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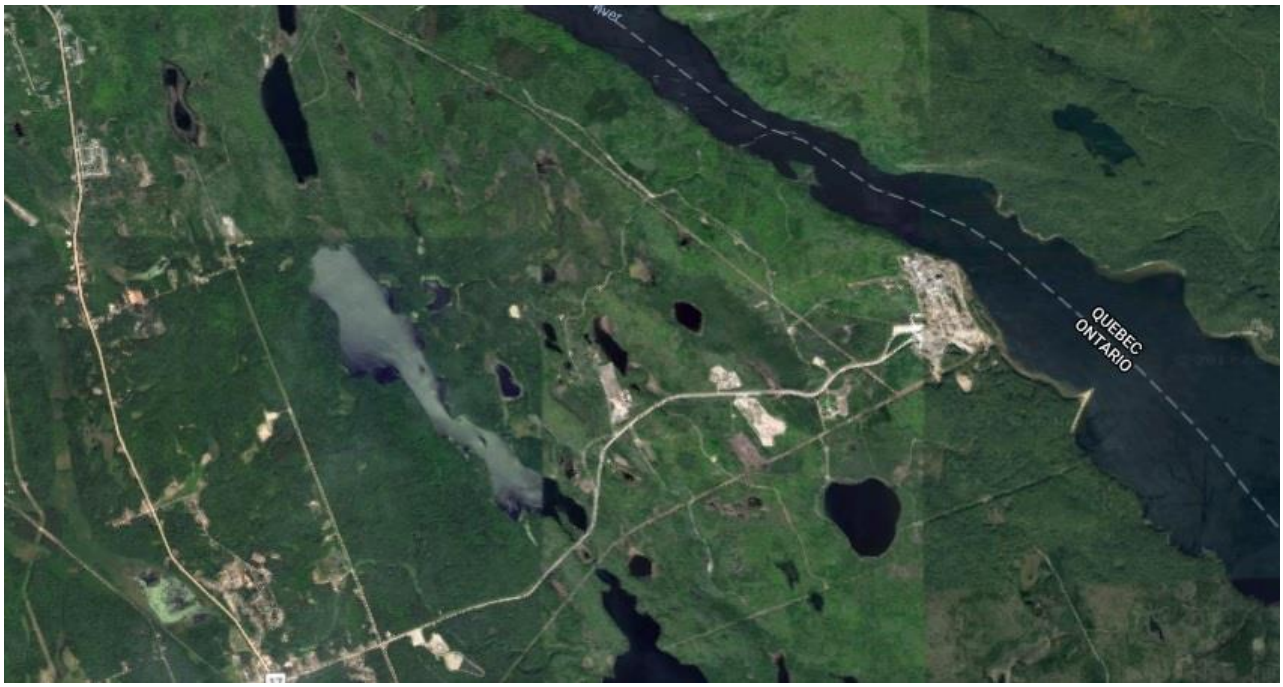


# Submission to the CNSC on the Draft Environmental Impact Statement

## CNL's Near Surface Disposal Facility

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# INTRODUCTION

The Canadian Environmental Law Association (CELA) welcomes this opportunity to review the draft environmental impact statement (EIS) for the proposed Near Surface Disposal Facility Project submitted by the proponent, Canadian Nuclear Laboratories (CNL).

For nearly 50 years, CELA has used legal tools, undertaken ground breaking research and conducted public interest advocacy to increase environmental protection and the safeguarding of communities. We work towards protecting human health and our environment by actively engaging in policy planning and seeking justice for those harmed by pollution or poor environmental decision-making.

In this context, CELA has sought to examine compliance and adequacy of the proposed project and its assessment in conjunction with the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA). CELA has examined whether the project and its assessment adequately consider environmental effects and their significance, mitigation measures, adequacy of proposed follow-up programs, alternative means of carrying out the project and other factors listed under section 19 of CEAA.

