Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 22-H7.150

File / dossier : 6.01.07
Date: 2022-04-11
Edocs: 6772249

Oral presentation

Written submission from Simon J. Daigle

Exposé oral

Mémoire de Simon J. Daigle

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

Canada

BRIEF

Submission to CNSC re: CNL's application to amend its license to allow for the construction of a Near Surface Disposal Facility (Ref. 2022-H-07)

Simon J Daigle, B.Sc., M.Sc., M.Sc (A)
Occupational / Industrial Hygienist, Toxicologist (Solvent exposures – hydrocarbons)
Air quality (Tropospheric Ozone) / Climate Change Expert
Epidemiologist (Communicable and non-communicable diseases)
Climatologist & geophysicist (geothermal energy)

I would like to submit this letter brief and request to present these concerns virtually on May 31, 2022, as a concerned Canadian.

The following are explicit reasons **TO NOT** consider a Near Surface Disposal Facility (Low Level Radiation Risks) at this time in the area considered for this project near Chalk River at Renfrew.

The **APPROVAL PROCESS OF THIS NSDF SITE MUST BE SUSPENDED** until all scientific facts are elucidated and supported by scientific review and consensus, social acceptability from all Canadians and locally and more importantly must be in alignment with IAEA principles (Ref. 2) & the recent IPCC Climate Change report (Ref. 3) for climate adaptation and mitigation for the site considered as there are real risks involved for the health and safety of the population, indigenous peoples and lands and our environment.

IPCC climate change risks are impacting Canada's climate currently and will be for thousands of years to come especially if the 1,5 C is not respected and more importantly if 2.7 C is predicted short term in this century. **It is clear that scientific evidence confirm that Canada is warming twice as faster than the rest of the planet and this will impact this NSDF site today as well as beyond the year 2100 and year 12,210 and that nuclear waste stored at this NSDF site will be impacted by climate change risks from increased precipitation, deforesting risks from wood products harvesting by companies on crown land, damages on indigenous lands from climate change, drought and forest fire risks, and increased erosion risks in time that are all problematic at a base of a any mountain.** Geomorphological erosion risks in time (hundreds to thousands of years) at a base of a mountain and from 1 km near the Ottawa river are problematic. **The suggested site will be impacted and may result in the increased the risk of radioactive waste leaking in the environment that is proximate to the Ottawa river,**

indigenous lands and that also feeds in the Montreal St-Lawrence River going through Montreal, Quebec Canada because of geomorphological erosion at this Near Surface Disposal Facility (Ref. 2022-H-07) (Ref. 1).

Additionally, the general area of Chalk River is seismically active in contrast to many other parts of the Shield within the Precambrian geological structure and are a concern comparatively to other more stable geological structures. Seismicity in the region and the presence of numerous major faults are a real concern that warrants extreme caution in the selection process of this NDSF site for a permanent nuclear waste disposal near surface facility site. Although, this risk is convoluted scientifically and regarded to be a low risk. This does not mean it will not impact future activity of seismic damage in this area as well as the impacts on this nuclear waste site and facility beyond the year 2100 and 12,100. Caution has to be applied to prevent leakage in the environment in which is problematic beyond the year 2100 and year 12,100. **Predictability is a real public concern based on seismotectonic regime probability within 50 years (10% chance of being exceeded of a risk of an earthquake) but also beyond the years 2100 & 12,100 inclusively (Ref. 6).**

In 2022, lithospheric and potential earthquake analysis in eastern Canada (Quebec and Ontario) are also a real public concern as per seismologists and experts. Here a few excerpts from one expert (Fiona Darbyshire, UQAM, GEOTOP – researcher, seismic & lithospheric activity) (Ref. 5 & 6). **So imagine, what will happen in the years 2100 or 12,100. We do know simply because of the following lithospheric and seismic scientific facts:**

Quotes – (Ref. 6, 7, 8 & 9): 2018 – Researcher / Expert: Fiona Darbyshire (UQAM_GEOTOP)

Phase velocity variations in southeastern Canada and the northeast USA (2018): "The formation and evolution of continental lithosphere is not yet well understood, and studying eastern Canada might illuminate ways to address some fundamental questions about evolving continents. Our study region includes the Phanerozoic Appalachian belt, and eastern Grenville province. The resolution of available seismic velocity models in this area, especially in the eastern part, is still not adequate due to lack of sucient data"

