



HOUSE OF COMMONS  
CHAMBRE DES COMMUNES  
CANADA

# **CANADA AND RADIOACTIVE WASTE MANAGEMENT: IMPORTANT DECISIONS FOR THE FUTURE**

**Report of the Standing Committee on Environment and  
Sustainable Development**

**Francis Scarpaleggia, Chair**

**SEPTEMBER 2022  
44th PARLIAMENT, 1st SESSION**

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## **NOTICE TO READER**

### **Reports from committees presented to the House of Commons**

Presenting a report to the House is the way a committee makes public its findings and recommendations on a particular topic. Substantive reports on a subject-matter study usually contain a synopsis of the testimony heard, the recommendations made by the committee, as well as the reasons for those recommendations.

To assist the reader:

A list of abbreviations used in this report is available on page ix

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# **THE STANDING COMMITTEE ON ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**

has the honour to present its

## **FOURTH REPORT**

Pursuant to its mandate under Standing Order 108(2), the committee has studied nuclear waste governance in Canada and has agreed to report the following:





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## LIST OF ACRONYMS

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AECL	Atomic Energy of Canada Limited
APM	Adaptive phased management
CANDU	Canada Deuterium Uranium
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
CELA	Canadian Environmental Law Association
CNEA	Canadian National Energy Alliance
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CRL	Chalk River Laboratories
CSA	Canadian Standards Association
DGR	Deep geological repository
DNA	Deoxyribonucleic acid
GHG	Greenhouse gas
GOCO	Government-owned, contractor-operated
HLW	High-level waste
IAA	<i>Impact Assessment Act</i>
IAAC	Impact Assessment Agency of Canada
IAEA	International Atomic Energy Agency
ILW	Intermediate-level waste
LLW	Low-level waste

NDSF	Near surface disposal facility
NRCan	Natural Resources Canada
NWMO	Nuclear Waste Management Organization
OPG	Ontario Power Generation
SMR	Small modular reactor

## SUMMARY

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There are environmental, economic and social benefits to society from nuclear power and medical isotopes. The waste generated by their production and use, however, requires robust control and management. To examine the governance of radioactive waste in Canada and its impacts on the environment, the House of Commons Standing Committee on Environment and Sustainable Development (the Committee) undertook a study, beginning in February 2022. The Committee held four meetings and has prepared 12 recommendations for the Government of Canada.

Radioactive waste in Canada is any material that contains a radioactive nuclear substance and for which no further use is foreseen. It is typically produced by nuclear energy generation, and by the production and use of isotopes for medical procedures. Depending on its radioactivity, waste is classified as high-level waste (HLW), intermediate-level waste (ILW) or low-level waste (LLW).

Witnesses provided testimony related to two proposals for the long-term disposal of radioactive waste in Canada: a deep geological repository (DGR) is proposed for construction in one of two locations in Ontario for irradiated nuclear fuel, which is considered HLW, and a near-surface disposal facility (NSDF) is proposed for the long-term disposal of LLW near Chalk River, Ontario. Some witnesses felt confident in the rigor of the processes followed to choose sites and consult with communities, while others expressed concern with the processes. There are currently no plans to address the long-term storage of ILW in Canada.

The Committee heard testimony about broad questions related to nuclear waste and its management and governance. Witnesses spoke about the importance of an independent Canadian Nuclear Safety Commission, as well as the roles of Natural Resources Canada, the Impact Assessment Agency of Canada, Atomic Energy of Canada Limited and Canadian Nuclear Laboratories and the Nuclear Waste Management Organization. Overall, some witnesses expressed confidence in Canada's oversight systems for nuclear waste and others indicated concerns about the involvement of private organizations.

The Committee also heard about the safety record of the Canadian nuclear industry, including during transportation of radioactive waste. Members heard evidence about Canada's conformance to international standards for governance and management of radioactive waste, about transformation and reprocessing of such waste, and about classification and record keeping. They heard input related to nuclear governing

authorities' consultations with concerned citizens and with Indigenous communities, and about how information is and could be shared with the public.

As Canada seeks to decarbonize its energy grid and achieve net zero emissions by 2050, nuclear power will be part of the energy mix, and issues of radioactive waste management must be addressed. Rigorous consideration is needed to deal appropriately with radioactive waste, because decisions made in the near future will have repercussions decades, centuries and even millennia from now. The Government of Canada must make careful choices about how to oversee the nuclear industry and the radioactive waste it generates, as these choices have the potential to affect human and environmental health and public trust in the nuclear industry.

# LIST OF RECOMMENDATIONS

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*As a result of their deliberations committees may make recommendations which they include in their reports for the consideration of the House of Commons or the Government. Recommendations related to this study are listed below.*

## **Recommendation 1**

**The Committee recommends that the Auditor General of Canada conduct a public audit of Canada’s radioactive waste governance. .... 25**

## **Recommendation 2**

**The Committee recommends that any research and development work related to small modular reactor (SMR) technology rigorously document and categorize in their analyses the radioactive waste that will be generated, and that a plan be developed to manage this waste as part of Canada’s *Policy for Radioactive Waste Management and Decommissioning*. .... 40**

## **Recommendation 3**

**The Committee recommends that the Government of Canada prioritize the building of a deep geological repository (DGR) and acknowledge that it is the safest way to store high level radioactive waste. .... 41**

## **Recommendation 4**

**The Committee recommends that the Government of Canada use all existing science on radioactive waste management and storage as the foundational component in decision making for future waste management projects..... 42**

## **Recommendation 5**

**The Committee recommends that the Government of Canada invest in research in reducing, reusing, and recycling nuclear waste..... 44**

**Recommendation 6**

The Committee recommends that the Canadian Nuclear Safety Commission and Natural Resources Canada, which directed the Nuclear Waste Management Organization to lead consultations on a long-term storage plan for intermediate-level radioactive waste, follow the International Atomic Energy Agency standards in their policies and practices, and provide clear rationale to Parliament and Canadians for any deviations from these standards that are deemed unavoidable..... 46

**Recommendation 7**

The Committee recommends that the Canadian Nuclear Safety Commission:

- follow the International Atomic Energy Agency standards in its policies and practices;
- implement recommendations that were made by the International Atomic Energy Agency’s Integrated Regulatory Review Service Audit that was conducted in 2019; and
- provide clear rationale to Parliament and Canadians for any deviations from these standards that are deemed unavoidable (e.g., waste classification, in situ decommissioning), and that these justifications be documented and made publicly available within 30 days of sending to Parliament. .... 46

**Recommendation 8**

The Committee recommends that Natural Resources Canada and the Canadian Nuclear Safety Commission be required to provide additional detail in Canada’s inventory of radioactive waste, such as source and level of radioactivity, and that this information be provided and made publicly available as soon as possible. .... 48



**Recommendation 9**

The Committee recommends that Natural Resources Canada and the Canadian Nuclear Safety Commission work with Library and Archives Canada to ensure that the preservation of records reflects reports from the Organization for Economic Co-operation and Development Nuclear Energy Agency’s Radioactive Waste Management Committee, such that they are maintained up-to-date and preserved for the hazardous lifespan of the waste itself. .... 48

**Recommendation 10**

The Committee recommends that Government of Canada work with Indigenous communities to co-develop a consultation framework that upholds the right of Indigenous peoples to free, prior and informed consent as set out in article 29.2 of the *United Nations Declaration on the Rights of Indigenous Peoples*..... 52

**Recommendation 11**

The Committee recommends that the Canadian Nuclear Safety Commission, Natural Resources Canada, Atomic Energy of Canada Limited (and its contractor, Canadian Nuclear Laboratories), and the Nuclear Waste Management Organization review their communications and websites to ensure

- documentation and information on Canada’s radioactive waste are divulged in full transparency and easy to find; and
- relevant technical documents are summarized for the layperson. .... 53

**Recommendation 12**

The Committee recommends that the Government of Canada invest in scientific-based public education initiatives on nuclear energy and nuclear waste storage..... 53





# CANADA AND RADIOACTIVE WASTE MANAGEMENT: IMPORTANT DECISIONS FOR THE FUTURE

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## INTRODUCTION

Between 3 February 2022 and 3 March 2022, the House of Commons Standing Committee on Environment and Sustainable Development (the Committee) undertook a “comprehensive review of nuclear waste governance in Canada and its impacts on the environment, including the issues raised by the import of these wastes and the trade in medical technologies.”<sup>1</sup>

There are environmental, economic and social benefits to society from nuclear power and medical isotopes, but the waste generated requires robust control and management. This report does not focus on the merits of nuclear technology but rather on the governance of radioactive waste in Canada.

The report first provides general background about radioactive waste in Canada, including waste classifications, locations and quantities. It then explains the governance structure for radioactive waste, including the entities with decision-making and management responsibilities for Canada’s radioactive waste, and addresses the importance of independent and transparent review. The report lays out the need for long-term storage solutions and discusses the proposed near surface disposal facility at Chalk River for low-level radioactive waste and the proposed deep geological repository for high-level radioactive waste. An overview of the safety record of the Canadian nuclear industry is provided, along with a debate on the risks and benefits of transforming existing radioactive waste, such as through reprocessing. After comparing Canadian radioactive waste governance to international standards and discussing the importance of Indigenous consultation and community engagement when siting radioactive waste repositories, the report presents the need for improved public engagement on radioactive waste matters.

The Committee met with federal officials who regulate radioactive waste, Indigenous leaders, concerned citizen groups, those who manage Canada’s historic radioactive waste, representatives from the nuclear industry, and academics, among others. The

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1 House of Commons, Standing Committee on Environment and Sustainable Development (ENVI), *Minutes of Proceedings*, 1 February 2022.



Committee thanks the 28 witnesses who provided testimony as well as the groups and individuals who sent in briefs<sup>2</sup> on the topic.

## WHAT IS RADIOACTIVE WASTE?

The Canadian Nuclear Safety Commission (CNSC) defines radioactive waste as “any material (liquid, gaseous or solid) that contains a radioactive nuclear substance for which no further use is foreseen.”<sup>3</sup> It may also contain hazardous substances that are not radioactive. If not managed safely, radioactive waste poses a danger to human health and the environment.

Exposure to the ionizing radiation emitted by radioactive waste can cause harmful effects. The severity of the effect is dependent on the radiation dose and dose rate experienced (i.e., cumulative over many years or acute). High radiation doses kill cells and may result in death. Examples of high radiation doses are those experienced by the workers and firefighters who responded to the 1986 Chernobyl nuclear plant accident: 800 to 16,000 millisieverts (mSv).<sup>4</sup> Lower radiation doses may damage DNA and increase the risk of cancer later in life. According to the CNSC:

Studies have shown that radiation will increase the frequency of some cancers that already occur naturally and that this increase is proportionate to the radiation dose—i.e., the greater the dose, the greater the risk of cancer. However, studies to date have not been able to show any excess cancers or other diseases in people chronically exposed to radiation at doses lower than about 100 mSv.<sup>5</sup>

If isotopes from radioactive waste get into groundwater or rivers, they may enter food chains. While such indirect exposure, if it occurred, would produce a much smaller dose than a direct exposure, a much larger population could be exposed.<sup>6</sup>

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2 As of 1 April 2022, the Committee had received 38 briefs, of which 36 raised concerns with, or recommended improvements to, Canada’s radioactive waste governance, while two briefs found no issues with the current governance system.

3 Canadian Nuclear Safety Commission (CNSC), [Radioactive waste](#).

4 CNSC, [Radiation Health Effects](#).

5 Ibid.

6 United States Nuclear Regulatory Commission, [Backgrounder on Radioactive Waste](#).

The CNSC recognizes four classes of radioactive waste:

- 1) uranium mine and mill waste;<sup>7</sup>
- 2) low-level radioactive waste (LLW);
- 3) intermediate-level radioactive waste (ILW); and
- 4) high-level radioactive waste (HLW).<sup>8</sup>

A CSA (Canadian Standards Association) Standard for radioactive waste, compiled by government and industry stakeholders, came into force in March 2019.<sup>9</sup> Figure 1 provides a summary of the source, description, interim storage, monitoring and respective radioactive lifetimes for the four categories of radioactive waste<sup>10</sup> in Canada.

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7 Discussion during the study centred on low-, intermediate- and high-level radioactive waste. However, some briefs and witnesses reminded the Committee of the challenges of managing the volume of uranium mine waste in Canada. See: ENVI, *Evidence*, 15 February 2022, 1200 (Dr. Gordon Edwards, President, Canadian Coalition for Nuclear Responsibility); and Steve Lawrence, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022.




8 CNSC, [What is Radioactive Waste?](#)

9 Natural Resources Canada (NRCan), [Inventory of Radioactive Waste in Canada 2019](#), 2021, p. 3.

10 During the Committee's study, the terms "radioactive waste" and "nuclear waste" were used interchangeably by some witnesses. As a result of quoting witnesses, both terms appear in this report. The Government of Canada and the International Atomic Energy Agency (IAEA) use the term "radioactive waste" to describe the low-, intermediate- and high-level radioactive waste resulting from the use of nuclear technology. "Nuclear fuel waste" is classified as high-level radioactive waste in Canada, as shown in Figure 1.