Based on CELA's initial review of the draft EIS and the deficiencies contained within, this submission should be considered a commentary on missing and inadequate information for decision making. We reserve the right and intend to provide additional substantive comment on the next version of the EIS.

Based on our review, CELA has made recommendations (see page 2) and a list of information requests to the CNCS (see pages 3 - 4) in order to inform the decision that should be made as a result of the Commission's responsibilities under sections 52 and 53 of CEAA.

Pursuant to our Participant Funding Program application, CELA has engaged the professional services of Dr. Tanya Markvart and Dr. Ian Fairlie. The first chapter of this report titled Sustainable Development evaluates the project's documentation and assessment of effects in compliance with the statutory purpose of CEAA and the principle of sustainable development. The second chapter of our report, titled Human Health and Safety, comments on the omissions in the existing draft and specific areas requiring further information.

# SUMMARY OF RECOMMENDATIONS

**No.1** CNL defined and used three criteria (technical feasibility, economic feasibility, and environmental effects) to evaluate the alternative means and the preferred NSDF option. CNL, however, did not discuss the relative contributions of the alternative means and the preferred NSDF option to sustainability. Nor, did CNL explain the process by which it incorporated sustainability concerns in its evaluations.

**No.2** CNL set out other principles (CNL design principles, INPO nuclear safety culture principles, IAEA safety principles) and CNSC licensing requirements, asserting that these provided the context for its evaluation. It did not, however, show how these principles and requirements influenced the analysis and conclusions.

**No.3** CNL's comparative evaluation of alternative means clearly did not capture the complexities in the decisions that must be made in alternative means assessment. Critical questions remain about the trade-offs among the options with respect to their respective contributions to sustainability. These unaddressed trade-offs are especially evident in CNL's 'Evaluation of Alternatives' summary tables for facility type, facility design, facility location, and site selection.

**No.4** CNL considered adaptive management in the design of its monitoring program. It is unclear, however, how the notion of adaptive management capacity influenced CNL's evaluation of alternative means as well as its assessment of the proposed NSDF.

**No.5** CNL did not provide sufficient detail about the post-closure phase to give the public confidence in the long-term safety of the proposed NSDF project. At this juncture in the EA process CNL has an opportunity to incorporate the concept of 'rolling stewardship' in planning for the long-term monitoring and safety of the NSDF.

**No.6** Unfortunately, typographical errors, incorrect statements, scientific inaccuracies and omissions have impeded the ability of CELA to intelligibly comment on the draft EIS. The EIS and accompany Performance Assessment should be rechecked by CNL and published for a second review before the final EIS version is published.

## SUMMARY OF INFORMATION REQUESTS

**No.1** Describe how sustainability-based criteria were used to evaluate and compare the alternative means as well as the effects of the preferred NSDF option.

**No.2** Describe how the three evaluation criteria (technical feasibility, economic feasibility, and likely environmental effects), CNL design principles, INPO nuclear safety culture principles, IAEA safety principles, and CNSC licensing requirements constitute relevant sustainability considerations.

**No.3** Provide a description of the process by which consideration for sustainability contributions was incorporated throughout the assessment and design of the preferred NSDF option.

**No.4** Provide a comparative evaluation of the alternative means in terms of their relative contributions to sustainability in order to clearly demonstrate to the public that the NSDF is the best option with respect to net contributions to sustainability.

**No.5** Describe and demonstrate how trade offs were considered among the options in the comparative evaluation of alternative means.

**No.6** Describe how reversibility, retrievability, diversity, and redundancy were incorporated in (a) the comparative evaluation of alternative means and (b) the design and assessment of the preferred NSDF option.

**No.7** Provide in-depth plans for the long-term monitoring of the NSDF during the post-institutional control phase.

**No.8** Provide a description of how the concept of rolling stewardship will be applied in all phases of monitoring for the NSDF.

