



**Final submission from the
Ottawa River Institute**

**Mémoire définitif de
l'Ottawa River Institute**

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

Ottawa River Institute

Worker Health and Safety Issues Related to the NSDF

Written submission - June 27, 2023 hearing on the Near Surface Disposal Facility

The Ottawa River Institute (ORI) is an incorporated, charitable organization. Our mission is to foster sustainable communities and ecological integrity in the Ottawa River watershed.

In our oral presentation (CMD 22-H7.129) for last year's hearing we stated that worker health and safety are inadequately addressed in the Environmental Assessment Report found in CNSC Staff CMD 22-H7.

We also noted that Chalk River Laboratories (CRL) has been one of the largest employers in the upper Ottawa Valley for many decades, with people coming from around the world to work there, and expressed support for a clean-up of CRL:

We believe that necessary clean-up work and proper long-term management of waste can provide well-paying jobs for years to come. We want those jobs to be as safe as possible so workers and their families can enjoy good health and a good quality of life.

The NSDF Project requires a federal authority (the CNSC) to exercise a power conferred under section 3 of the *Nuclear Safety and Control Act* - specifically, "the limitation, to a reasonable level and in a manner that is consistent with Canada's international obligations, of the risks to... the health and safety of persons... associated with the development, production and use of nuclear energy."

Hence, one of the environmental effects that must be assessed for the NSDF Project is the effect of a change to the environment that may be caused by the Project on "health and socio-economic conditions," as stated in subsection 5(2)(b)(i) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012).

CNSC staff say that they have reviewed an assessment done by Canadian Nuclear Laboratories related to keeping radiation exposures "As Low As Reasonably Achievable" (ALARA) for NSDF workers:

The ALARA assessment includes several aspects such as an evaluation of the design of the facility, the proposed radiation work activities during operation of the NSDF, the identification and assessment of the radiological hazards for routine radiation work activities, and the completion of an ALARA design and review questionnaire. CNSC staff reviewed the ALARA assessment and confirmed that it meets regulatory requirements. (CMD 22-H7, p. 86 of 590)

CNSC staff also cite a Canadian Nuclear Laboratories estimate that the highest dose for a NSDF worker would be 10.4 mSv/y, less than the 20 mSv/y occupational radiation exposure action level for the CRL site. (CMD 22-H7, p. 87 of 590)

But details are lacking.

For example, on page 201 of 590 in CMD 22-H7, under the heading “Effects identified pursuant to subsection 5(2) of the CEEA 2012,” one finds the following statement:

Project-related predicted changes in water quality and **air quality** could adversely affect the health of Indigenous peoples, the public **and workers**. [emphasis added]

However, Tables 8.2 and 8.3, “Key radiological and non-radiological potential accidents and malfunctions and proposed mitigation measures,” list “Particulate matter and dust generation” as a problem **only during the NSDF construction phase**:

Particulate matter and dust is [sic] expected to be generated during the site preparation and construction activities. The potential effects to worker health and the environment **are negligible** as the effects are localized. (CMD 22-H7, pp. 292-295 of 590, emphasis added)

This assessment of “negligible” air quality effects to workers is limited to the site preparation and construction phases of the NSDF Project.

We wish to alert Commission members to the fact that worker health risks will be greatly increased during the operation phase, when particulate matter and dust will contain radioactive and other hazardous substances. There is potential during the operation phase for an accident -- associated with an extreme wind event -- to generate excessive quantities of particulate matter and dust, leading to loss of containment of radioactive and hazardous materials and contamination of off-site areas. This could affect the public as well as workers and should be assessed as a key potential radiological accident.

An assessment of impacts of “high winds” in Table 8.4, “Potential effects of the environment on NSDF Project components,” (CMD 22-H7, pp, 299-301 of 590), only considers impacts on the final cover system.

The CNSC’s Environmental Assessment Report fails to consider the environmental and health effects that extreme winds would have on the mound’s contents during the operation phase. This constitutes a serious deficiency in the Report.

Inhalation of radioactive materials such as alpha-emitting radionuclides is well known to have significant negative impacts on health. These negative impacts are reflected in the high radiotoxicity values associated with alpha emitters. This is also inadequately addressed in the Environmental Assessment Report for the NSDF. Risks of significant adverse environmental and health impacts from dispersion and inhalation of radioactive and hazardous substances are real, not hypothetical.