**Figure 1: Source, Description, Storage, Monitoring and Radioactive Lifetimes for the Four Categories of Radioactive Waste in Canada**

 <h2>What is radioactive waste?</h2>		<p>Radioactive waste is any liquid, gas or solid that contains a radioactive nuclear substance and for which there is no foreseeable use.</p>			
<p>There are <b>four classes</b> of radioactive waste in Canada.</p> <p>Classes of radioactive waste are organized according to the containment and isolation required to ensure safety in the short and long term and take into consideration the risk to the health and safety of humans and the environment.</p>					
	1	2	3	4	
	<b>Uranium mine and mill waste</b>	<b>Low-level radioactive waste</b>	<b>Intermediate-level radioactive waste</b>	<b>High-level radioactive waste</b>	
<b>Where does it come from?</b>	Includes tailings and waste rock generated by the mining and milling of uranium ore. 	From mining/milling ore into yellowcake. 	Nuclear power plants, research reactors, test facilities, radioisotope manufacturers or users, uranium refining and conversion, and nuclear fuel fabrication. 	Nuclear power plants, prototype and research reactors, test facilities, and radioisotope manufacturers and users. 	Nuclear power plants, prototype and research reactors, and test facilities. 
<b>What does it look like?</b>	Tailings have the consistency of fine sand and waste rock, which is simply gravel and broken up rock. 	Used equipment, paper, cable, clothing, decommissioned parts, even mops. 	Refurbishment waste, ion-exchange resins and some radioactive sources used in radiation therapy. 	Used nuclear fuel that is still significantly radioactive. 	
<b>How is it stored in the interim?</b>	Tailings are placed back into the mined-out pit or tailing containment facilities. Waste rock is stored in piles on the surface. 	Typically, long-lived low-level waste is stored above ground at licensed facilities in bins and bags. 	Currently, this waste is stored in shielded above-ground or in-ground storage silos at licensed waste facilities. 	Used fuel is stored at the reactor site in reinforced, leak-proof cooling pools for 7 to 10 years, and then can be transferred to dry storage in concrete canisters or silos. 	
<b>Who monitors it?</b>	CNSC inspectors monitor mine sites during operation and long after closure. 	Low-level waste is monitored at licensed facilities that are inspected by the CNSC. 	The CNSC inspects and licenses all intermediate waste management facilities. 	The CNSC and the International Atomic Energy Agency monitor used nuclear fuel. 	
<b>How long will it be radioactive?</b>	Because the decay of natural uranium is so slow, it can take billions of years to reach the earth's normal background level of radiation. 	Some short-lived waste can decay within hours or days and then be disposed of like regular waste. Longer-lived waste may need isolation for up to a few hundred years. 	This waste generally contains long-lived radionuclides that require isolation beyond several hundred years (300 to 500 years). 	The radioactivity of irradiated, used nuclear fuel starts high but decreases quickly (by 99% in the first 10 years). It then takes about 1 million years to decrease to the original level of natural uranium. 	

Source: Canadian Nuclear Safety Commission, [What is Radioactive Waste?](#)

Radioactive waste becomes less radioactive over time. HLW remains radioactive for many thousands of years. ILW and LLW are radioactive for shorter periods of time. For example, Jason Van Wart, Vice-President of Nuclear Sustainability Services at Ontario Power Generation (OPG), described preliminary readings on the reduction in radioactivity observed in LLW from the Bruce Nuclear Generating Station: “On average, it's approximately 10% of the radioactivity that was originally there when we stored the waste. Over the period of 30 to 40 years, the waste has significantly decayed in terms of radioactivity.”<sup>11</sup> However, one witness mentioned that accurately measuring some types of radioactivity is a challenge.<sup>12</sup>

## RADIOACTIVE WASTE IN CANADA

Radioactive waste in Canada is generated by activities including:

- the nuclear fuel cycle, which includes uranium mining, nuclear fuel fabrication, the operation of nuclear power generating stations, and the eventual decommissioning of nuclear facilities; and
- the generation and use of radioactive isotopes in medical procedures.<sup>13</sup>

## Waste from Nuclear Power Generation

Canadian-developed CANDU (or Canada Deuterium Uranium) reactors use the heat created by nuclear fission to create electricity: The nuclear fuel creates heat as its atoms split. This heat converts water into steam. The steam turns a turbine that spins a magnet, which makes electricity flow to the power grid. The spent nuclear fuel is HLW, as described in Figure 1. CANDU reactors are currently active in Ontario and New Brunswick.<sup>14</sup>

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11 ENVI, *Evidence*, 3 February 2022, 1215 (Jason Van Wart, Vice-President, Nuclear Sustainability Services, Ontario Power Generation Inc.).

12 “It is very challenging to actually measure many of the radionuclides in radioactive waste. It's difficult. It's easy to measure something like cobalt-60, which is a powerful gamma emitter, but for many of the beta and even alpha emitters, it takes pretty specialized equipment. When waste is mixed—potentially low- and intermediate-level waste—it's difficult to know whether it should be classified as low or intermediate.” ENVI, *Evidence*, 3 February 2022, 1235 (Ole Hendrickson, Researcher, Concerned Citizens of Renfrew County and Area).

13 NRCAN, *Inventory of Radioactive Waste in Canada 2019*, 2021, p. 3.

14 Government of Canada, “[Gross capacity of nuclear power plants in Canada](#)”, *Uranium and nuclear power facts*.



In 2019, nuclear power plants generated approximately 15% of the electricity produced across Canada. Nuclear power represented approximately 58% of the electricity generated in Ontario and 38% of the electricity generated in New Brunswick.<sup>15</sup> Jason Van Wart credited the reliability of nuclear power in Ontario with making it possible for that province to stop coal-fired electricity generation—and the associated greenhouse gas (GHG) emissions—in 2014.<sup>16</sup>

John Gorman, President and Chief Executive Officer of the Canadian Nuclear Association, pointed out that for Canada to meet its GHG emissions reduction targets, “all the tools at our disposal, all non-emitting and clean energy technologies, including nuclear, are needed to play a role in dramatically reducing emissions.”<sup>17</sup> Some witnesses felt that nuclear power is needed in order for Canada to reach its net-zero targets and meet the increased energy demand created by electrification<sup>18</sup> but not all agreed.<sup>19</sup>

Small modular reactors (SMRs) are a developing technology which could be used to supply power to small electrical grids or rural and remote areas. SMRs are usually smaller than traditional nuclear power plants<sup>20</sup> and can be used in heavy industry and mining operations for electricity, heat, and to produce hydrogen.<sup>21</sup> Some witnesses

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15 NRCan, [Energy Fact Book 2021-2022](#), 2021, p. 58.

16 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

17 ENVI, [Evidence](#), 3 February 2022, 1105 (John Gorman, President and Chief Executive Officer, Canadian Nuclear Association).

18 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart); ENVI, [Evidence](#), 15 February 2022, 1215 (James Scongack, Chief Development Officer and Executive Vice President of Operations, Bruce Power); and ENVI, [Evidence](#), 15 February 2022, 1300 (Prof. Jason Donev, Senior Instructor, Department of Physics and Astronomy, University of Calgary, as an individual).

19 ENVI, [Evidence](#), 3 March 2022, 1945 (Chief Duncan Malcolm Michano, Chief, Biigtigong Nishnaabeg).

In a submitted brief, Gail Wylie considered that nuclear energy is too costly in absolute terms: more expensive than renewable energy, financially demanding since the risk is uninsurable; unsustainable due to the unresolved problem of radioactive waste; as well as running the risk of proliferation which could lead to military hazards. See: Gail Wylie, [Submission to the Standing Committee on Environment and Sustainable Development comprehensive review of the governance of nuclear waste in Canada and its impacts on the environment](#), Brief submitted to ENVI, February 2022.

20 According to NRCan, [Small Modular Reactors for Mining](#):

“An SMR is subject to an impact assessment under the *Impact Assessment Act* (IAA) if it is proposed to:

- Have a combined thermal capacity of more than 900MW(th) on a site that is within the boundaries of an existing licensed Class IA nuclear facility”; or
- “Have a combined thermal capacity of more than 200MW(th) on a site that is not located within the boundaries of an existing licensed Class IA nuclear facility.”

21 CNSC, [Small modular reactors](#); and ENVI, [Evidence](#), 3 February 2022, 1135 (John Gorman).



believed SMRs are a way to move forward towards net-zero goals despite the fact that the technology is not yet fully developed.<sup>22</sup> The term SMR encompasses a variety of reactor designs that produce “radioactive wastes that vary in characteristics such as chemical composition, physical form and uranium enrichment.”<sup>23</sup>

## Medical Isotope Production and Waste

Medical isotopes play a critically important role in medical diagnosis and cancer treatment, as well as to sterilize medical equipment and personal protective equipment.<sup>24</sup> Jason Van Wart stated, “medical isotopes produced in nuclear power plants are helping to save millions of lives every year.”<sup>25</sup> For example, cobalt-60, used for sterilization and radiation therapy, has been produced at the Pickering Nuclear Generating Station for 50 years.<sup>26</sup> Molybdenum-99, a precursor to an isotope used in diagnostic imaging, was produced at Chalk River Laboratories (CRL) and will soon be produced at the Darlington Nuclear Generating Station.<sup>27</sup> James Scongack, Chief Development Officer and Executive Vice President of Operations at Bruce Power felt that Canada could become a world leader in producing medical isotopes such as cobalt-60.<sup>28</sup> Gilles Provost, retired journalist and spokesperson for Ralliement contre la pollution radioactive, explained that, after Canada’s exports of cobalt-60 are used in other countries, Canada repatriates the waste.<sup>29</sup> Gilles Provost felt that each country should manage its cobalt-60 waste itself rather than having Canada bear that burden.<sup>30</sup>

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22 ENVI, [Evidence](#), 3 February 2022, 1135 (John Gorman); and ENVI, [Evidence](#), 1 March 2022, 1155 (Dr. Jeremy Whitlock, Section Head, Concepts and Approaches, Department of Safeguards, IAEA, as an individual).

23 ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. M.V. Ramana, Professor, School of Public Policy and Global Affairs, University of British Columbia, as an individual).

24 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart); ENVI, [Evidence](#), 15 February 2022, 1135 (James Scongack); and ENVI, [Evidence](#), 1 March 2022, 1210 (Fred Dermakar, President and Chief Executive Officer, Atomic Energy of Canada Limited [AECL]).

25 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

26 Ibid.

27 Gordon Edwards, Canadian Coalition for Nuclear Responsibility, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, February 2022; and ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

28 ENVI, [Evidence](#), 15 February 2022, 1215 (James Scongack).

29 ENVI, [Evidence](#), 15 February 2022, 1335 (Gilles Provost, Retired Journalist and Spokesperson, Ralliement contre la pollution radioactive).

30 ENVI, [Evidence](#), 15 February 2022, 1335 (Gilles Provost).



## VOLUME AND LOCATION OF RADIOACTIVE WASTE IN CANADA

Canada’s latest inventory of its radioactive waste was conducted in 2019 and published in 2021. Table 1 presents the inventory of radioactive waste in Canada as of 2019. HLW accounts for approximately 95% of the radioactivity of all radioactive waste but accounts for less than 1% of the volume of radioactive waste. Almost all the radioactive waste in Canada by volume is LLW.

**Table 1: Inventory of Radioactive Waste in Canada in 2019**

Waste Category	Waste Inventory at the End of 2019	Waste Inventory Projected to 2022	Waste Inventory Projected to 2050	Waste Inventory Projected to 2100
Waste from uranium mines and mills	385,000,000 tonnes	No projection <sup>a</sup>	No projection <sup>a</sup>	No projection <sup>a</sup>
Low-level radioactive waste	2,524,670 m <sup>3</sup> (1,010 Olympic-sized pools) <sup>b</sup>	2,616,087 m <sup>3</sup>	3,082,690 m <sup>3</sup>	3,410,478 m <sup>3</sup>
Intermediate-level radioactive waste	15,681 m <sup>3</sup> (6 Olympic-sized pools) <sup>b</sup>	18,361 m <sup>3</sup>	30,087 m <sup>3</sup>	32,324 m <sup>3</sup>
High-level radioactive waste	12,718 m <sup>3</sup> (5 Olympic-sized pools) <sup>b</sup>	13,577 m <sup>3</sup>	21,012 m <sup>3</sup>	22,853 m <sup>3</sup>

Notes: a. No projection is available for uranium mine and mill waste, as inventory depends on production levels, which are affected by market price fluctuations for uranium.

b. An Olympic-sized swimming pool is the equivalent of 2,500 m<sup>3</sup>.

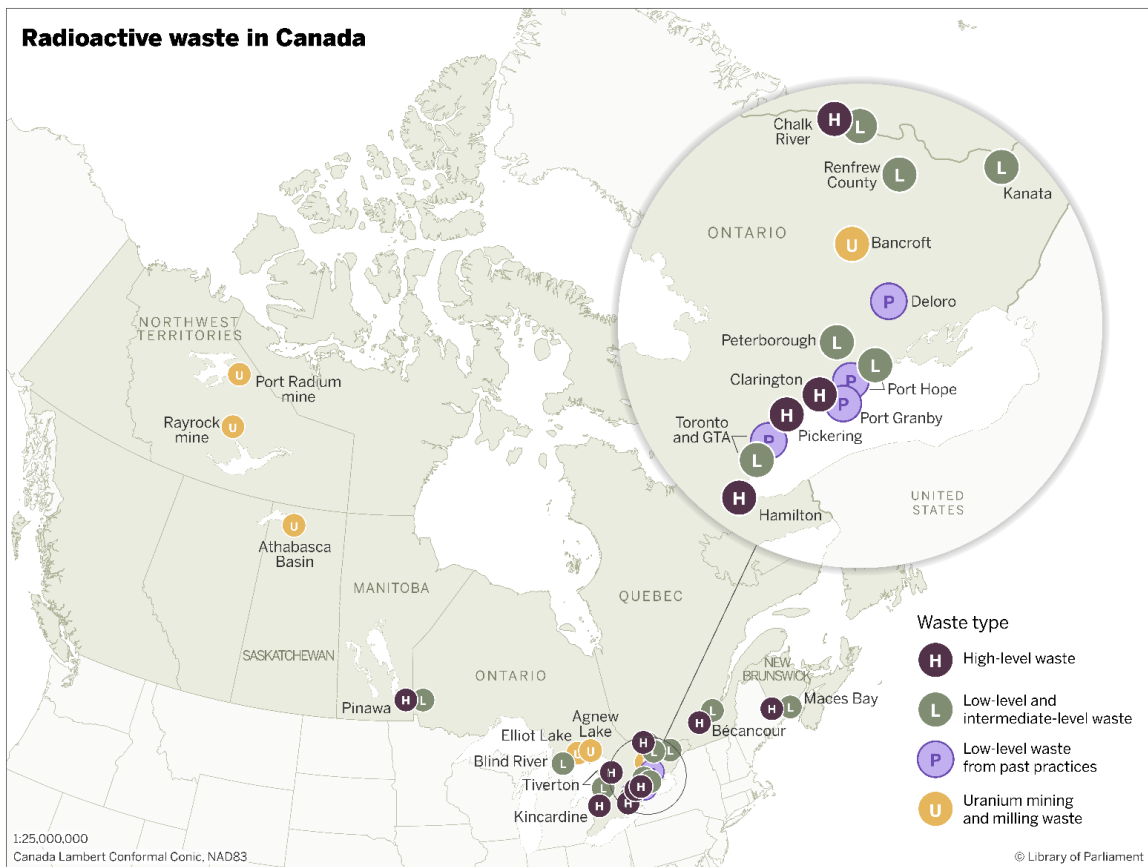
Source: Prepared by the Committee using data obtained from Natural Resources Canada, [Inventory of Radioactive Waste in Canada 2019](#), 2021, p. 13.

