



**Final submission from
Lynn Jones**

**Mémoire définitif de
Lynn Jones**

In the Matter of the

À l'égard des

Canadian Nuclear Laboratories (CNL)

Laboratoires Nucléaires Canadiens (LNC)

Application from the CNL to amend its Chalk River Laboratories site licence to authorize the construction of a near surface disposal facility

Demande des LNC visant à modifier le permis du site des Laboratoires de Chalk River pour autoriser la construction d'une installation de gestion des déchets près de la surface

**Commission Public Hearing
Part 2**

**Audience publique de la Commission
Partie 2**

May and June 2022

Mai et juin 2022

Final Submission with respect to Canadian Nuclear Laboratories' application to amend its Chalk River Laboratories site licence to authorize the construction of a "near surface disposal facility"

June 6, 2023
Lynn Jones, M.H.Sc.

Thank you for the opportunity to submit final comments on the environmental assessment and licensing of the proposed giant above-ground radioactive waste dump at Chalk River, misnamed "near surface disposal facility" by CNSC staff.

For the purposes of this final submission, I would like to emphasize two points from my oral intervention on May 31, 2022 and a couple of additional points presented by Dr. JR Walker in his June 1, 2022 oral and written interventions.

1. The NSDF will not contain and isolate wastes

From my reading of International Atomic Energy Agency (IAEA) safety standards, it is a fundamental principle of radioactive waste management that wastes must be isolated from the biosphere for the duration of their radiological hazard.

The IAEA document SSR-5 Specific Safety Requirements "Disposal of Radioactive Waste" states several times that **"The preferred strategy for the management of all radioactive waste is to contain it and to isolate it from the accessible biosphere."**

It is clear that The NSDF would not contain and isolate radioactive waste from the accessible biosphere. One only needs to look at the table in the EIS entitled "Maximum concentrations of radionuclides in the treated effluent and east swamp stream." Just above the table is the statement **"both aquatic and terrestrial species will be exposed to contaminated surface water and sediment in the East Swamp stream, perch lake, perch creek, and Ottawa River."**

The table lists **29 radionuclides** that will be present in the treated effluent. They include a large quantity of tritium and **four isotopes of plutonium**.

To be clear, this is "treated effluent" we are talking about here. So after "mitigation" by the waste treatment plant, the effluent being dumped into the Perch Creek Basin and Ottawa River contains **29 radionuclides including four isotopes of plutonium!** This contaminated effluent is being dumped into a drinking water source for millions of Canadians. This is a pretty outrageous proposal in my view, dumping plutonium-laced effluent in to people's drinking

water. Only people ignorant of the very serious risks of radiation could propose such an immoral abomination.

So the NSDF is clearly NOT going to contain and isolate the waste from the biosphere.

Every release of radioactive material into the Ottawa River increases risks of adverse effects from exposure to radiation to human and non-human biota. These increased risks cannot be justified (and therefore are not “reasonable”) because they would be inflicted on many people who received no benefit from the programs that created the wastes. (eg residents of Quebec downstream of Chalk River in Gatineau and Montreal)

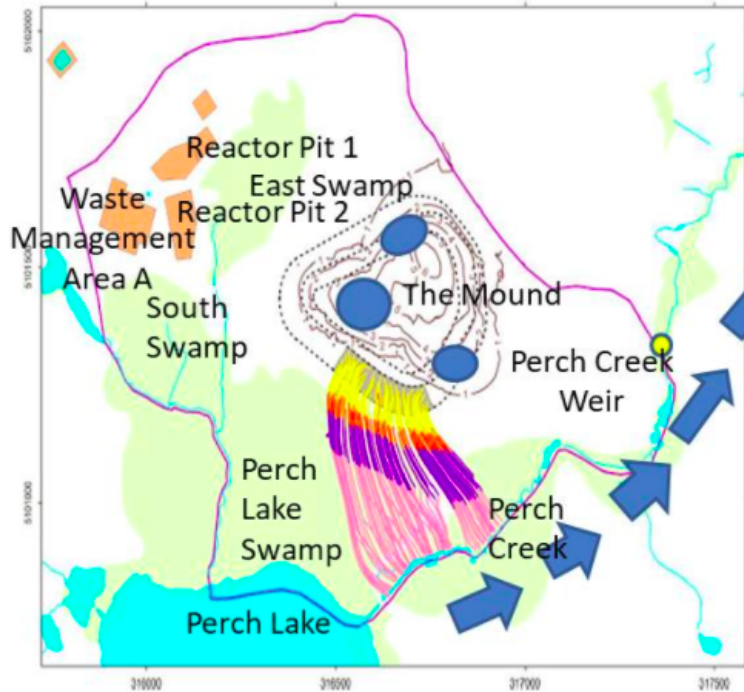
2. The giant radioactive waste mound is expected to disintegrate in a process of “normal evolution”

