.

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<sup>54</sup> CMD 22-H7, p. 28

<sup>55</sup> EIS, p. 2-19

<sup>56</sup> SSR-5, p.41

<sup>57</sup> SSR-5, pp. 28 and 41

<sup>58</sup> CMD 22-H7, p.17

<sup>59</sup> *Environmental Assessment Report: Near Surface Disposal Facility Project*, p.34 (part of CMD 22-H7)