All LLW, ILW and HLW in Canada is currently stored in interim storage.<sup>31</sup> This interim storage is licensed, temporary storage to be used until final disposal facilities become available. LLW is stored above ground in bins and bags. ILW is stored in shielded above-ground or in-ground storage silos. HLW is stored in pools for seven to ten years before

31 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

being transferred to dry storage in concrete canisters or silos.<sup>32</sup> Figure 2 shows the location of these storage facilities in Canada.

**Figure 2: Temporary Storage Locations for Low-level Radioactive Waste, Intermediate-level Radioactive Waste and High-level Radioactive Waste in Canada**



Note: “Low-level waste from past practices” refers to historic low-level waste (LLW) which originated from past handling, transportation and use of uranium ore. It is mainly in the form of soil contaminated with uranium and radium. Between the 1930s and 1960s, uranium ore was mined at Port Radium in the Northwest Territories and shipped to be refined at a facility in Port Hope, Ontario. The majority (>98%) of the historic LLW in Canada is in the Port Hope area. Other sites in the greater Toronto area have small amounts of historic LLW from radium dial painting operations in the 1930s. The federal government has accepted responsibility for historic waste, whereas LLW resulting from ongoing operations are the responsibility of the waste owners and producers. (See: Natural Resources Canada, [Inventory of Radioactive Waste in Canada 2019](#), 2021, pp. 30-31; and Canadian Nuclear Safety Commission, [Historic nuclear waste.](#))

32 CNSC, [What is Radioactive Waste?](#)



Source: Map prepared by the Library of Parliament, Ottawa, 2022, using data from Natural Resources Canada, [Inventory of Radioactive Waste in Canada 2019](#), 2021; the Canadian Nuclear Safety Commission, [Radioactive waste](#), January 2022 and [Uranium mines and mills waste](#), November 2021; and Natural Resources Canada, [Administrative Boundaries in Canada—CanVec Series—Administrative Features](#), 2019. The following software was used: Esri, ArcGIS Pro, version 2.9.2. Contains information licensed under [Open Government Licence—Canada](#).

Many witnesses believed that the current storage is safe for the time being, but is not a permanent solution.<sup>33</sup> As explained by Jason Van Wart, while interim storage “is safe in the short and medium term, it's not a plan for the long term. Interim storage cannot be maintained in perpetuity for thousands of years. Buildings and packages [storing radioactive waste] degrade over time and need to be continually maintained. What is needed is permanent disposal.”<sup>34</sup> The CNSC defines “disposal” as “the placement of radioactive waste without the intention of retrieval.”<sup>35</sup>

The CNSC and Natural Resources Canada (NRCan) report that Canada’s interim storage facilities “are safe, secure and environmentally sound” and “are continually monitored by the licensees and the CNSC to ensure fitness for service.”<sup>36</sup> However, they add that “Canada recognizes that enhanced, long-term management approaches will be required for all its spent fuel and radioactive wastes.”<sup>37</sup>

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33 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart); ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami, President and Chief Executive Officer, Nuclear Waste Management Organization [NWMO]); ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. Jeremy Whitlock); ENVI, [Evidence](#), 1 March 2022, 1210 (Fred Dermakar); ENVI, [Evidence](#), 1 March 2022, 1215 (Joseph McBrearty, President and Chief Executive Officer, Canadian Nuclear Laboratories [CNL]); and ENVI, [Evidence](#), 1 March 2022, 1250 (Patrice Desbiens, Deputy Director, Gentilly-2 Facilities, Hydro-Québec).

34 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

35 CNSC, REGDOC-3.6, [Glossary of CNSC Terminology](#), May 2022.

36 CNSC and NRCan, [Seventh Canadian National Report for the Joint Convention](#), April 2021.

37 Ibid.

## GOVERNANCE STRUCTURE FOR RADIOACTIVE WASTE IN CANADA

**“Radioactive waste governance is a non-partisan issue; party affiliation is irrelevant, nor does it matter whether you support nuclear power or do not support it, because we are all in the same boat when it comes to radioactive waste.”<sup>38</sup>**

The federal government holds primary responsibility for the nuclear sector in Canada. It is responsible for the regulation of nuclear energy and materials, including radioactive waste, and for policy, research and development.<sup>39</sup> Because provinces have jurisdiction over their electricity needs, the decision to pursue nuclear energy—and generate the resultant radioactive waste—rests with the provinces.<sup>40</sup> In February 2020, the Government of Canada announced it would review and modernize *Canada’s Radioactive Waste Policy Framework*, which has been in place since 1996. A new draft policy is being developed and is expected to be completed by the end of 2022.

Two federal statutes govern most issues related to radioactive waste management in Canada. First, the *Nuclear Safety and Control Act* and its regulations form the regulatory framework for nuclear energy in Canada. Under the Act, the CNSC is the independent federal agency responsible for regulating, licensing and overseeing nuclear activities and facilities in Canada; it regulates all steps in the management of radioactive waste.<sup>41</sup>

Second, the *Nuclear Fuel Waste Act* provides the federal government with a framework for making decisions on the management of nuclear fuel waste in Canada. The Nuclear Waste Management Organization (NWMO) was created under the Act in 2002 to develop and implement a long-term management plan for nuclear fuel waste, which is HLW.<sup>42</sup>

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38 ENVI, *Evidence*, 15 February 2022, 1140 (Gordon Edwards).

39 NRCAN, *Nuclear Energy*.

40 Ibid.

41 CNSC, *Radioactive waste*.

42 NWMO, *Who We Are*.



Other federal statutes relevant to management of radioactive waste include:

- the *Nuclear Liability and Compensation Act*;
- the *Impact Assessment Act*;
- the *Canadian Environmental Protection Act*; and
- the *Fisheries Act*.

NRCan is the department responsible for federal radioactive waste policy matters. Other main entities involved in the governance of radioactive waste management are described below.

### Canadian Nuclear Safety Commission

The CNSC is an “independent, quasi-judicial tribunal with the authority to regulate all nuclear facilities and activities in Canada, including radioactive wastes.”<sup>43</sup> The CNSC’s decisions are to be “based on the best available science and an understanding of the risks involved” and can only be reviewed by a federal court.<sup>44</sup> The CNSC does not report to a minister but rather reports to Parliament through the Minister of Natural Resources.<sup>45</sup>

Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the CNSC was responsible for the environmental assessment of proposed radioactive waste storage projects that, if approved, it would subsequently regulate. The *Impact Assessment Act* (IAA), which came into force in 2019, provides separation between the entity that decides if a proposed radioactive waste storage project can proceed from the impact assessment phase to the regulatory phase (the Impact Assessment Agency of Canada [IAAC]), and the regulator that licenses the project (the CNSC). Projects whose reviews had already started under CEAA 2012 may continue under that Act.

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43 ENVI, *Evidence*, 3 March 2022, 1830 (Rumina Velshi, President and Chief Executive Officer, CNSC).

44 Ibid.

45 Ibid.

## Nuclear Waste Management Organization

The NWMO is a not-for-profit organization fully funded by Canada’s nuclear electricity producers—Hydro-Québec, New Brunswick Power Corporation, and OPG.<sup>46</sup> The NWMO is responsible for the long-term management of used nuclear fuel, which is generally considered HLW. The NWMO recently reaffirmed its commitment to manage only nuclear fuel waste generated in Canada, and to “not import, manage or store used nuclear fuel from other countries”.<sup>47</sup> Gordon Edwards, President of the Canadian Coalition for Nuclear Responsibility, pointed out that the NWMO’s commitment has no basis in law.<sup>48</sup> Some witnesses believed a law or regulation banning the importation of nuclear fuel waste would be necessary.<sup>49</sup>

## Impact Assessment Agency of Canada

The IAAC administers the IAA and is accountable to the Minister of Environment and Climate Change. An impact assessment under the IAA may be required for projects that manage or generate radioactive waste. An impact assessment should help “project proponents, the public, Indigenous groups and decision-makers understand the possible impacts of proposed projects before they are allowed to proceed. Assessments identify ways to avoid or reduce a project's potential negative impacts while increasing the potential positive effects.”<sup>50</sup> Since the IAA came into force in 2019, no projects managing or generating radioactive waste have been subject to an impact assessment.

## Atomic Energy of Canada Limited and Canadian Nuclear Laboratories

Atomic Energy of Canada Limited (AECL) was established in 1951 as a federal Crown corporation with a mandate including “driving nuclear innovation for Canada and

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46 ENVI, *Evidence*, 3 February 2022, 1120 (Laurie Swami) and NWMO, *Who we are*.

47 NWMO, *The NWMO reinforces commitment to only manage waste generated in Canada*, News Release, December 2021.

48 ENVI, *Evidence*, 15 February 2022, 1205 (Dr. Gordon Edwards).

49 Ibid; Tony Reddins, *Brief to the Standing Committee on Environment and Sustainable Development about Nuclear Waste Governance in Canada*, Brief submitted to ENVI, March 2022.

The importation of low- and intermediate-level waste, including medical isotope waste, is addressed later in the report. These wastes would not fall under the purview of the NWMO as they are not nuclear fuel waste.

50 ENVI, *Evidence*, 3 March 2022, 1940 (Steve Chapman, Director General, National Programs, Impact Assessment Agency of Canada).



cleaning up federal nuclear legacy waste.”<sup>51</sup> AECL is responsible for managing the Government of Canada’s radioactive waste and decommissioning liabilities. This includes legacy liabilities that are a result of past activities at AECL’s sites for nuclear science and technology, and historic waste liabilities for LLW for which the Government of Canada has accepted responsibility.<sup>52</sup> AECL fulfils its mandate through a government-owned contractor-operated (GoCo) model with Canadian Nuclear Laboratories (CNL). Under the GoCo model, AECL “owns the sites, facilities, assets, intellectual property and responsibility for environmental remediation and radioactive waste management. CNL is responsible for the day-to-day operations of the sites.”<sup>53</sup> As part of government restructuring, the assets of AECL’s CANDU Reactor Division were sold in 2011 to Candu Energy Inc., a division of SNC-Lavalin. CNL was launched in 2014, and in 2015, all its shares were transferred to a private-sector consortium, Canadian National Energy Alliance (CNEA), which now operates it. The consortium is made up of the companies SNC-Lavalin, Fluor and Jacobs.

Joseph McBrearty, President and Chief Executive Officer of CNL, believed the GoCo model was a beneficial one because it

offers one of the best potential contracting mechanisms that Canada can employ. There is not very much decommissioning in nuclear waste management experience that exists in Canada today. The vast majority of that experience exists in the United States and the United Kingdom. The ability to bring in high-quality engineering firms, to actually bring that talent to Canada and have it rapidly and expeditiously available, is a significant benefit and allows Canada to be at the same level as the other major nuclear tier-one nations.<sup>54</sup>

Figure 3 shows the organizations responsible for the long-term management of radioactive waste in Canada.

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51 ENVI, [Evidence](#), 1 March 2022, 1210 (Fred Dermakar).

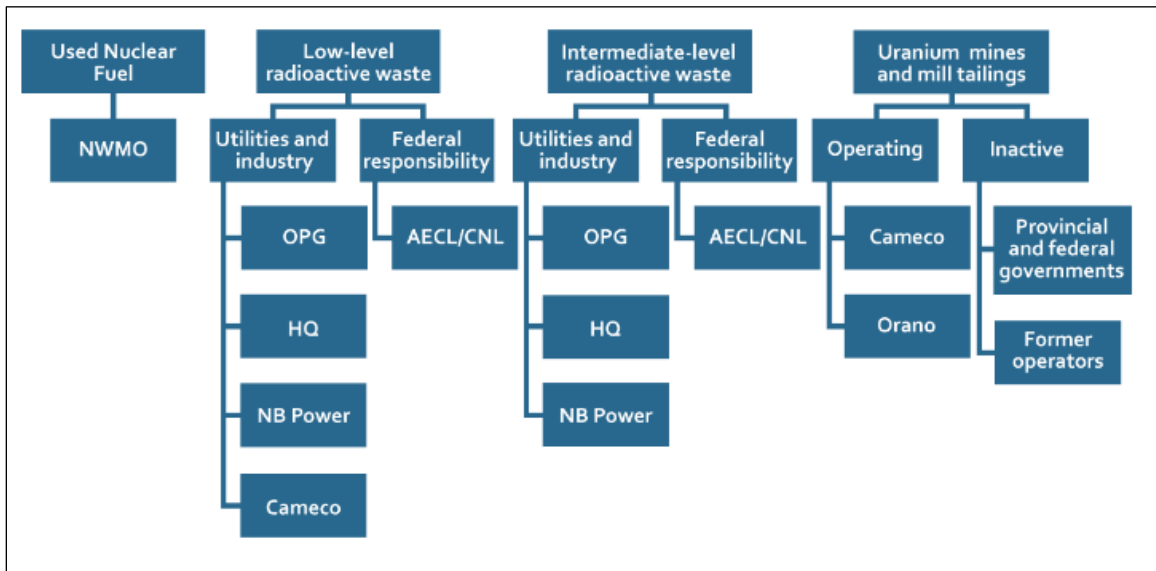
52 CNSC, [Radioactive waste](#).

53 AECL, [GoCo Model](#).

54 ENVI, [Evidence](#), 1 March 2022, 1225 (Joseph McBrearty).



**Figure 3: Organizations Responsible for the Long-Term Management of Four Types of Radioactive Waste in Canada**



Note: Acronyms used in the figure are: NWMO—Nuclear Waste Management Organization; OPG—Ontario Power Generation; HQ—Hydro Québec; AECL—Atomic Energy of Canada Limited; and CNL—Canadian Nuclear Laboratories.

Source: Canadian Nuclear Safety Commission, *Radioactive waste*.