Lithospheric structure across eastern Canada (2018). "the structure of the crust appears to have changed over geological time; in particular, we observe a distinct difference between Archean crust, with a simple structure, sharp Moho and felsic compositions, and crust associated with Proterozoic mobile belts. The latter shows a systematically deeper and more complex Moho transition, highly-variable composition, and internal structures reminiscent of the present-day Himalayan collision zone. The deep seismic structure of the continent thus supports the hypothesis that modern-style plate tectonics was already active at least as far back as the Paleoproterozoic"

Additionally, CTV news 2011:

4.3-magnitude earthquake rattles western Quebec: A 4.3-magnitude earthquake struck an area covering eastern Ontario and western Quebec Wednesday afternoon, with people from Ottawa to the Greater Montreal Region reporting that they felt the temblor. CTV News. Published Wednesday, March 16, 2011 7:57PM EDT.

"Small earthquakes are felt in this zone three or four times a year. **Earthquakes cause damage in the zone about once a decade. According to Natural Resources Canada, around 450 earthquakes occur in eastern Canada each year. Among them, perhaps four exceed magnitude 4, while 30 will exceed magnitude 3. Seismologist Fiona Ann Darbyshire** says the area around western Quebec and eastern Ontario experience hundreds of small earthquakes a year, but they're usually quite smaller"

Other reasons for being cautious in approving this nuclear waste site : (Ref. 5)

1. The proposed site is unsuitable for a dump of any kind. The site is less than one kilometre from the Ottawa River which forms the border between Ontario and Quebec. The river is a drinking water source for millions of Canadians. After passing the Chalk River Laboratories, it flows downstream through Ottawa Gatineau, past Parliament Hill, and on to Montreal. The site is tornado and earthquake prone; the Ottawa River itself is a major fault line. The site is partly surrounded by wetlands and the underlying bedrock is porous and fractured.

2. The mound would contain hundreds of radioactive materials, dozens of hazardous chemicals and tonnes of heavy metals. Radioactive materials destined for the dump include tritium, carbon-14, strontium-90, four types of plutonium (one of the most dangerous radioactive materials if inhaled or ingested), and up to 80 tonnes of uranium. Twenty-five out of the 30 radionuclides listed in the reference inventory for the mound are long-lived. This suggests the dump would remain dangerously radioactive for 100,000 years. A very large quantity of cobalt-60 in the dump would give off so much intense gamma radiation that workers must use lead shielding to avoid dangerous radiation exposures. The International Atomic Energy Agency says high-activity cobalt-60 is "intermediate-level waste" and must be stored underground. Dioxin, PCBs, asbestos, mercury, up to 13 tonnes of arsenic and hundreds of tonnes of lead would go into the dump. It would also contain thousands of tonnes of copper and iron and 33 tonnes of aluminum, tempting scavengers to dig into the mound after closure.

3. The mound would leak radioactive and hazardous contaminants into the Ottawa River during operation and after closure. Many ways the mound would leak are described in the environmental impact statement. The mound is expected to eventually disintegrate in a process referred to as "normal evolution."

4. There is no safe level of exposure to the radiation that would leak into the Ottawa River from the Chalk River mound. All of the escaping radioactive materials would increase risks of

birth defects, genetic damage, cancer and other chronic diseases. The International Atomic Energy Agency says radioactive wastes must be carefully stored out of the biosphere, not in an aboveground mound.

5. International safety standards do not allow landfills to be used for nuclear waste disposal. The International Atomic Energy Agency says that only Very Low Level Radioactive Waste (VLLW) can be put in an above-ground landfill type facility. Canada would be shirking its international obligations as a member state of the IAEA and a signatory to an international nuclear waste treaty if it allowed this dump to be licensed.

6. The giant Chalk River mound would not reduce Canada's $8 billion federal radioactive waste liabilities and could in fact increase them. The giant pile of leaking radioactive waste would be difficult to remediate. Remediation costs could exceed those of managing the wastes had they not been put in the mound

Canadians are all responsible for what happens in Renfrew with this project. The World and Canada benefited from Chalk River for medical radiological isotopes and we must adopt the most reasonable and practicable solution for this nuclear waste project and helping the CNL adopt the most viable solution in this community. Why are we so concerned by this issue? The next generation, and future generations, will need our help to resolve this issue. Are you in for the long run Government of Canada? Climate change is real and we need to be responsible for what happens in Renfrew Ontario. We need authority, accountability and responsibility to be valued as a real public concern with CNL and the Government of Canada. Why are you not making this happen for the next generations to be? Why are accepting this project when the new NRCan nuclear waste policy review is not completed?