**No.9** Provide an explanation in response to the following omissions:

- Precise nature of the heat-generating wastes
- Estimated maximum heat emission rates and maximum temperatures in the proposed facility
- Estimates of collective doses to nearby populations
- Estimates of annual tritium uptakes by local population, and specific activity limits

- Detailed geological, hydrogeological and geotechnical information that justifies the Chalk River location for the proposed NSDF, and
- Proposals to remediate the existing groundwater pollution at Chalk River.

# I. SUSTAINABLE DEVELOPMENT

This chapter will provide a sustainability-based evaluation of the Canadian Nuclear Laboratories' Environmental Impact Statement for the proposed Near Surface Disposal Facility project at Chalk River Laboratories.

This submission's analysis rests in part on the purpose of the *Canadian Environmental Assessment Act 2012* (CEAA, 2012), as set out in sections 4(1)(b), (h), and (i):

> 4(1) The purposes of this Act are
> […]
> (b) to ensure that designated projects…are considered in a careful and precautionary manner to avoid significant adverse environmental effects;
> […]
> (h) to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy; and
> (i) to encourage the study of the cumulative effects of physical activities in a region and the consideration of those study results in environmental assessments.

CELA's evaluation concentrated on the following essential considerations of sustainable development in environmental assessment (EA):

- Evaluation criteria and process (see Section 1.1)
- Consideration of trade-offs (see Section 1.2)
- Consideration of the precautionary principle and associated concepts (see Section 2)
- Long-term monitoring plans (see Section 3)

In the following sections, the key deficiencies in CNL's draft EIS with respect to these sustainability concerns are described. A summary of Information Requests, which would enhance CELA's understanding of CNL's EIS in these regards is included at the end (see Table 1).

## 1. CNL's Consideration of Sustainability

CELA's approach to analyzing CNL's consideration of sustainability in the subject EIS is based on best practices in sustainability-based EA, which have been established by practitioners and

scholars in the field (see Gibson, 2005; Gibson, 2017; Pope & Grace, 2006). In previous EIS public comment processes for proposed nuclear waste management projects, we provided in-depth explanations of how proponents should fulfill their obligations under CEAA in this regard (e.g., Markvart, 2014).

In the following sub-sections, we highlight some key areas where CNL failed to adequately consider sustainability concerns in the NSDF EIS.

### *1.1 CNL's Evaluation Criteria and Process*

Gibson (2005) provides a comprehensive set of sustainability criteria for application in EA. They are rooted in a fundamental concern for the multi-scale interconnections and interdependencies within and between human and biophysical systems and present and future generations, especially effects on inter- and intragenerational equity, ecological system integrity, and governance capacity. In addition, Gibson explains the process by which sustainability considerations should be incorporated throughout the EA process in order to select the best option.

An adequate consideration of sustainability in EA should demonstrate that the preferred option emerged from a comprehensive comparative evaluation of options in light of their relative contributions to sustainability. The proponent must clearly demonstrate that the preferred option would contribute the greatest net social, economic, and environmental benefits to society while avoiding significant adverse effects.

CNL defined and used three criteria (technical feasibility, economic feasibility, and environmental effects) to evaluate the alternative means and the preferred NSDF option. But, CNL did not discuss the relative contributions of the alternative means and the preferred NSDF option to sustainability. Nor, did CNL explain the process by which it incorporated sustainability concerns in its evaluations.

In order to clearly demonstrate to the public that the NSDF option is the best option in light of net contributions to sustainability, CNL should provide the following additional information:

- A description of the sustainability-based criteria that CNL adopted to evaluate and compare the alternative means as well as the effects of the preferred NSDF option;
- A description of how the three criteria (technical feasibility, economic feasibility, and likely environmental effects) constitute relevant sustainability considerations;

- A description of the process by which CNL incorporated consideration for sustainability contributions throughout the assessment and design of the preferred NSDF option; and
- A description of the relative contributions to sustainability of the alternative means and the preferred NSDF option.