## INDEPENDENCE AND OVERSIGHT OF RADIOACTIVE WASTE GOVERNANCE IN CANADA

There was much discussion among witnesses as to whether the existing governance reporting structure provided enough oversight and independence and avoided conflicts of interest—or the appearance of them. Dr. Gordon Edwards believed that “the people who speak most highly of the CNSC are the people they're supposed to be regulating” and stated:

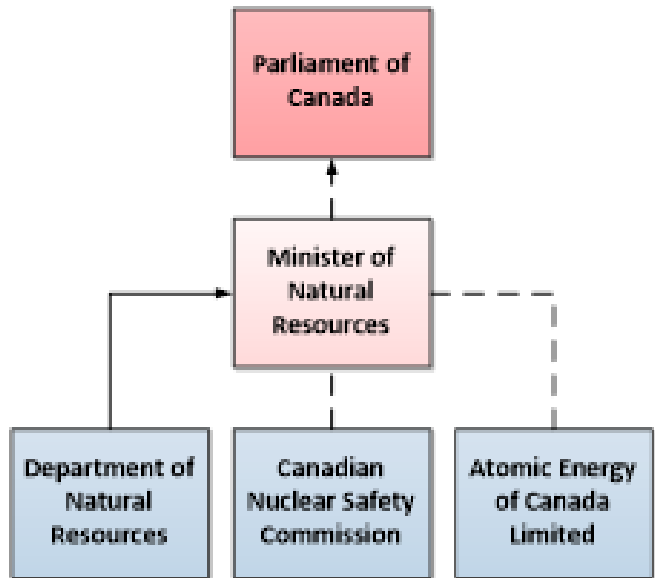
I think it would be useful if the CNSC—the Canadian Nuclear Safety Commission—reported directly to Parliament on a regular basis. Parliament could summon people who have dealt with the commission and have been unhappy with their findings so that some light can be shone on this matter.<sup>55</sup>

55 ENVI, *Evidence*, 15 February 2022, 1200 (Dr. Gordon Edwards).



As illustrated in Figure 4, CNSC and AECL do not report to the Minister of Natural Resources but rather to Parliament, *through* the Minister. Because only ministers of the Crown or parliamentary secretaries acting on their behalf can table documents in the House of Commons,<sup>56</sup> the Minister of Natural Resources tables documents (such as annual reports) on behalf of CNSC and AECL in Parliament.

**Figure 4: Canada’s Current Governance Reporting Structure for Nuclear Energy and Radioactive Waste, as Depicted by the International Atomic Energy Agency**



Note: The dashed line indicates that CNSC and AECL report to Parliament through the Minister of Natural Resources to Parliament, as opposed to reporting to the Minister. The solid line indicates that Natural Resources Canada reports to the Minister.

Source: International Atomic Energy Agency, *Country Nuclear Power Profiles*, “Canada”, 2018.

Some witnesses stated that the CNSC and AECL both reporting through the Minister of Natural Resources on matters of radioactive waste could create a real or perceived conflict of interest since the Minister of Natural Resources is also responsible for promoting and regulating the nuclear industry. These witnesses generally suggested that the Minister of Environment and Climate Change Canada would be a more appropriate

56 House of Commons, *Standing Orders of the House of Commons*, 2021, S.O. 32(2).

Minister to handle matters of radioactive waste management while the Minister of Natural Resources could retain the responsibility for the nuclear industry.<sup>57</sup>

In its brief, the Canadian Environmental Law Association (CELA) suggested that the agencies and departments that promote the development and use of nuclear power (AECL and NRCan) should report to and through a separate minister of the Crown from the one to which the nuclear safety regulator (the CNSC) reports.<sup>58</sup> It argued this would bring Canada into alignment with guidance from the International Atomic Energy Agency (IAEA). In fact, as specified by CELA, having the CNSC and the AECL report to the same Minister contravenes the IAEA's *Convention on Nuclear Safety*, which states that "Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy."<sup>59</sup> CELA quoted from the response from then-Minister of Natural Resources Seamus O'Regan to a petition filed through the Commissioner of Environment and Sustainable Development on the matter, which stated that the Governor in Council has authority to designate a minister other than the Minister of Natural Resources for the purposes of the *Nuclear Safety Control Act*, thereby changing who is responsible to Parliament for the CNSC.<sup>60</sup> In his response, then-Minister O'Regan noted that a corresponding change would be needed under the *Financial Administration Act* and that this decision would be made by the Prime Minister of Canada as per the Privy Council Office's guide for Ministers, *Open and Accountable Government*.<sup>61</sup>

In a brief, Barry Stemshorn, Honorary Senior Fellow at the University of Ottawa and former Assistant Deputy Minister responsible for administration of the *Canadian Environmental Protection Act, 1999*, concurred with the CELA brief that the CNSC and AECL should report to separate ministers in order to provide more separation between CNSC and the promoters of the nuclear industry. He recommended that a parliamentary review or an audit, possibly by the Commissioner of the Environment and Sustainable

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57 ENVI, *Evidence*, 3 February 2022, 1155 (Ole Hendrickson); ENVI, *Evidence*, 1 March 2022, 1150 (Dr. M.V. Ramana); and Barry Stemshorn, *Nuclear Waste Governance in Canada*, Brief submitted to ENVI, March 2022.

58 Canadian Environmental Law Association, *Background—Need for Separation of Ministerial Reporting by Canadian Nuclear Safety Commission and Atomic Energy of Canada Limited*, Brief submitted to ENVI, February 2022.

59 IAEA, *Convention on Nuclear Safety*, 17 June 1994, p. 4.

60 Response letter dated 9 October 2020 from Minister O'Regan to the petitioner of Environmental Petition No. 443, obtainable upon request to the Office of the Auditor General, Commissioner of the Environment and Sustainable Development.

61 *Ibid.*



Development, be conducted to ensure that CNSC’s legislative framework aligns with the IAEA. Mr. Stemshorn presented the opinion that the CNSC should not be independent from government but that “elected representatives should have the final word on decisions that require value-laden choices, often between economic benefits on the one hand and risks to environmental and/or public health on the other.”<sup>62</sup> He believed the CNSC’s decisions should be “ratified by elected members of cabinet who are accountable to Canadians” as opposed to its current quasi-judicial state.<sup>63</sup>

Rumina Velshi, President and Chief Executive Officer of the CNSC, addressed the concern raised about the optics of having the regulator (the CNSC) reporting to NRCan. She noted that the reporting structure is strictly to allow for the tabling of the CNSC’s reports in Parliament and that there was “no political interference in our decision-making.”<sup>64</sup> She noted that whichever minister CNSC reports through is a decision for the Governor in Council and that she couldn’t “see it making any difference in how we carry out our mandate”.<sup>65</sup> Although Thomas Isaacs, private consultant, did not wish to advise on the parliamentary reporting structure, he offered the opinion, shared by other witnesses, that radioactive waste management should have independent oversight which is monitored by Parliament,<sup>66</sup> and that it should be done in a way that is “perceived as being competent and free of conflicts of interest.”<sup>67</sup>

In his written correspondence to the Committee, Dr. M.V. Ramana, Professor at the School of Public Policy and Global Affairs at the University of British Columbia, weighed in on the issue of governance, stating:

The current structure naturally induces suspicion. The problem is that Natural Resources Canada has the responsibility to develop and promote nuclear energy. Because the CNSC is responsible for the protection of “health, safety, security and the environment”, its ideal role can, on occasion, be at odds with the promotion of nuclear energy. Conversely,

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62 Barry Stemshorn, [Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, 1 March 2022. Note: This opinion was not presented by other witnesses.

63 As described by Rumina Velshi, President and Chief Executive Officer of the CNSC, the CNSC is quasi-judicial and its decisions can only be reviewed by a federal court. No Cabinet Members or other Members of Parliament are currently involved in its decision making. (ENVI, [Evidence](#), 3 March 2022, 1830 (Rumina Velshi).

64 ENVI, [Evidence](#), 3 March 2022, 1835 (Rumina Velshi).

65 Ibid.

66 Dr. M.V. Ramana, [“Study on Nuclear Waste Governance in Canada”](#), Written submission to ENVI, March 2022.

67 ENVI, [Evidence](#), 15 February 2022, 1230 (Thomas Isaacs, Private Consultant, as an individual).

when regulating a technology that is being promoted by the Ministry, the regulator might be motivated to adopt practices that prioritize the potential for rapid deployment rather than ensuring a higher degree of safety and precaution.<sup>68</sup>

The Committee does not suggest that there is a conflict of interest in having the CNSC report to Parliament through the Minister of Natural Resources. However, the Committee sees benefits to improving public trust and confidence in Canada's radioactive waste management by eliminating a perceived conflict of interest. Greater social acceptance of potential future nuclear development may be one such benefit.

### **Recommendation 1**

**The Committee recommends that the Auditor General of Canada conduct a public audit of Canada's radioactive waste governance.**

## **LONG-TERM STORAGE OF RADIOACTIVE WASTE**

**“[P]ermanent disposal facilities for nuclear reactor waste have never been approved in Canada. Such facilities will impact many future generations and we must get them right.”<sup>69</sup>**

There is a moral imperative to store the radioactive waste resulting from nuclear energy generation permanently and safely and not to pass on the responsibility to future generations.<sup>70</sup> Chief Duncan Malcolm Michano of the Biigtigong Nishnaabeg believed radioactive waste should stop being produced because it would be “poisonous to our descendants for hundreds of thousands of years”.<sup>71</sup> He raised the issue of the amount of

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68 Dr. M.V. Ramana, “[Study on Nuclear Waste Governance in Canada](#)”, Written submission to ENVI, March 2022.

69 ENVI, [Evidence](#), 3 February 2022, 1110 (Ole Hendrickson).

70 ENVI, [Evidence](#), 3 February 2022, 1130 (John Gorman); ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami); and ENVI, [Evidence](#), 1 March 2022, 1200 (Dr. Jeremy Whitlock).

71 ENVI, [Evidence](#), 3 March 2022, 1945 (Chief Duncan Malcolm Michano).



waste that could be produced in 100 or 500 years compared to the waste created over the last 60 years for which long-term plans do not yet exist.<sup>72</sup>

Witnesses spoke of how the polluter pays principle applies to nuclear energy, and that the nuclear industry tracks and pays for all its waste.<sup>73</sup> Laurie Swami, President and Chief Executive Officer of the NWMO, explained that the long-term disposal of HLW is prefunded by the nuclear energy industry for all existing used fuel bundles. The money is held in trust funds that the NWMO will be able to access once it obtains its construction licence for the deep geological repository (DGR).<sup>74</sup> Ole Hendrickson, Researcher at the Concerned Citizens of Renfrew County and Area, raised questions about the availability of funds for radioactive waste management, noting that discounted and undiscounted federal liabilities for federally owned nuclear sites was approximately \$23.4 billion. This exceeds the \$7.1 billion in federal liabilities for 2,500 contaminated sites. In the 2021–2022 Main Estimates, \$808 million was directed towards AECL’s nuclear decommissioning and radioactive waste management expenses.<sup>75</sup>

Dr. Gordon Edwards agreed that applying the polluter pays principle to radioactive waste is important. However, he felt that the polluters should not determine the extent of waste management and, therefore, the extent of how much polluters must pay. Instead, he felt that those with “only the health and welfare of the Canadian citizens and the Canadian environment” should be in charge of waste management.<sup>76</sup>

Chief Reg Niganobe, Grand Council Chief of the Anishinabek Nation, Chiefs of Ontario, outlined the five principles on radioactive waste agreed upon by the Anishinabek Nation and the Iroquois Caucus, adopted by the leadership of 133 First Nations communities in Ontario:

First, there should be no abandonment but rather a policy of perpetual stewardship. Climate change has made weather events unpredictable; therefore, human-made storage must be resilient to ensure that radioactive materials stay out of the food we eat, the water we drink, the air we breathe and the land we live on.

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72 Ibid.

73 ENVI, [Evidence](#), 3 February 2022, 1140 (Laurie Swami); ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart); and ENVI, [Evidence](#), 3 February 2022, 1210 (John Gorman).

74 ENVI, [Evidence](#), 3 February 2022, 1140 (Laurie Swami).

75 ENVI, [Evidence](#), 3 February 2022, 1110 (Ole Hendrickson).

See: Government of Canada, [Main Estimates—2021–2022 Estimates](#).

76 ENVI, [Evidence](#), 15 February 2022, 1200 (Dr. Gordon Edwards).

Second, the best possible containment must be used with adaptable packaging to align with changing environmental conditions.

Third, it should be monitored and retrievable in a relationship of continuous guardianship. Information and resources must be passed from one generation to the next to ensure that any signs of leakage are able to be addressed.

The fourth principle declares that nuclear waste should be away from major water bodies. When we poison our waterways, we poison ourselves. Rivers and lakes are the blood and lungs of mother earth.

Finally, exports and imports of waste should be forbidden except in truly exceptional cases after full consultation with all those whose lands and waters are being put at risk.<sup>77</sup>

William Turner, AECL retiree and resident of Deep River, noted in his brief that the term “abandon” is used in the *Nuclear Safety and Control Act* to refer to the final phase in the life cycle of a nuclear substance or nuclear facility.<sup>78</sup> Section 26 (e) of the Act states: “Subject to the regulations, no person shall, except in accordance with a licence, prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility.”<sup>79</sup> The CNSC defines “abandon” as “remove[d] from regulatory control.”<sup>80</sup> William Turner noted that many of Canada’s CANDU power reactors are entering the decommissioning phase of their life cycles, and that “abandonment” is the next (and final) phase after decommissioning. However, he observed that the CNSC does not have guidance for licensees on abandonment and has been removing the term from their guidance documents in recent years. William Turner was concerned for the governance of nuclear waste in Canada if “neither the nuclear industry nor the regulator appears willing to address the radioactive waste abandonment issue.”<sup>81</sup>

While William Turner saw abandonment as an inevitable phase of the nuclear facility life cycle, for which CNSC should be proactively providing guidance to the licensees, Gordon Edwards, President of the Canadian Coalition for Nuclear Responsibility, did not

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77 ENVI, *Evidence*, 15 February 2022, 1245 (Chief Reg Niganobe, Grand Council Chief, Anishinabek Nation, Chiefs of Ontario); and ENVI, *Evidence*, 15 February 2022, 1330 (Chief Reg Niganobe).

78 William Turner, *Nuclear Waste Governance in Canada*, Brief submitted to ENVI, March 2022.

79 S.C. 1997, c. 9, *Nuclear Safety and Control Act*.

S. 26 (a) Subject to the regulations, no person shall, except in accordance with a licence, possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information.” (S.C. 1997, c. 9, *Nuclear Safety and Control Act*).