For example: Early research at Chalk River included irradiation of thorium fuels. This produced waste that the project proponent might could be put in the NSDF (e.g., from the Thorium Pit). A 2013 paper by G.W.R. Edwards, N.D. Priest, R.B. Richardson of AECL, *Inhalation radiotoxicity of irradiated thorium as a heavy water reactor fuel*, says “Irradiation of Th-230 and Th-232 produces a range of radionuclides that have high radiotoxicity and are unique to thorium fuels.”

Compared to alternative facility designs, the above-ground design of the NSDF -- with waste exposed to wind (including extreme wind events such as tornadoes) -- will increase worker health risks from exposures to radioactive and hazardous substances, and also the likelihood that wastes will be dispersed and will contaminate off-site areas.

Without a detailed assessment of worker health risks associated with the NSDF Project, and a comparison of these risks with those associated with alternative facility types such as underground repositories, **CMD 22-H7 is seriously deficient.**

In our 2022 written submission (CMD 22-H7.129) we submitted questions related to the effects on health and socioeconomic conditions of the NSDF project. We drew upon the October 2020 [*Near Surface Disposal Facility Safety Analysis Report*](#) (available on the Impact Assessment Registry, but not on CNL’s NSDF website). Our questions about worker health and safety were not addressed in CNSC Staff CMD 22-H7 or during last year’s hearing; nor (to our knowledge) have they been addressed since.

We will not repeat all our unanswered questions here. However, the problem of dust and particle generation, and health risks associated with their inhalation by NSDF workers, illustrates the seriousness of the omissions.

In our submission, CMD 22-H7.129, we noted that the *Safety Analysis Report* estimates that “ground gamma” would be the highest annual radiation exposure pathway for workers at the mound (6.36 mSv/year), many times higher than inhalation of alpha and beta particles (0.01 mSv/year). Even for NSDF heavy equipment operators, the *Safety Analysis Report* estimates the radiation dose at 6.37 mSv/year, essentially the same as the “ground gamma” dose.

Assuming negligible inhalation doses for NSDF workers is clearly erroneous. In addition to radioactive particulate matter and dust, workers would be exposed to airborne tritium oxide, carbon-14, iodine-129 and radon.

We asked, how did the dose models calculate NSDF worker inhalation doses, and why is the risk from inhalation estimated to be so minimal?

As we noted in our submission, CMD 22-H7.129, the Hanford Environmental Restoration Disposal Facility, used for “benchmarking” of the NSDF, experiences dust control challenges that require continuous use of water trucks and fixatives. These techniques help reduce inhalation doses but cannot eliminate them.

Furthermore, it defies logic that heavy equipment operators – who spend eight hours a day, four days a week, for eight months a year moving waste materials, compacting and grading the mound -- will inhale insignificant amounts of radioactive dust and particles.

We do not have access to the models used to estimate worker and public doses associated with operations of the NSDF. The *Safety Analysis Report*, p. 14-33, says that the “RESRAD-OFFSITE” code, developed by the Argonne National Laboratory, was used -- but lacks further details. The [RESRAD-ONSITE website](#) makes specific mention of “inhalation of airborne radionuclides resuspended or volatilizing (H-3 and C-14) from soil.” The [RESRAD-OFFSITE website](#) says the approach of RESRAD-OFFSITE is the same as that of RESRAD-ONSITE, with nine exposure pathways including inhalation of airborne radionuclides and radon.

Further investigation into worker health and safety issues is clearly warranted.

Worker radiation doses should be addressed in detail in CNSC’s Environmental Assessment Report. The statement that “Should the Commission approve the construction of the NSDF, CNL will review and revise the dose estimates once operating procedures for the NSDF are developed” (CMD 22-H7, p. 87 of 590) does not constitute an adequate examination of this issue.

The CNSC has a statutory duty to prevent unreasonable risks to workers and members of the public. **In our view, this must be done before a license is granted, and not left to the proponent to address after the fact.**

There is sufficient evidence to conclude that the NSDF, as a designated project under CEAA 2012, is likely to cause significant adverse environmental effects.

Under section 52 of CEAA 2012, the Commission should refer the matter of whether those effects are justified in the circumstances to the Governor in Council through the Minister of Natural Resources, responsible before Parliament for the CNSC.