Some time shortly after the “institutional control period” ends, according to CNL’s Performance Assessment for the NSDF, the mound is expected to disintegrate in one of two predicted scenarios which are 1) leaching through the base liner and 2) Bathtub effect overflow scenario

This inevitable disintegration was clearly described in the Draft EIS for the NSDF (2017) which included 25 occurrences of the phrase “liner and cover failure as a result of normal evolution” and **3 occurrences** of the phrase “inevitable failure of the cover”

CNL’s *Performance Assessment for the NSDF* included the following illustration of the “Bathtub Scenario.” The blue arrows and the Ottawa River were added by Concerned Citizens of Renfrew County and Area researcher Ole Hendrickson, when he incorporated Figure 8-5 into a Powerpoint deck.

The “Bathtub” Scenario



“Upon cover failure, untreated leachate discharges into Perch Creek along its northern stream bank (between Perch Lake and Perch Creek Weir **approximately 1.5 km from Ottawa River**) at a daily average flow rate of 120 m³/d (43,200 m³/year). The total waste volume will require approximately 25 years to fully discharge into Perch Creek.” (Source: EIS, p. 5-212)

Figure 8-5 Conceptual Representation of the “Bathtub” Scenario Source: Performance Assessment for NSDF to Support the EIS March 2017 232-509240-ASD-001 Rev. 0

Here is part of a table showing radionuclide flow out of the mound (**including four isotopes of plutonium**) as it disintegrates: (page 763 of the draft EIS)

Table 5.8.6-5: Radionuclide Flux Flowing out of the ECM during Bathtub Scenario

Radionuclide	Radionuclide Concentrations (Bq/yr)	Radionuclide	Radionuclide Concentrations (Bq/yr)
Ac-227	1.07×10^6	Pu-239	2.14×10^7
Ag-108m	2.52×10^6	Pu-240	3.25×10^7
Am-241	7.77×10^7	Pu-241	1.25×10^{-2}
Am-243	5.25×10^4	Pu-242	1.01×10^5
C-14	2.48×10^{10}	Ra-226	3.07×10^6
Cl-36	3.71×10^8	Ra-228	1.95×10^{-6}
Co-60	1.16×10^{-8}	Se-79	1.16×10^5
Cs-135	2.12×10^5	Sn-126	8.32×10^4
Cs-137	2.62×10^9	Sr-90	3.36×10^7

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And finally here is a pie chart showing the contribution of various radionuclides (such as Carbon-14, Polonium and Caesium-137) to the radiation dose that would be received by an infant downstream in Pembroke, under the “bathtub scenario” of “normal evolution” of the Chalk River Mound: (Page 190 of the Performance Assessment document)