80 CNSC, REGDOC-3.6, *Glossary of CNSC Terminology—Glossary—A*.

81 William Turner, *Nuclear Waste Governance in Canada*, Brief submitted to ENVI, March 2022.



accept that abandonment must or should occur. Dr. Edwards stated that “rolling stewardship is an alternative to abandonment and should be seriously considered by Parliament. Abandonment is irresponsible; three final repositories have experienced failure so far.”<sup>82</sup> Dr. Edwards described the concept of rolling stewardship as “an intergenerational waste management concept whereby each successive generation passes on the knowledge and provides the necessary resources to the next generation, so that nuclear wastes are never placed beyond human control and are never left unattended.”<sup>83</sup> The concept of rolling stewardship of radioactive waste, as opposed to abandonment, was supported by several briefs and witnesses<sup>84</sup> such as Ole Hendrickson, who stated that, in the case of a facility with waste remaining radioactive for thousands to hundreds of thousands of years,

it would essentially never be possible to abandon or unlicense a facility that's above ground and that still has significant quantities of radioactive and non-radioactive hazards in it. You essentially need a perpetual licence. This would represent a perpetual liability for the people of Canada and for our governments and taxpayers.<sup>85</sup>

Potential long-term storage options discussed by witnesses included a near surface disposal facility (NSDF) in Chalk River, Ontario for LLW and a DGR, also in Ontario, for HLW. There are no plans to address the long-term storage needs for ILW in Canada. In November 2020, the Minister of Natural Resources asked the NWMO to lead the

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82 ENVI, [Evidence](#), 15 February 2022, 1145 (Gordon Edwards).

The three final repositories that have experienced failure are the Asse II and Morsleben salt mines in Germany and the Waste Isolation Pilot Plant in the United States. They are deep geological repositories developed to store radioactive waste.

83 Gordon Edwards and Robert Del Tredici, Canadian Coalition for Nuclear Responsibility to the Joint Review Panel, [Examples of Rolling Stewardship Beyond One or Two Generations](#), submission to the Joint Review Panel on the Deep Geologic Repository Project for Low and Intermediate Level Radioactive Waste, 30 October 2013.

84 Laurence Leduc-Primeau, Regroupement des organismes environnementaux en énergie, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Paul Filteau, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Ian Pineau, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Paula Tippett, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; ENVI, [Evidence](#), 3 March 2022, 1930 (Chief Duncan Malcolm Michano); ENVI, [Evidence](#), 15 February 2022, 1245 (Chief Reg Niganobe); Sandy Greer, [Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment](#), Brief submitted to ENVI, March 2022; and Faye More, Port Hope Community Health Concerns Committee, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022.

85 ENVI, [Evidence](#), 3 February 2022, 1150 (Ole Hendrickson).



development of an integrated radioactive waste management strategy for LLW and ILW as part of the review of the *Radioactive Waste Policy*.<sup>86</sup>

## Near Surface Disposal Facility

Joseph McBrearty described the history of CRL, which is in the area of Chalk River, Ontario, including over 70 years of “groundbreaking research” including two Nobel Prizes and the invention of the CANDU reactor.<sup>87</sup> Since 2015, CNL has managed the legacy waste liabilities at CRL, which include contaminated soil, and old buildings.<sup>88</sup>

The clean-up of the Chalk River site involves managing low-, intermediate- and high-level wastes. All radioactive waste is expected to be disposed of by 2070.<sup>89</sup> ILW will be processed to reduce its volume and stored at a new facility until a national determination has been made for its disposition. Nuclear fuel waste (HLW) will be transported off-site to the DGR (discussed in the next section).

CNL has proposed a NSDF as the “the best approach to isolate and contain [LLW], to reduce risk and to protect the surrounding environment.”<sup>90</sup> The NSDF would be “a mound, built at near-surface level, consisting of disposal cells with a base liner and cover as well as systems to collect leachate, detect leaks and monitor the environment”.<sup>91</sup> The NSDF proposed at CRL would have a licence or regulatory oversight for 300 years while the structure would last over 550 years.<sup>92</sup> The CNSC held public hearings in February and May 2022 to hear from intervenors before making a final decision on the facility.<sup>93</sup> A timeline of significant events in the history of Chalk River Laboratories is included in Table 2.

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86 Nuclear Waste Management Organization, *NWMO asked to lead development of an integrated radioactive waste management strategy for Canada*, News Release, November 2020.

87 ENVI, *Evidence*, 1 March 2022, 1215 (Joseph McBrearty).

88 Ibid.

89 Ibid.

90 Ibid.

91 CNSC, *Proposed nuclear facility—Near Surface Disposal Facility*.

92 ENVI, *Evidence*, 3 February 2022, 1150 (Ole Hendrickson); and CNL, *Near Surface Disposal Facility*.

93 ENVI, *Evidence*, 3 March 2022, 1855 (Rumina Velshi).



**Table 2: Timeline of Significant Events in the History of Chalk River Laboratories in Chalk River, Ontario**

Year	Event
<b>1944</b>	Building of Chalk River Laboratories (CRL) begins in Chalk River, Ontario. It is operated by the National Research Council of Canada.
<b>1951</b>	Atomic Energy of Canada Limited (AECL) is established as a federal Crown corporation. It operates CRL.
<b>1940s, 1950s, 1960s</b>	Temporary radioactive waste storage areas and facilities are created at CRL, leading to the contamination of the surrounding soil.
<b>2011</b>	As part of government restructuring of AECL, the assets of its CANDU Reactor Division are sold to Candu Energy Inc., a subsidiary of SNC-Lavalin.
<b>2014</b>	Canadian Nuclear Laboratories (CNL) is launched.
<b>2015</b>	As part of government restructuring of AECL, the shares of CNL are transferred to a private-sector contractor, as part of a government owned contractor operated model for the management and operations of AECL’s sites. The private-sector contractor is a consortium, Canadian National Energy Alliance (CNEA), which begins to operate CNL.
<b>2015</b>	Clean-up by CNL begins at the CRL site.
<b>2016</b>	Environmental assessment process begins for the Chalk River near surface disposal facility (NSDF) under the <i>Canadian Environmental Assessment Act, 2012</i> , overseen by the Canadian Nuclear Safety Commission (CNSC).
<b>February and May 2022</b>	CNSC commission hearings for CNL’s request to amend CRL site licence to authorize the construction of the NSDF.
<b>September 2022</b>	Environmental assessment and licence decision.
<b>Approximately 2500</b>	End of NSDF lifespan, if approved.

Note: Only low-level waste is proposed to be stored at the near surface disposal facility. There are no current plans in Canada for the long-term storage of intermediate-level waste. High-level waste would be transported off-site to a deep geological repository.

Sources: Prepared by the Committee based on data from Atomic Energy of Canada (AECL), [1944–2019 AECL Historical Timeline](#); AECL, [Environmental Stewardship: Near Surface Disposal Facility](#); Canadian Nuclear Safety Commission, [Regulatory review status for the Near Surface Disposal Facility \(NSDF\)](#); and Canadian Nuclear Laboratories, [Near Surface Disposal Facility](#).

While some witnesses believed the NSDF was a good way forward for the long-term storage of LLW,<sup>94</sup> others did not.<sup>95</sup> The CNSC is concluding its environmental assessment of the proposed NSDF, which started in 2016 under CEAA 2012.<sup>96</sup> Because the environmental assessment process under CEAA 2012 is different from the new impact assessment process under the IAA, some witnesses expressed disappointment that the NSDF environmental assessment process was proceeding under CEAA 2012.<sup>97</sup>

It was initially proposed that the NSDF would store small amounts of ILW. Public concern led to the project being revised to only store LLW. Meggan Vickard, General Manager of Waste Services at CNL said this was “a great example” of public input during the environmental assessment process.<sup>98</sup> According to Joseph McBrearty, the approach to the NSDF project had gone through several changes because of input from Indigenous communities.<sup>99</sup>

In June 2020, the CNSC adopted a regulatory document on the management of radioactive waste.<sup>100</sup> It provides descriptions of LLW, ILW, HLW and uranium mine and mill tailings. Ole Hendrickson was concerned that ILW was being inappropriately reclassified as LLW so that it could still be stored in the NSDF at Chalk River.<sup>101</sup> A brief from the Concerned Citizens of Renfrew County and Area questioned why, between 2016 and 2019, the ILW inventory at Chalk River was reduced by 90%, from 19,468 m<sup>3</sup> to 1,382 m<sup>3</sup>, among other irregularities. The group called for AECL to provide a full inventory, including radioactivity and specific radionuclides, that resolves the differences between the 2016 and 2019 inventories of current and projected wastes.<sup>102</sup> Gilles Provost and Ginette Charbonneau, physicist and spokesperson for

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94 ENVI, [Evidence](#), 1 March 2022, 1150 (Dr. Jeremy Whitlock); ENVI, [Evidence](#), 1 March 2022, 1305 (Joseph McBrearty); and ENVI, [Evidence](#), 1 March 2022, 1305 (Meggan Vickard, General Manager, Waste Services, CNL).

95 ENVI, [Evidence](#), 3 February 2022, 1150 (Ole Hendrickson); ENVI, [Evidence](#), 15 February 2022, 1200 (Dr. Gordon Edwards); and ENVI, [Evidence](#), 15 February 2022, 1310 (Gilles Provost).

96 See Government of Canada, [Near Surface Disposal Facility Project](#) for status.

97 ENVI, [Evidence](#), 3 February 2022, 1110 (Ole Hendrickson).

98 ENVI, [Evidence](#), 1 March 2022, 1235 (Meggan Vickard).

99 ENVI, [Evidence](#), 1 March 2022, 1240 (Joseph McBrearty).

100 CNSC, [REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#).  
For the document history on the adoption of the regulatory document, see: CNSC, [Document History of REGDOC-2.11.1, Waste Management, Volume I: Management of Radioactive Waste](#).

101 ENVI, [Evidence](#), 3 February 2022, 1145 (Ole Hendrickson).

102 Concerned Citizens of Renfrew County and Area, [Changes in reporting of federal radioactive waste between 2016 and 2019](#), Brief submitted to ENVI, February 2022.



Ralliement contre la pollution nucléaire, argued that ILW was still going to be stored at the NSDF because of inappropriate categorization of cobalt-60.<sup>103</sup> CNL’s Waste Acceptance Criteria for the NSDF was initially issued for review and comment on 30 April 2019. It has since been revised five times to incorporate CNSC comments and other changes, most recently in November 2020. The document’s revision history shows that the revision released in September 2020, “replaced “Reference Inventory” with the “Licensed Inventory” that has lower total activity limits for Iodine 129 and Plutonium-239/240.”<sup>104</sup>

The proposed site for the NSDF is close to the Ottawa River. Dr. Gordon Edwards expressed concern about the proximity of the NSDF to the river and the possibility of climate change-impacted flooding and precipitation resulting in leaching of wastes into the Ottawa River.<sup>105</sup> Mr. Hendrickson added that “the IAEA says that siting is an extremely critical part of radioactive waste management”<sup>106</sup> to address concerns for leaching into waterways. Some witnesses spoke in favour of taking a regional approach to an impact assessment along the Ottawa River, given that there are several other nuclear facilities located in the Ottawa Valley.<sup>107</sup> In 2021, the City of Ottawa requested a regional assessment under the *Impact Assessment Act* that was turned down by the Minister of the Environment.<sup>108</sup>

Joseph McBrearty explained that the proposed site was identified as the best site from a geological standpoint as well as a hydrogeological standpoint “to ensure that the Ottawa River watershed is protected at all costs.”<sup>109</sup> He added that the proposed site was chosen so that the NSDF would not be affected by human-made or natural events—including major weather events such as flooding caused by climate change and dam failures.<sup>110</sup> Meggan Vickerd explained that CNL has a “very robust environmental monitoring program that includes groundwater sampling, surface water sampling and soil and air

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103 ENVI, [Evidence](#), 15 February 2022, 1255 (Ginette Charbonneau, Physicist and Spokesperson, Ralliement contre la pollution nucléaire); and ENVI, [Evidence](#), 15 February 2022, 1310 (Gilles Provost).

104 CNL, “[Waste Acceptance Criteria](#),” *Near Surface Disposal Facility Waste Acceptance Criteria*, 232-508600-WAC-003, Revision 4, 12 November 2020, p. 4.

105 ENVI, [Evidence](#), 15 February 2022, 1140 (Dr. Gordon Edwards).

106 ENVI, [Evidence](#), 3 February 2022, 1240 (Ole Hendrickson).

107 ENVI, [Evidence](#), 15 February 2022, 1255 (Ginette Charbonneau); ENVI, [Evidence](#), 15 February 2022, 1310 (Chief Reg Niganobe); and ENVI, [Evidence](#), 3 February 2022, 1145 (Ole Hendrickson).

108 Impact Assessment Agency of Canada, Canadian Impact Assessment Registry, Potential Regional Assessment of Radioactive Waste Disposal in the Ottawa Valley, [Minister’s Response](#), 30 July 2021.

109 ENVI, [Evidence](#), 1 March 2022, 1220 (Joseph McBrearty).

110 ENVI, [Evidence](#), 1 March 2022, 1230 (Joseph McBrearty).

sampling, not only on the Chalk River site but off the site as well.” She added that CNL has been working with Indigenous groups to include traditional knowledge in the environmental monitoring program and potentially have them conduct the environmental monitoring.<sup>111</sup>

CNL witnesses told the Committee that the risk currently presented by radioactive waste on the Chalk River Laboratories campus was low but that it would be even lower after the waste is stored in the NSDF. Joseph McBrearty emphasized that a large portion of the waste at Chalk River site is exposed to the elements—including about 500,000 cubic metres of contaminated soil and World War II-era buildings.<sup>112</sup> Since cleanup began at the Chalk River site in 2015, 110 out of nearly 200 structures have been safely remediated in a way that minimized material needing to be sent for final disposal.<sup>113</sup>

## Deep Geological Repository

**“I believe strongly that all countries that rely on nuclear power for part of their energy mix have a responsibility to begin preparations for the ultimate disposition of the resulting used fuel. This generation has an obligation to provide solutions for this used fuel, not to simply pass it on to future generations as their burden.”<sup>114</sup>**

The challenge of developing a long-term storage plan for spent nuclear fuel or HLW in Canada is not new. In 1978, the governments of Canada and Ontario directed AECL to develop the concept of a DGR for spent nuclear fuel and, in 1988 a federal public review of the concept (and a range of nuclear fuel waste management issues) was initiated.<sup>115</sup> After extensive public consultation and scientific review, the environmental assessment

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111 ENVI, [Evidence](#), 1 March 2022, 1305 (Meggan Vickard).