In addition, in Section 2.4 CNL set out other principles (CNL design principles, INPO nuclear safety culture principles, IAEA safety principles) and CNSC licensing requirements, asserting that these provided the context for its evaluation. This section however, does not show how these principles and requirements influenced the analysis and conclusions.

The public must have a clear understanding of:

- How these constitute relevant sustainability considerations, and
- How they were integrated in a comparative evaluation of the alternative means leading up to the selection of the preferred option.

### *1.2 CNL's Consideration of Trade-Offs*

One key aspect of evaluating and comparing alternatives in light of sustainability contributions is the consideration of trade-offs among the options. Gibson (2005, 2013) and others (see Morrison-Saunders & Pope, 2013) provide an in-depth explanation of trade-offs and guidelines for dealing with them in EA decision making. As Gibson (2013) explains, substantive trade-offs

> involve choices about what purposes to serve, what alternatives to favour, what design features to incorporate, what enhancements and mitigations to consider adequate and what undertakings to approve with what conditions and implementation controls, etc. Most significantly, substantive trade-offs are about the anticipated effects resulting from these choices. They centre on what predicted damages and risks are accepted as the price to pay for what expected benefits (p.2).

CNL's comparative evaluation of alternative means raises important questions about trade-offs, which should have been addressed before CNL identified the preferred alternatives. These unaddressed trade-offs are especially evident in CNL's 'Evaluation of Alternatives' summary tables for facility type (2.5-2), facility design (2.5-3), facility location (2.5-4), and site selection (2.5-5).

To briefly elaborate, CNL asserted that the above ground concrete vault (AGCV) facility type (table 2.5-2) would offer increased design robustness compared to the ECM option because it

would have high strength concrete structural elements and engineered packages for all wastes. CNL stated that this would result in reduced releases of leachate to groundwater compared to the ECM option. In addition, CNL stated that an AGCV facility would offer greater protection from weathering and erosion compared to the ECM. When compared with the ECM, however, CNL noted that the AGCV facility would take longer to build, require at least two sites due to storage capacity/spatial area requirements, be more expensive, and have additional packaging requirements.

CNL explained and presented a table summary of this comparison without any discussion of trade-offs. Instead of conducting an alternative means assessment, the CNL used a simple gradient evaluation framework with 'most favourable' at the highest end, 'favorable' in the middle or neutral point, and 'least favorable' at the lowest end. This framework clearly did not capture the complexities in the decisions that must be made in alternative means assessment. Indeed, it seems that CNL simply tallied the scores.

Critical questions remain about trade-offs among the options with respect to contributions to sustainability. To give one example, without commenting here on the accuracy of their technical assessment, CNL's comparative evaluation of facility types must address whether or not it would be more beneficial with respect to contributions to sustainability to spend more money and time in the short term on the AGCV option, which would require more packaging and more land/area, but provide greater robustness and increased protection to groundwater and from weathering and erosion over the long term.

To set a sound basis for the selection of the NSDF and other associated means as the preferred options, CNL must identify and discuss trade-offs in its comparative evaluation of alternative means.

## 2. CNL's Consideration of the Precautionary Principle

The purpose of CEAA is to ensure that designated projects are considered in a careful and precautionary manner with regards to all aspects of the assessment process. One overarching concept that should be central to a precautionary approach in nuclear waste management is 'adaptive management capacity', which was incorporated in previous EIS Guidelines for the preparation of OPG's EIS for the Deep Geologic Repository project for low and intermediate-level radioactive waste.

The concept of adaptive management has been widely adopted in the sectors of energy and

natural resource management, as it provides an iterative approach to management in the face of,

- Scientific uncertainty and human error;
- Technological innovations and/or advances in scientific understanding;
- New technical or scientific information regarding the design and operation of a project;
- Changes in social and political opinion;
- Changes in policy and regulatory frameworks, including safety standards; and
- Unforeseen events (including natural disasters, malfunctions, accidents and malevolent acts).