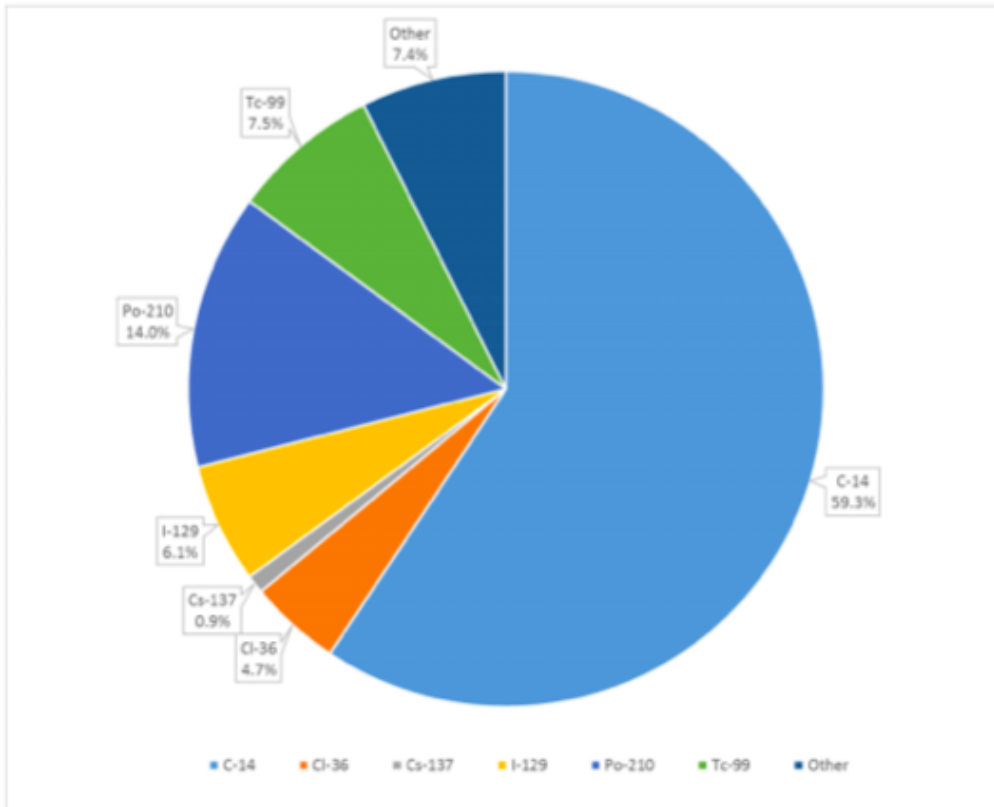
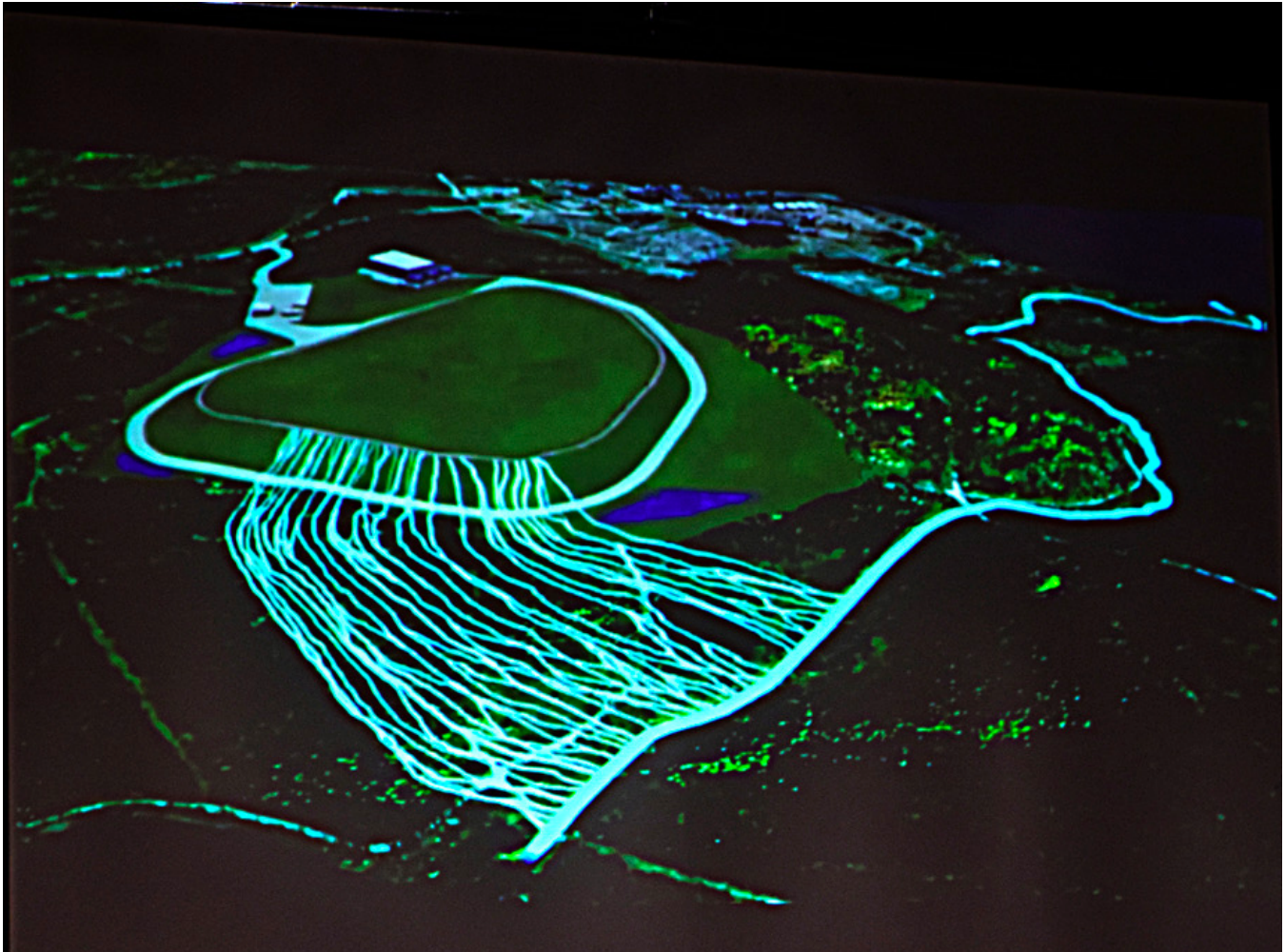


Figure 8-7 Percent Contribution by Radionuclide for Predicted Dose to an Infant in Pembroke (Bathtub Scenario)

So again, **clearly the proposed NSDF will not contain and isolate wastes from the biosphere.** And again, every release of radioactive material into the Ottawa River increases risks of adverse effects (cancer, birth defects and genetic mutations) in human and non-human biota from exposures to radiation. These increased risks, especially the ones occurring in the distant future cannot be justified (and therefore are not “reasonable”) because the people being exposed the them would have received **zero benefit** from the nuclear programs that produced the wastes and risks.