112 ENVI, [Evidence](#), 1 March 2022, 1305 (Joseph McBrearty).

113 ENVI, [Evidence](#), 1 March 2022, 1215 (Joseph McBrearty).

114 ENVI, [Evidence](#), 15 February 2022, 1135 (Thomas Isaacs).

115 Minister of Public Works and Government Services Canada, “Executive Summary”, [Environmental Assessment Panel Report](#) (on nuclear fuel waste management and a disposal concept proposed by Atomic Energy of Canada Limited, Chaired by Blair Seaborn), 1998, ISBN 0-662-26470-3.

Note: The assessment was initiated under the federal Environmental Assessment and Review Process Guidelines Order (a precursor to the *Canadian Environmental Assessment Act*).



review panel, chaired by Blair Seaborn (“the Seaborn Panel”), published its report in 1998. The Seaborn Panel examined “the criteria by which the safety and acceptability of any concept for long-term waste management should be evaluated,” coming up with the following key conclusions:

- Broad public support is necessary in Canada to ensure the acceptability of a concept for managing nuclear fuel wastes.
- Safety is a key part, but only one part, of acceptability. Safety must be viewed from two complementary perspectives: technical and social.<sup>116</sup>

On this basis, the Seaborn Panel defined the safety and acceptability criteria as follows:

- To be considered acceptable, a concept for managing nuclear fuel wastes must:
  - have broad public support;
  - be safe from both a technical and a social perspective;
  - have been developed within a sound ethical and social assessment framework;
  - have the support of Aboriginal people;
  - be selected after comparison with the risks, costs and benefits of other options; and
  - be advanced by a stable and trustworthy proponent and overseen by a trustworthy regulator.
- To be considered safe, a concept for managing nuclear fuel wastes must be judged, on balance, to:
  - demonstrate robustness in meeting appropriate regulatory requirements;
  - be based on thorough and participatory scenario analyses;

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116    Ibid.

- use realistic data, modelling and natural analogues;
- incorporate sound science and good practices;
- demonstrate flexibility;
- demonstrate that implementation is feasible; and
- integrate peer review and international expertise.<sup>117</sup>

The *Nuclear Fuel Waste Act* of 2002 created the NWMO and “set the stage for the NWMO to develop a solution for all of Canada.”<sup>118</sup> Some witnesses stated that the NWMO is sufficiently independent from industry to be objective and trustworthy.<sup>119</sup> Other witnesses felt the creation of the NWMO did not follow the recommendations the Seaborn Panel to form an entity independent from industry to manage nuclear fuel waste in Canada.<sup>120</sup>

Chief Duncan Malcolm Michano believed the federal government was delegating the governance and policy-making for radioactive waste to industry and likened it to “putting the fox in charge of the chicken coop”.<sup>121</sup> Other witnesses also expressed concerns that the NWMO governance model, i.e., being owned and operated strictly by radioactive waste generators and having only industry members on the board, could

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117 Ibid.

118 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart).

119 ENVI, [Evidence](#), 15 February 2022, 1230 (James Scongack); and ENVI, [Evidence](#), 15 February 2022, 1230 (Thomas Isaacs).

120 Mary Lou Harley, [A Brief on Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, February 2022; ENVI, [Evidence](#), 3 February 2022, 1250 (Ole Hendrickson); and ENVI, [Evidence](#), 15 February 2022, 1140 (Dr. Gordon Edwards).

121 ENVI, [Evidence](#), 3 March 2022, 1930 (Chief Duncan Malcolm Michano).



create at least the appearance of a conflict of interest.<sup>122</sup> Many briefs and witnesses suggested that an independent body should manage waste.<sup>123</sup>

In 2007, the Government of Canada selected adaptive phased management (APM) as the long-term plan for nuclear fuel waste. The APM calls for “centralized containment and isolation of Canada's used fuel in a deep geological repository in an area with suitable geology and an informed and willing host”.<sup>124</sup> A DGR is a network of tunnels and a placement room built at a depth of between 500 m and 800 m beneath the surface depending on the rock characteristics at the site. Both engineering systems and the rock itself would provide protection to people and the environment (as shown in Figure 5).<sup>125</sup> According to Mollie Johnson, Assistant Deputy Minister of the Low Carbon Energy Sector at NRCan, DGRs have been identified as a best practice across international standards.<sup>126</sup> At the time of the study, Sweden had recently approved a site for its DGR, and Finland had applied for an operating licence for its DGR, which is under construction.<sup>127</sup>

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122 ENVI, [Evidence](#), 3 February 2022, 1250 (Ole Hendrickson); and ENVI, [Evidence](#), 15 February 2022, 1140 (Dr. Gordon Edwards).

123 ENVI, [Evidence](#), 3 February 2022, 1250 (Ole Hendrickson); Gail Wylie, [Submission to the Standing Committee on Environment and Sustainable Development comprehensive review of the governance of nuclear waste in Canada and its impacts on the environment](#), Brief submitted to ENVI, February 2022; Tony Reddins, [Brief to the Standing Committee on Environment and Sustainable Development about Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, March 2022; Faye More, Port Hope Community Health Concerns Committee, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Ian Pineau, [“Nuclear Waste Governance in Canada”](#), Brief Submitted to ENVI, March 2022; Laurence Leduc-Primeau, Regroupement des organismes environnementaux en énergie, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Paul Filteau, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; and Paula Tippett, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022.

124 NWMO, [About Adaptive Phase Management](#).

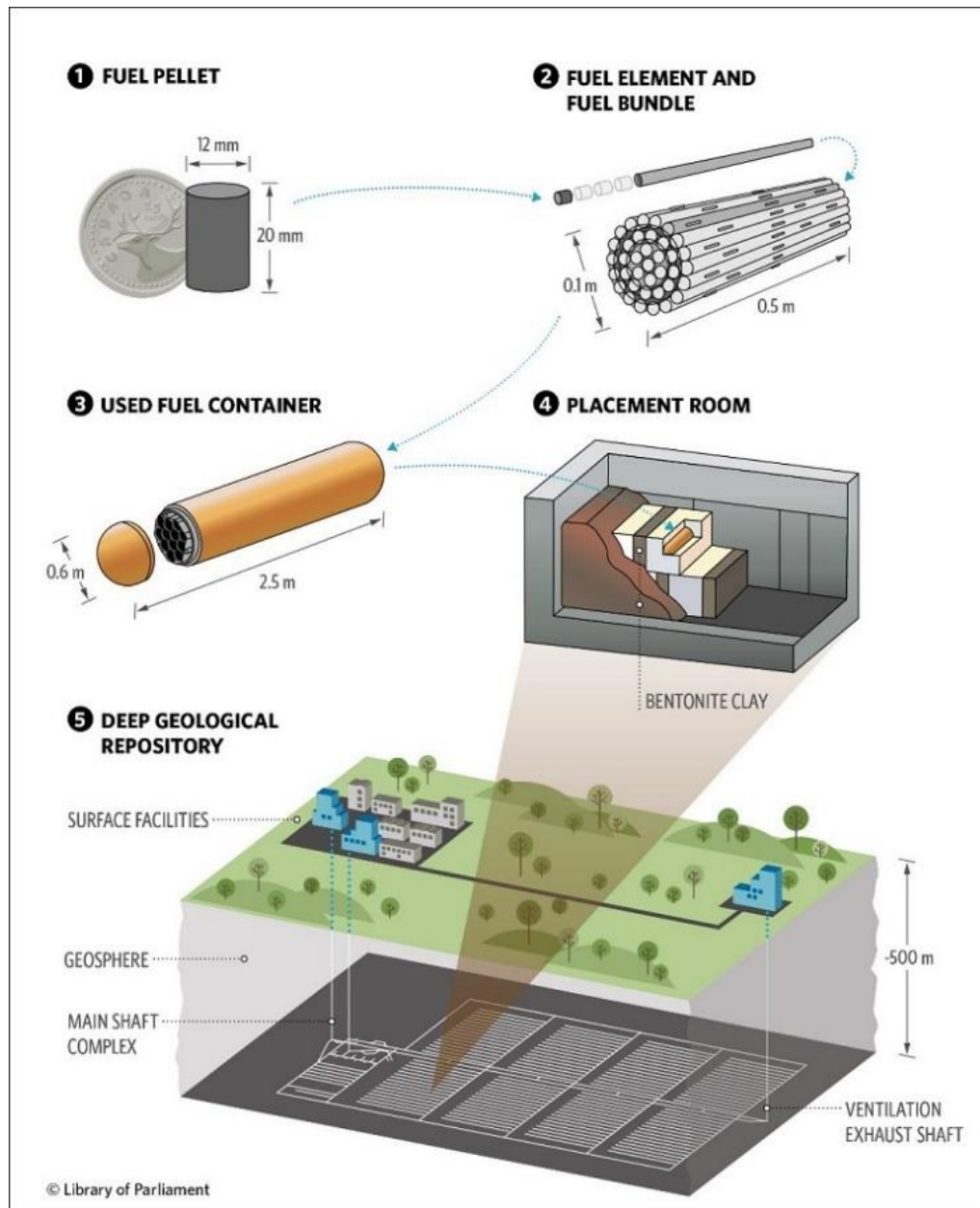
125 ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami).

126 ENVI, [Evidence](#), 3 March 2022, 1910 (Mollie Johnson, Assistant Deputy Minister, Low Carbon Energy Sector, NRCan).

127 ENVI, [Evidence](#), 3 February 2022, 1105 (John Gorman); ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami); and ENVI, [Evidence](#), 3 February 2022, 1230 (Laurie Swami).



Figure 5: Stages in the Multiple-Barrier System for the Disposal of Used Nuclear Fuel in a Deep Geological Repository



Sources: Figure prepared by the Library of Parliament using data obtained from Canadian Nuclear Association, *The Canadian Nuclear Factbook 2019*, p. 50; and Nuclear Waste Management Organization, *Ensuring Safety: Multiple-Barrier System*, Backgrounder, 2015. In: Xavier Deschênes-Phillion and Sophie Leduc, Library of Parliament, *Nuclear Energy and Radioactive Waste Management in Canada*, 2020.



The Committee heard that a DGR has consistently been recognized as the safest way to permanently store nuclear waste. Laurie Swami stated that

[t]he need for a permanent solution for Canada's used nuclear fuel has been studied and discussed for more than 50 years. The overwhelming result of this work—and work done over the same period internationally—was that over the long term, used nuclear fuel should be managed in a deep geological repository and in a location that is socially acceptable.<sup>128</sup>

The Organization for Economic Co-operation and Development's Nuclear Energy Agency issued a report on the management and disposal of HLW, which confirmed that DGRs are the best approach.<sup>129</sup> Additionally, the International Energy Agency's review of Canada's energy policy recommended that the Canadian government support NWMO's mandate in selecting a site for a DGR.

The Committee heard from witnesses who supported the process to develop a DGR<sup>130</sup> as well as those who opposed it.<sup>131</sup> The NWMO began the process to find a willing host community for the DGR in 2010. Down from an initial group of 22 communities in Saskatchewan and Ontario that had voluntarily entered into the selection process, two communities are currently being considered to host the DGR: the Township of Ignace in northwestern Ontario and the Municipality of South Bruce in southern Ontario.<sup>132</sup> A site selection is expected by the end of 2023.<sup>133</sup> The Committee noted the importance of the informed consent of the community that will host the DGR.

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128 ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami).

129 Nuclear Energy Agency, Organization for Economic Co-operation and Development, [Management and Disposal of High-Level Radioactive Waste: Global Progress and Solutions](#), NEA No. 7532, 2020.

130 ENVI, [Evidence](#), 3 February 2022, 1115 (Jason Van Wart); ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. Jeremy Whitlock); and ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami).

131 Protect Our Waterways—No Nuclear Waste South Bruce, [Submission to the Parliamentary Standing Committee on Environment and Sustainable Development regarding Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, March 2022; and ENVI, [Evidence](#), 3 March 2022, 1930 (Chief Duncan Malcolm Michano).

132 ENVI, [Evidence](#), 3 February 2022, 1245 (Laurie Swami); and NWMO, [Study Areas](#).

133 ENVI, [Evidence](#), 3 February 2022, 1120 (Laurie Swami).

The Committee received some briefs about the DGR project in South Bruce.<sup>134</sup> Rita Groen’s correspondence, which describes exchanges with the Saugeen Ojibway Nation about work conducted by the NWMO, reveals concerns related to the alleged lack of independence: “The multi-year funding agreement between South Bruce and NWMO also mentions communications with media must be NWMO approved. NWMO is in the driver’s seat and has all the control.”<sup>135</sup>

Storing radioactive waste in stable rock would keep it “safe from earthquakes, hurricanes, warmongers and glaciers.”<sup>136</sup> Glaciations occur every several tens of thousands of years and cover Canada with glaciers up to four kilometres thick, destroying everything on the surface and spreading the debris across the continent. Since radioactive waste will be radioactive for several glaciation cycles, it is important to store this waste below the surface away from future glaciers.<sup>137</sup> Chief Duncan Malcolm Michano extended the timescale even further, noting that all rock formations eventually move, and this movement would allow the radioactive waste to leach from the DGR into the environment.<sup>138</sup>

Dr. M.V. Ramana explained that the radioactive waste produced by some SMRs might not currently be suitable for long-term storage in DGRs without a lot of pre-processing.<sup>139</sup> He gave the example of the waste from molten salt reactors which could “be in chemical forms that are not known to occur in nature and thus unsuitable for geological disposal.”<sup>140</sup> Dr. Jeremy Whitlock, Section Head of Concepts and Approaches at the Department of Safeguards of the IAEA, agreed there would be “technical challenges that one will have to address before the spent fuel from the SMRs can be put into a [DGR]” but believed scientists and engineers would be able to develop the appropriate pre-

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134 Protect Our Waterways—No Nuclear Waste South Bruce, [Submission to the Parliamentary Standing Committee on Environment and Sustainable Development regarding Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, March 2022; Glen McDonald, [NWMO’s Property Value Protection Program](#), Brief submitted to ENVI, March 2022; Sandy Greer, [Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment](#), Brief submitted to ENVI, March 2022; and Rita Groen, “[Nuclear Waste Governance in Canada](#),” Written submission to ENVI, March 2022.