Associated design concepts that may increase the level of adaptive management capacity in nuclear waste management facilities include reversibility, retrievability, diversity and redundancy (see OECD, 2001, 2012).

Reversibility is the possibility of reversing one or a series of decisions taken during the lifetime of a nuclear waste management project. Reversal is the actual action of changing a previous decision. The associated implication for design include making provisions for reversal should it be required. Retrievability denotes the action of recovery of the waste packages. Designing a nuclear waste management project so that waste can be deposited or stored in a retrievable manner enhances the reversibility of decisions by providing an additional degree of flexibility. Moreover, a demonstrated possibility to retrieve the waste at each stage after emplacement may increase public confidence in the long-term safety of a project.

Diversity and redundancy are major sources of adaptive management capacity (see Walker & Salt, 2006). The diversity requirement seeks to ensure that decision makers evaluate and compare a range of different alternatives that could achieve the same objective. If the preferred option fails there should be sufficient knowledge about other options to make adaptation feasible. The concept of redundancy is central to enhancing the safety and reliability of complex technologies. An element of a system is redundant if there are backups to do its work if it fails.

Clearly, CNL considered adaptive management in the design of its monitoring program. It is unclear, however, how the notion of adaptive management capacity influenced CNL's evaluation of alternative means as well as its assessment of the proposed NSDF. It is in the public's best interest to have a good understanding of how CNL incorporated and

operationalized the concept of adaptive management capacity throughout the EIS as it is critical to the long-term safety of the proposed project.

## 3. CNL's Long-Term Monitoring Plans

CNL's monitoring plans include three key phases: construction, closure and post-closure. As CNL explains in Section 10 of the EIS, the post-closure stage involves institutional control and post-institutional control, which will continue indefinitely after the year 2400. CNL, however, did not provide sufficient detail about the post-closure phase to give the public confidence in the long-term safety of the proposed NSDF project.

Indeed, the insufficient detail provided in the EIS suggests that CNL intends to abandon the waste once the NSDF project has been transferred into post-institutional control. CNL must provide adequate detail about its plans for the long-term monitoring of the NSDF, as future generations will bear the costs and impacts of the project for hundreds of thousands of years to come.

At this juncture in the EA process, CNL has an opportunity to incorporate the concept of 'rolling stewardship' in planning for the long-term monitoring and safety of the NSDF. As the Canadian Coalition for Nuclear Responsibility explains, rolling stewardship involves:

- Plans for the accurate transmission of information from one generation to the next;
- Plans for the transfer of responsibility from one generation to the next, e.g., a 'changing of the guard' every 20 years;
- Plans for the recharacterization of the waste when necessary;
- Plans to rapidly detect and correct any leakages or other problems;
- Plans for the retrieval of waste as appropriate; and
- Plans for continual adaptive management and monitoring.

In the section, below, CELA provides a summary of the major deficiencies identified with respect to the above described components of CNL's EIS. The section ends with a table presenting associated Information Requests.

## Summary of Deficiencies and Information Requests

CNL defined and used three criteria (technical feasibility, economic feasibility, and environmental effects) to evaluate the alternative means and the preferred NSDF option. But

CNL did not discuss the relative contributions of the alternative means and the preferred NSDF option to sustainability. Nor did CNL explain the process by which it incorporated sustainability concerns in its evaluations.

In addition, CNL set out other principles (CNL design principles, INPO nuclear safety culture principles, IAEA safety principles) and CNSC licensing requirements, asserting that these provided the context for its evaluation. It did not, however, show how these principles and requirements influenced the analysis and conclusions.

CNL's comparative evaluation of alternative means clearly did not capture the complexities in the decisions that must be made in alternative means assessment. Critical questions remain about the trade-offs among the options with respect to their respective contributions to sustainability. These unaddressed trade-offs are especially evident in CNL's 'Evaluation of Alternatives' summary tables for facility type, facility design, facility location, and site selection.