The graphic below was produced by Radio Canada “Découverte” in March 2018 for its superlative documentary, Chalk River Heritage. The graphic shows the mound overflowing and radioactively contaminated material spilling out of the

mound and entering the Ottawa River under the “bathtub scenario” described by the proponent as one of two likely scenarios for “normal evolution” of the mound.



I would now like to highlight a couple of points from these 2022 interventions of Dr. JR Walker:

<https://www.nuclearsafety.gc.ca/eng/the-commission/hearings/cmd/pdf/CMD22/CMD22-H7-63.pdf>

<https://www.nuclearsafety.gc.ca/eng/the-commission/hearings/cmd/pdf/CMD22/CMD22-H7-63A.pdf>

Dr. Walker was a high ranking official in charge of radioactive waste management at AECL prior to his retirement in 2013. He was the "champion" of the Nuclear Legacy Liabilities Program, the multi-million dollar federal program in the early 2000's (prior to privatization) to clean up the \$8 billion dollar nuclear waste liability at Chalk River. His most recent title at AECL was Director of Safety

Engineering and Licensing. **His expertise on the question of whether or not to license the NSDF, is unparalleled.**

As Dr. JR Walker has noted in his 2022 Interventions, radiation doses to humans from the mound are out of compliance with regulations:

“the maximum doses to persons from the Engineered Containment Mound are 0.015 mSv and 0.14 mSv, for the normal evolution and disruptive events, respectively. These maximum doses occur at 4,100 years and 7,650 years, respectively, both of which are significantly beyond the design life of the Engineered Containment Mound.”

*“The stated doses of 0.015 mSv and 0.14 mSv are both above the criteria used by our international partners and are **non-compliant with the criteria for disposal given in Canadian regulations** [8]. Hence, even using the stated inventory of the Engineered Containment Mound (Table 1), the radionuclides have not decayed sufficiently to meet disposal criteria even after several thousand years. (emphasis added)*

Another point on which Dr. Walker is clear and unequivocal is the question of “Intermediate level waste.” According to the IAEA, Intermediate level radioactive waste must be disposed of tens of meters below the ground.

Though the very long environmental assessment process, there was much debate and confusion over whether or not CNL intended to put ILM in the giant Chalk River Mound. Dr. Walker asserts that there is no question that the wastes CNL intends to put in the giant mound are Intermediate level and must be disposed of underground as noted in the following quotes from his 2022 interventions:

*“The waste acceptance criteria are insufficiently protective for the material permitted to be emplaced in the proposed Engineered Containment Mound to qualify as low level waste — the radionuclides do not decay to an acceptable level during the time that institutional controls can be relied upon. Consequently, **the emplaced material is intermediate level radioactive waste that should not be emplaced in a near surface***

facility because it requires a greater degree of containment and isolation than that provided by near surface disposal;” (emphasis added)

*“...only one radionuclide (Tritium) decays sufficiently to meet Canada’s disposal criteria by the end of the Institutional Control Period. **The other radionuclides take hundreds, thousands, or millions of years to meet Canada’s disposal criteria.** The WAC are insufficiently protective — permitting material to be emplaced that is unsafe for near surface disposal. **This material is intermediate level waste and requires underground disposal.**”* (emphasis added)

*“The Proposal is an Engineered Containment Mound comprising a **large and unverified quantity of intermediate-level waste;**”* (emphasis added)

Disposing of Intermediate Level waste in an above-ground mound, clearly contravenes IAEA guidance and would lead to significant adverse environmental effects and unreasonable risks to humans and non-human biota. It would also be highly unethical.

By way of an overall summary, there are clearly significant adverse environmental risks that cannot be mitigated, and unreasonable radiation risks associated with the proposed NSDF.

The CNSC’s mandate is to protect people and the environment from radioactivity produced by the nuclear industry. The Commission cannot approve the requested license amendment authorizing construction of the NSDF AND uphold its mandate. The two things are incompatible. Under Section 52 of CEA 2012, Commissioners can refer the decision to elected officials in Cabinet and sleep with a clear conscience.