135 Rita Groen, “[Nuclear Waste Governance in Canada](#),” Written submission to ENVI, March 2022.

136 ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. Jeremy Whitlock).

137 ENVI, [Evidence](#), 3 February 2022, 1210 (Laurie Swami); and ENVI, [Evidence](#), 1 March 2022, 1115 (Dr. Jeremy Whitlock).

138 ENVI, [Evidence](#), 3 March 2022, 1930 (Chief Duncan Malcolm Michano).

139 ENVI, [Evidence](#), 1 March 2022, 1115 (Dr. M.V. Ramana).

140 ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. M.V. Ramana).



processing technologies in order to do so.<sup>141</sup> Dr. Ramana noted that the cost of this pre-processing is unknown because the necessary technology and methods have not yet been perfected.<sup>142</sup>

## Recommendation 2

**The Committee recommends that any research and development work related to small modular reactor (SMR) technology rigorously document and categorize in their analyses the radioactive waste that will be generated, and that a plan be developed to manage this waste as part of Canada’s *Policy for Radioactive Waste Management and Decommissioning*.**

The proposed DGR is currently included in the waste management plans of some nuclear facilities—HLW from both CRL and the decommissioned Gentilly-2 nuclear reactor in Quebec will be transferred to the DGR once it is approved and constructed.<sup>143</sup> In fact, Gentilly-2’s deferred decommissioning approach, which includes a storage-with-surveillance period of about 35 years, was chosen based on the availability of the NWMO’s permanent site for spent fuel disposal by 2048. This approach also allows more time for the radioactive material to decay and reduces storage costs until the permanent facility become available.<sup>144</sup>

As previously mentioned, several witnesses and authors of briefs were concerned about the “abandonment” phase of managing nuclear substances and facilities, which occurs after radioactive waste has been removed from regulatory control, requiring no further action, including monitoring.<sup>145</sup> Instead of abandonment, these individuals preferred the concept of “rolling” or “perpetual” stewardship and monitoring of waste by this and

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141 ENVI, [Evidence](#), 1 March 2022, 1140 (Dr. Jeremy Whitlock).

142 ENVI, [Evidence](#), 1 March 2022, 1130 (Dr. M.V. Ramana).

143 ENVI, [Evidence](#), 1 March 2022, 1215 (Joseph McBrearty); and ENVI, [Evidence](#), 1 March 2022, 1215 (Patrice Desbiens).

144 ENVI, [Evidence](#), 1 March 2022, 1215 (Patrice Desbiens).

145 William Turner, [Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, March 2022; ENVI, [Evidence](#), 15 February 2022, 1245 (Chief Reg Niganobe); ENVI, [Evidence](#), 15 February 2022, 1330 (Chief Reg Niganobe); Laurence Leduc-Primeau, Regroupement des organismes environnementaux en énergie, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Paul Filteau, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; Ian Pineau, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022; and Paula Tippett, [“Nuclear Waste Governance in Canada”](#), Brief submitted to ENVI, March 2022.

future generations.<sup>146</sup> Such an approach would require that waste packages be accessible, so they could be repackaged if leaks were detected, storage could be adapted to unforeseen changing climatic conditions affecting the integrity of the waste storage, or changes could be implemented based on evolving scientific knowledge.<sup>147</sup>

## SAFETY RECORD OF THE CANADIAN NUCLEAR INDUSTRY

Witnesses emphasized the safety record of the Canadian nuclear industry.<sup>148</sup>

Jason Van Wart noted that all radioactive waste is “well regulated in Canada by the CNSC and managed safely by owners, with an excellent safety record... across Canada.”<sup>149</sup>

Professor Jason Donev, Senior Instructor in the Department of Physics and Astronomy at the University of Calgary, concurred, stating that “[t]he Canadian nuclear industry has an extraordinary record of safety, safe practice, and compliance [with regulations].”<sup>150</sup>

Dr. Jeremy Whitlock characterized the risk of accidents to spent nuclear fuel as “low.”<sup>151</sup>

### Recommendation 3

**The Committee recommends that the Government of Canada prioritize the building of a deep geological repository (DGR) and acknowledge that it is the safest way to store high level radioactive waste.**

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146 ENVI, *Evidence*, 3 March 2022, 1930 (Chief Duncan Malcolm Michano); Sandy Greer, *Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment*, Brief submitted to ENVI, March 2022; ENVI, *Evidence*, 15 February 2022, 1145 (Dr. Gordon Edwards); ENVI, *Evidence*, 15 February 2022, 1245 (Chief Reg Niganobe); Faye More, Port Hope Community Health Concerns Committee, “*Nuclear Waste Governance in Canada*”, Brief submitted to ENVI, March 2022; Laurence Leduc-Primeau, Regroupement des organismes environnementaux en énergie, “*Nuclear Waste Governance in Canada*”, Brief submitted to ENVI, March 2022; Paul Filteau, “*Nuclear Waste Governance in Canada*”, Brief submitted to ENVI, March 2022; Ian Pineau, “*Nuclear Waste Governance in Canada*”, Brief submitted to ENVI, March 2022; and Paula Tippet, “*Nuclear Waste Governance in Canada*”, Brief submitted to ENVI, March 2022; ENVI, *Evidence*, 3 March 2022.

147 ENVI, *Evidence*, 15 February 2022, 1200 (Dr. Gordon Edwards); and Sandy Greer, *Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment*, Brief submitted to ENVI, March 2022.

148 ENVI, *Evidence*, 3 February 2022, 1210 (John Gorman); ENVI, *Evidence*, 3 March 2022, 1900 (Rumina Velshi); and ENVI, *Evidence*, 15 February 2022, 1250 (Prof. Jason Donev).

149 ENVI, *Evidence*, 3 February 2022, 1115 (Jason Van Wart).

150 ENVI, *Evidence*, 15 February 2022, 1250 (Prof. Jason Donev).

151 ENVI, *Evidence*, 1 March 2022, 1140 (Dr. Jeremy Whitlock).



Dr. Gordon Edwards agreed that the nuclear industry is operating reactors in a safe manner, however he differentiated this safety record from the future management of radioactive waste in a safe manner over multiple generations.<sup>152</sup>

Rumina Velshi, added that “the transportation [of radioactive waste] has an impeccable record in over 60 years of transportation. ... There has not been an incident that has impacted the environment or the safety of individuals.”<sup>153</sup> Over one million packages of nuclear substances are transported per year in Canada.<sup>154</sup> Laurie Swami explained that used nuclear fuel will need to be transported from its existing storage facilities at the nuclear power facilities in New Brunswick, Quebec and Ontario, to an eventual long-term storage site. She acknowledged that

We will be implementing programs with knowing where our trucks are at all times, understanding the areas they're driving through, and we will probably have escort cars and things like that for protection of the used fuel and do this in a very safe manner.<sup>155</sup>

Dr. Jeremy Whitlock agreed that Canadians needed to learn about the safety of the transportation of radioactive waste because “it’s going to be going through their communities all along the path”. He added that seeing the rigorous safety tests through which transport vehicles and containers are put through would assuage concerns about the safety of the transportation of radioactive waste.<sup>156</sup>

#### **Recommendation 4**

**The Committee recommends that the Government of Canada use all existing science on radioactive waste management and storage as the foundational component in decision making for future waste management projects.**

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152 ENVI, [Evidence](#), 15 February 2022, 1205 (Dr. Gordon Edwards).

153 ENVI, [Evidence](#), 3 March 2022, 1900 (Rumina Velshi).

154 ENVI, [Evidence](#), 3 March 2022, 1900 (Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer, CNSC).

155 ENVI, [Evidence](#), 3 February 2022, 1245 (Laurie Swami).

156 ENVI, [Evidence](#), 1 March 2022, 1155 (Dr. Jeremy Whitlock).

## TRANSFORMING CURRENT WASTE

In some cases, radioactive waste can be transformed to become less hazardous, or even used for other purposes. James Scongack outlined the importance of reducing, reusing or recycling, or disposing of radioactive waste, in that order.<sup>157</sup>

Jason Van Wart mentioned OPG initiatives to minimize LLW, including opening a “clean energy sorting and recycling centre” with McMaster University. LLW—some of which has been in storage for decades—is brought to the centre, sorted, decontaminated, cleaned and, where radioisotopes have sufficiently decayed, free released for recycling of materials such as metals. The remaining low-level waste is compacted to reduce the environmental footprint and the number of storage buildings required for continued storage.<sup>158</sup>

In the case of HLW, a chemical process called reprocessing separates the “uranium and plutonium from the other radioactive fission products that are produced in a nuclear reactor”.<sup>159</sup> Canada does not currently reprocess its HLW but did do so in the 1950s.<sup>160</sup> Dr. M.V. Ramana expressed concerns that some SMR designs envision the reprocessing of spent fuel, since separating uranium and plutonium from other radioactive compounds “makes little difference to long-term management of nuclear wastes, while making nuclear weapons proliferation easier”.<sup>161</sup> The separated uranium and plutonium can be used as the fissile material in nuclear weapons. Acquiring fissile material is the main obstacle in the development of nuclear weapons.<sup>162</sup>

In her brief, Dr. Susan O’Donnell raised concerns regarding the federal government’s \$50.5 million grant to Moltex Energy to use pyroprocessing to extract plutonium from HLW stored at Point Lepreau, New Brunswick.<sup>163</sup> Dr. O’Donnell worried that NRCan’s new draft radioactive waste management policy, which “allows for reprocessing high-level

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157 ENVI, [Evidence](#), 15 February 2022, 1135 (James Scongack).

158 ENVI, [Evidence](#), 3 February 2022, 1200 (Jason Van Wart); and ENVI, [Evidence](#), 3 February 2022, 1215 (Jason Van Wart).

159 ENVI, [Evidence](#), 1 March 2022, 1130 (Dr. M.V. Ramana).

160 Ibid.

161 ENVI, [Evidence](#), 1 March 2022, 1105 (Dr. M.V. Ramana); and Dr. M.V. Ramana, “[Study on Nuclear Waste Governance in Canada](#)”, Written submission to ENVI, March 2022.

162 ENVI, [Evidence](#), 1 March 2022, 1130 (Dr. M.V. Ramana).

163 Dr. Susan O’Donnell, [The problem with New Brunswick’s Plan for high-level nuclear waste](#), Brief submitted to ENVI, March 2022.



waste,” “moves our national policy in a dangerous direction”.<sup>164</sup> Dr. Ramana provided a brief to the Committee that had been submitted to the New Brunswick Minister of Natural Resources and Energy Development regarding the proposed SMRs in New Brunswick, by Moltex and ARC.<sup>165</sup> This brief took issue with a proposal by ARC to import used nuclear fuel or weapons-grade fissile material from dismantled nuclear warheads from the United States, and predicted that the “liquid sodium coolant from the proposed ARC design will become a new category of liquid radioactive waste, posing special problems that promise to be very expensive.”<sup>166</sup>

Substances and elements found in radioactive waste from nuclear reactors can have other uses or themselves be sources of useful substances and elements. For example, tritium is used in emergency lighting, as a biomedical tracer, and in international research on fusion power. A by-product of tritium, helium-3, is used in quantum computing, border security, neutron research and medical imaging.<sup>167</sup>

## Recommendation 5

**The Committee recommends that the Government of Canada invest in research in reducing, reusing, and recycling nuclear waste.**

## COMPARISON OF CANADIAN RADIOACTIVE WASTE GOVERNANCE WITH INTERNATIONAL PRACTICES

Some witnesses told the Committee that Canada is well regarded around the world when it comes to the management and governance of its radioactive waste.<sup>168</sup> Others said that Canada is doing things that are against international standards.<sup>169</sup>

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164 Ibid.

165 Dr. Susan O’Donnell, Dr. Louise Comeau, Dr. Janice Harvey, Dr. Gordon Edwards and Dr. M.V. Ramana, *Briefing paper: The proposed nuclear reactors (SMRs) for New Brunswick*, Written submission to ENVI, received March 2022.

166 Ibid.

167 ENVI, *Evidence*, 3 February 2022, 1115 (Jason Van Wart).

168 ENVI, *Evidence*, 3 February 2022, 1130 (John Gorman); ENVI, *Evidence*, 15 February 2022, 1150 (James Scongack); and ENVI, *Evidence*, 1 March 2022, 1250 (Fred Dermarkar).

169 ENVI, *Evidence*, 3 February 2022, 1145 (Ole Hendrickson); and ENVI, *Evidence*, 15 February 2022, 1255 (Ginette Charbonneau).



John Gorman stated that, in terms of nuclear energy, Canada is “a tier one, globally respected nation in terms of our assets, our facilities and our regulator.”<sup>170</sup>

James Scongack specified that the CNSC “internationally is a tremendously respected independent regulator.”<sup>171</sup>

A number of witnesses expressed concern that plans to bury some nuclear reactors onsite when they reach the end of their lifespan in Canada go against the standards of the IAEA.<sup>172</sup> One of these reactors is in Pinawa, Manitoba, on the Winnipeg River, while the other is near the town of Rolphton, Ontario, on the Ottawa River.<sup>173</sup>

Ginette Charbonneau expressed reservations with the plan to bury the Rolphton reactor in place, since it goes against the safety standards of the IAEA, which do not recognize in situ decommissioning or entombment as appropriate management methods.<sup>174</sup>

Ginette Charbonneau felt that the lack of planning in Canada for ILW has led to the proposal to bury it in place, as there is no permanent storage solution elsewhere for the Rolphton waste if the reactor is dismantled.<sup>175</sup> Gordon Edwards was apprehensive about CNL’s plans to “bury the dangerous radioactive carcasses of two defunct reactors right beside major rivers instead of dismantling them, as was originally proposed and approved by the CNSC.”<sup>176</sup>

Ole Hendrickson expressed concern that the process to develop the new CNSC regulatory document on decommissioning had not been fully transparent and seemed to give more weight to industry comments compared to comments from public

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170 ENVI, [Evidence](#), 3 February 2022, 1130 (John Gorman).