Clearly, CNL considered adaptive management in the design of its monitoring program. It is unclear, however, how the notion of adaptive management capacity influenced CNL's evaluation of alternative means as well as its assessment of the proposed NSDF.

Finally, CNL did not provide sufficient detail about the post-closure phase to give the public confidence in the long-term safety of the proposed NSDF project. At this juncture in the EA process CNL has an opportunity to incorporate the concept of 'rolling stewardship' in planning for the long-term monitoring and safety of the NSDF.

In order to clearly demonstrate to the public that the NSDF option is the best option in light of net contributions to sustainability, CNL must provide the following additional information in response to the Information Requests we provide in Table 1 below.

**Table 1.** Information Requests

| IR# | Information Request |
|---|---|
| #1 | Please provide a description of the sustainability-based criteria used to evaluate and compare the alternative means as well as the effects of the preferred NSDF option. |

| | |
|---|---|
| #2 | Please describe how the three evaluation criteria (technical feasibility, economic feasibility, and likely environmental effects), CNL design principles, INPO nuclear safety culture principles, IAEA safety principles, and CNSC licensing requirements constitute relevant sustainability considerations. |
| #3 | Provide a description of the process by which consideration for sustainability contributions was incorporated throughout the assessment and design of the preferred<br>NSDF option. |
| #4 | Provide a comparative evaluation of the alternative means in terms of their relative contributions to sustainability in order to clearly demonstrate to the public that the<br>NSDF is the best option with respect to net contributions to sustainability. |
| #5 | Describe and demonstrate how trade offs were considered among the options in the comparative evaluation of alternative means. |
| #6 | Describe how reversibility, retrievability, diversity, and redundancy were incorporated in (a) the comparative evaluation of alternative means and (b) the design and assessment of the preferred NSDF option. |
| #7 | Provide in-depth plans for the long-term monitoring of the NSDF during the post-institutional control phase. |
| #8 | Provide a description of how the concept of rolling stewardship will be applied in all phases of monitoring for the NSDF. |

# II. HUMAN HEALTH AND SAFETY

This chapter seeks to set out the apparent omissions and questionable matters as it relates to human health and safety contained in the two draft CNL documents, the *CNL Near Surface Disposal Facility Project EIS. Report 232-509220-Rept-004* and the *CNL Performance Assessment for Near Surface Disposal Facility to support the Environmental Impact Statement. Report 232-509240-ASD-001* (herein "Performance Assessment").

While CELA and our scientific consultants have carefully examined the draft EIS and its accompanying Performance Assessment report, the level of errors and omissions have impeded our ability to provide an intelligible response.

CELA has identified many typographical errors, incorrect statements and scientific inaccuracies. This is particularly the case with estimates in several tables in the two reports.

Other omissions include, but are not limited to:

- the precise nature of the heat-generating wastes
- estimated maximum heat emission rates
- estimated maximum temperatures in the proposed facility
- the report on criticality
- the report on Waste Acceptance Criteria
- the Safety Analysis report
- estimates of collective doses to nearby populations
- estimates of annual tritium uptakes by local population and specific activity limits
- the detailed geological, hydrogeological and geotechnical information that justifies the Chalk River location for the proposed NSDF, and
- proposals to remediate the existing groundwater pollution at Chalk River.

CELA submits that until this information has been revised and more fully explained by CNL, the final version of EIS should not be published. A revised draft should instead be provided for public comment in response to these deficiencies.

## CONCLUSION

CELA has sought to identify the gaps in the existing draft of the EIS and its consideration of the purposes of CEAA and the project's impacts on human health and safety.

CELA requests that all recommendations (see page 2) and information requests (see pages 3 -4) be provided before the next draft of the EIS.

**All of which is respectfully submitted this 19th day of May, 2017:**

CANADIAN ENVIRONMENTAL LAW ASSOCIATION
Per

Theresa A. McClenaghan
Executive Director and Counsel

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