You can make this difference happen, so please adopt a reasonable & practicable solution using the IAEA & ALARA principles.

Cordially,

Simon J Daigle, B.Sc, M.Sc., M.Sc(A)

References:

1. Near Surface Disposal Facility. Deep River, Renfrew County, Ontario. ENVIRONMENTAL IMPACT STATEMENT. Canadian Nuclear Laboratories, Volume 2, Project Number: 1547525. Revision 2; November 27, 2020. 232-509220-REPT-004 Revision 2.

Quotes: Significant impacts

Page – 5-24 – Quote

"Alternately, the magnitude of an effect may vary from low to high depending on the probability of different projected outcomes of climate change and the degree of success in actions implemented to mitigate effects from climate change. Likelihood is also considered a modifier, but it is applied after significance is determined"

Comments: This is a major factor for probability assessment of a catastrophic event beyond the year 2100 and the year 12,100. Further atmospheric and hydrological modelling are required (subjectively) but accompanied with objective scientific review and consensus.

Page – 5-111 – Quote

"The primary factors influencing the future geological evolution in the vicinity of the CRL site over the **10,000-year assessment timeframe are erosion and deposition of the overburden and weathering of the shallow bedrock.** The future climate will be the primary natural control on these factors. Climate Change Assessment for the Near Surface Disposal Facility Project (Golder 2019a) provides an assessment of long-term future climate for the CRL site, and concludes that the climate will be warmer **(by up to 8°C) and wetter (by up to 20%)** in the early portion (the first 1,000 years) of the assessment timeframe. Because of the uncertainty associated with estimating future climate in the long term, **the predictions are limited to this early portion of the assessment timeframe"**

Comments: Due to this uncertainty, the project should be suspended under these conditions are fully elucidated (objectively) and are not in alignment with IAEA principles. The long term infrastructure resilience of this long term storage of surface site is questionable (objectively) and unacceptable (objectively) under these conditions beyond years 2100 & 12,100 because of geomorphological erosion conditions and increased precipitation because of climate change. Without objective evidence, climate modelling cannot objectively be verifiable in the future nor can be validated as we cannot measure in real time in the future. Real time measurement is always an objective means to validate. We cannot substitute real measurement with climate modelling. We can say the pyramids are still standing in Egypt and were built (subjectively assumed) with excellent material construction technology and engineering and yet they erode, fracture and more importantly are now in degradation phase because of weathering and

environmental elements. Climate change will increase temperatures, precipitations, erosion risk factors, hydrogeological water table modifications, and impacts on the Ottawa river that feeds this community, indigenous lands and peoples and all other connected rivers including the St-Lawrence river in Montreal. More importantly, forest fires and deforestation on crown land will also impact these factors considerably if these are not controlled in time.

2. IAEA principles. Fundamental Safety Principals. SF-1. (2006).
Link: https://www.eea.europa.eu/data-and-maps/indicators/nuclear-energy-and-waste-production/iaea-2006-fundamental-safety-principles

3. IPCC report (Climate Change). 2022.
Link: https://www.ipcc.ch/report/ar6/wg2/

4. NRCan Nuclear Waste Policy review. 2021 & 2022.
Link: https://www.rncanengagenrcan.ca/en/content/about-policy-review

5. The Council of Canadians. (2022).

6. AECL-9085/3 NEOTECTONISM OF THE REGION SURROUNDING CHALK RIVER NUCLEAR LABORATORIES, ONTARIO CANADA. M.D. Thomas. Gravity, Geothermics and Geodynamics Division Earth Physics Branch Energy, Mines and Resources, 1 Observatory Crescent Ottawa, Ontario K1A OY3. 438 pages document (1983).

7. Darbyshire, Fiona. Phase velocity variations in southeastern Canada and the northeast USA (2018).

8. Darbyshire, Fiona. Lithospheric structure across eastern Canada (2018).

9. **4.3-magnitude earthquake rattles western Quebec:** A 4.3-magnitude earthquake struck an area covering eastern Ontario and western Quebec Wednesday afternoon, with people from Ottawa to the Greater Montreal Region reporting that they felt the temblor. CTV News. Published Wednesday, March 16, 2011 7:57PM EDT. Link: https://www.ctvnews.ca/4-3-magnitude-earthquake-rattles-western-quebec-1.619406