171 ENVI, [Evidence](#), 15 February 2022, 1150 (James Scongack).

172 William Turner, [Why entomb the two small reactors, NPD and WR-1, when a better alternative is available?](#), Brief submitted to ENVI, February 2022; ENVI, [Evidence](#), 15 February 2022, 1140 (Dr. Gordon Edwards); ENVI, [Evidence](#), 15 February 2022, 1225 (Dr. Gordon Edwards); and ENVI, [Evidence](#), 15 February 2022, 1255 (Ginette Charbonneau).

173 CNSC, [Regulatory review status for the decommissioning of the Whiteshell Reactor #1](#); and CNSC, [Nuclear Power Demonstration](#).

174 “No action (leaving the facility after operation as it is and waiting for decay of the radioactive inventory) and entombment (encasing all or part of the facility in a structurally long lived material) are not acceptable decommissioning strategies.” See: IAEA, [Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities](#), Specific Safety Guide No. SSG-47, 2018, p. 28.

175 ENVI, [Evidence](#), 15 February 2022, 1255 (Ginette Charbonneau).

176 ENVI, [Evidence](#), 15 February 2022, 1140 (Dr. Gordon Edwards).



intervenors.<sup>177</sup> He believed that the new regulatory document could be interpreted as allowing for the disposal in place of SMRs.<sup>178</sup>

## Recommendation 6

**The Committee recommends that the Canadian Nuclear Safety Commission and Natural Resources Canada, which directed the Nuclear Waste Management Organization to lead consultations on a long-term storage plan for intermediate-level radioactive waste, follow the International Atomic Energy Agency standards in their policies and practices, and provide clear rationale to Parliament and Canadians for any deviations from these standards that are deemed unavoidable.**

The Committee asked witnesses about the governance framework under the IAEA's *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. Rumina Velshi informed the Committee that, as a party to the convention, Canada is required to report every three years to an international body of peers on Canada's used fuel and radioactive waste management, adding that

It is an opportunity for peers to review the entire management system for waste management in Canada. We get feedback from them. We get questions from them. Areas for improvement are identified. In the spirit of transparency, it is presented to the commission as a public hearing meeting.<sup>179</sup>

Where areas for improvement are identified at one triennial meeting, Canada is “legally bound to respond to these at the next meeting” to ensure that issues identified are adequately addressed.<sup>180</sup>

## Recommendation 7

**The Committee recommends that the Canadian Nuclear Safety Commission:**

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177 ENVI, [Evidence](#), 3 February 2022, 1150 (Ole Hendrickson).

For the final regulatory document, comments, feedback and versions, see: CNSC, [Document history of REGDOC-2.11.2, “Decommissioning”](#).

178 ENVI, [Evidence](#), 3 February 2022, 1150 (Ole Hendrickson).

179 ENVI, [Evidence](#), 3 March 2022, 1845 (Rumina Velshi). For example, see: the [Seventh Canadian National Report for the Joint Convention](#), covering the 2017–2020 reporting period and the [Responses to Questions Raised from the Peer Review of Canada's Sixth National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management](#).

180 ENVI, [Evidence](#), 3 March 2022, 1845 (Ramzi Jammal).

- **follow the International Atomic Energy Agency standards in its policies and practices;**
- **implement recommendations that were made by the International Atomic Energy Agency’s Integrated Regulatory Review Service Audit that was conducted in 2019; and**
- **provide clear rationale to Parliament and Canadians for any deviations from these standards that are deemed unavoidable (e.g., waste classification, in situ decommissioning), and that these justifications be documented and made publicly available within 30 days of sending to Parliament.**

## Waste Classification and Record Keeping

Ole Hendrickson believed that Canada’s national radioactive waste inventory lacks consistent classification standards with detailed data on individual radionuclides that would be required to conform to Canada’s reporting obligations under the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*.<sup>181</sup> Currently, the inventory reports on the volume of waste of different classes but not radioactivity or specific radionuclides present in the waste. This lack of information has already led to unpredictable clean-up costs at the CRL in Ontario. As Fred Dermakar, President and Chief Executive Officer of AECL, explained, incomplete recordkeeping related to activities at the site in the 1940s, 1950s and 1960s means that total remediation costs could increase as CNL starts “digging into the ground to better understand what’s there”.<sup>182</sup>

The Concerned Citizens of Renfrew County and Area’s briefs called for NRCan to “add information on activity and specific radionuclides to its radioactive waste inventory” as “required under article 32(2) of the Joint Convention.”<sup>183</sup> *Ralliement contre la pollution*

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181 ENVI, *Evidence*, 3 February 2022, 1145 (Ole Hendrickson).

182 ENVI, *Evidence*, 1 March 2022, 1300 (Fred Dermakar).

183 Concerned Citizens of Renfrew County and Area, *Changes in reporting of federal radioactive waste between 2016 and 2019*, Brief submitted to ENVI, March 2022; and Concerned Citizens of Renfrew County and Area, *Canada’s Nuclear Waste Inventory*, Brief submitted to ENVI, February 2022.



radioactive's brief also requested that owners of radioactive waste be required to provide a detailed inventory with descriptions of their radioactivity.<sup>184</sup>

Dr. Jeremy Whitlock believed that radioactive waste management and decommissioning policies should require waste owners to document waste according to agreed-upon record keeping standards to ensure that the information needed to manage waste safely is available in an accessible format even as technology evolves.<sup>185</sup> The importance of transmitting key information to future generations about radioactive waste sites was also expressed by other witnesses.<sup>186</sup> Dr. Gordon Edwards believed Canada's record keeping policies do not align with those of the Nuclear Energy Agency of the Organization for Economic Co-operation and Development.<sup>187</sup>

### Recommendation 8

**The Committee recommends that Natural Resources Canada and the Canadian Nuclear Safety Commission be required to provide additional detail in Canada's inventory of radioactive waste, such as source and level of radioactivity, and that this information be provided and made publicly available as soon as possible.**

### Recommendation 9

**The Committee recommends that Natural Resources Canada and the Canadian Nuclear Safety Commission work with Library and Archives Canada to ensure that the preservation of records reflects reports from the Organization for Economic Co-operation and Development Nuclear Energy Agency's Radioactive Waste Management Committee, such that they are maintained up-to-date and preserved for the hazardous lifespan of the waste itself.**

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184 Ralliement contre la pollution radioactive, *Presentation of the Ralliement contre la pollution radioactive to the House of Commons Environment Committee*, Brief submitted to ENVI, February 2022.

185 ENVI, *Evidence*, 1 March 2022, 1145 (Dr. Jeremy Whitlock).

186 ENVI, *Evidence*, 15 February 2022, 1140 (Dr. Gordon Edwards); Faye More, Port Hope Community Health Concerns Committee, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022; Laurence Leduc-Primeau, Regroupement des organismes environnementaux en énergie, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022; Paul Filteau, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022; Ian Pineau, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022; and Paula Tippett, "[Nuclear Waste Governance in Canada](#)", Brief submitted to ENVI, March 2022.

187 See: Nuclear Energy Agency, Organisation for Economic Co-Operation and Development, *Preservation of Records, Knowledge and Memory Across Generations: Final Report*, which explains the variety of preservation mechanisms suitable for radioactive waste repositories and provides guidelines on their implementation.

## Public and Indigenous Consultation and Consent

Public consultation surrounding nuclear projects is important. This section covers the public consultation that occurred for the federal radioactive waste policy, the NSDF at Chalk River, and the DGR.

Between November 2020 and May 2021, NRCAN consulted with and received feedback from Indigenous peoples, public interest groups, waste producers and owners, other levels of government and other interested Canadians on how they would like to see Canada's radioactive waste policy modernized.<sup>188</sup> The draft radioactive waste management and decommissioning policy was published on 1 February 2022 after the consideration of the feedback received. It was possible to provide written feedback on the draft policy until 2 April 2022. The policy is intended to be finalized by the end of 2022.<sup>189</sup> The goal is to inform a "modernized radioactive waste policy that continues to meet international standards based on best available science and that reflects the values and principles of Canadians, including... [I]ndigenous peoples."<sup>190</sup> Mollie Johnson described the variety of viewpoints submitted on the draft policy: "If you read all the reports that are on our website right now, they show two sides, a spectrum of perspectives, when you look at the issue. I think that demonstrates that there is no monolithic or no single view on these matters."<sup>191</sup>

Thomas Isaacs mentioned that the main recommendation of the Blue-Ribbon Commission on America's Nuclear Future was that a consent-based approach should be used to select a radioactive waste storage site. He felt that this principle is reflected in the approach taken by the NWMO.<sup>192</sup> Laurie Swami stated that a "very important part of our work is that we must have a willing and informed community, and communities, where we will deploy our project."<sup>193</sup> The NWMO communicates to potential host communities the opportunities, risks, benefits and financial benefit that are associated with becoming a host community.<sup>194</sup>

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188 ENVI, *Evidence*, 3 March 2022, 1830 (Mollie Johnson).

189 Ibid.

190 Ibid.

191 ENVI, *Evidence*, 3 March 2022, 1845 (Mollie Johnson).

192 ENVI, *Evidence*, 15 February 2022, 1220 (Thomas Isaacs).

193 ENVI, *Evidence*, 3 February 2022, 1245 (Laurie Swami).

194 ENVI, *Evidence*, 3 March 2022, 1910 (Mollie Johnson).



Witnesses had differing viewpoints on how well informed the members of potential host communities are. Dr. Jeremy Whitlock believed that the NWMO had done a good job of providing the available information to members of potential host communities, leading to some very well-informed members, but worried that uninformed members of potential host communities could be “as vocal or more vocal” than those who were “fully informed” and “for it.”<sup>195</sup> Sandy Greer disagreed with the characterization of community members in opposition to the proposal as “uninformed.”<sup>196</sup>

Some witnesses provided their negative impressions of NWMO consultations.<sup>197</sup> Chief Reg Niganobe, Chief Duncan Malcolm Michano, and Dr. M.V. Ramana spoke of the potential economic benefits of hosting radioactive waste being used to convince community members to accept the risk of the radioactive waste.<sup>198</sup> Chief Duncan Malcolm Michano and Dr. Gordon Edwards spoke of the NWMO providing a one-sided “sales pitch” during community consultations about hosting radioactive waste, which they felt was not balanced with information about the potential risks.<sup>199</sup>

Witnesses mentioned the different consultation requirements under CEAA 2012 and the IAA, notably the more stringent requirements for consultation, particularly with Indigenous groups, under the IAA.<sup>200</sup> Joseph McBrearty believed that the Chalk River NSDF consultation process, grandfathered under the CEAA 2012 regime, included consultations meaningful enough that they would fulfil even the more rigorous IAA consultation requirements.<sup>201</sup> According to him, CNL and AECL engaged frequently and early with Indigenous communities.<sup>202</sup> Fred Dermarkar relayed that AECL and CNL are

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195 ENVI, [Evidence](#), 1 March 2022, 1120 (Dr. Jeremy Whitlock).

196 Sandy Greer, [Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment](#), Brief submitted to ENVI, March 2022.

197 In addition to the witnesses who appeared before the Committee, the following briefs addressed the same topic: Sandy Greer, [Submission on Nuclear Waste Governance in Canada and Its Impact on the Environment](#), Brief submitted to ENVI, March 2022; Protect Our Waterways—No Nuclear Waste South Bruce, [Submission to the Parliamentary Standing Committee on Environment and Sustainable Development regarding Nuclear Waste Governance in Canada](#), Brief submitted to ENVI, March 2022; and Sarah Gabrielle Baron, [Brief of recommendations](#), Brief submitted to ENVI, March 2022.

198 ENVI, [Evidence](#), 1 March 2022, 1120 (Dr. M.V. Ramana); ENVI, [Evidence](#), 15 February 2022, 1305 (Chief Reg Niganobe); and ENVI, [Evidence](#), 3 March 2022, 2000 (Chief Duncan Malcolm Michano).

199 ENVI, [Evidence](#), 3 March 2022, 2005 (Chief Duncan Malcolm Michano); and ENVI, [Evidence](#), 15 February 2022, 1210 (Dr. Gordon Edwards).

200 ENVI, [Evidence](#), 1 March 2022, 1310 (Joseph McBrearty); and ENVI, [Evidence](#), 3 March 2022, 2015 (Steve Chapman).

201 ENVI, [Evidence](#), 1 March 2022, 1310 (Joseph McBrearty).

202 Ibid.

pursuing “substance in relationships” with Indigenous groups rather than focussing on the process.<sup>203</sup>

Chief Reg Niganobe described the perspective from which First Nations communities in Ontario enter consultations regarding radioactive waste storage:

Since time immemorial, each of the 133 [F]irst [N]ation communities in Ontario have endeavoured to fulfill our traditional legal responsibilities by ensuring that our decisions are made with the best interests of the next seven generations. We must be collective in decisions about the land, think only of future generations, and allow this inherent responsibility to determine our decisions.<sup>204</sup>

Chief Reg Niganobe and Chief Duncan Malcolm Michano relayed that many Indigenous communities did not find consultation processes for radioactive waste storage proposals welcoming or accessible.<sup>205</sup> Chief Niganobe recalled a patronizing experience:

My community was part of this NWMO process at one point and one of the panellists who the NWMO had sent on their behalf remarked to our community that, “We could explain it to you, but you wouldn't understand it anyway. We'll give you all the information and you wouldn't understand it.”<sup>206</sup>

Chief Reg Niganobe emphasized that no decisions concerning nuclear waste storage, transportation, or decommissioning can be made without the free, prior and informed consent of Indigenous peoples as set out in article 29.2 of the *United Nations Declaration on the Rights of Indigenous Peoples*.<sup>207</sup> With regards to current consultation practices, he said that “transparency and full disclosure are essential, but not a substitute for full engagement”.<sup>208</sup> He suggested that the government could start work on creating an effective and broad consultation policy co-developed with Indigenous communities.<sup>209</sup>

When speaking about the NSDF process, Rumina Velshi explained that the CNSC is always learning how to improve the consultation process and added that “Certainly

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203 ENVI, [Evidence](#), 1 March 2022, 1310 (Fred Dermarkar).

204 ENVI, [Evidence](#), 15 February 2022, 1245 (Chief Reg Niganobe).

205 ENVI, [Evidence](#), 15 February 2022, 1305 (Chief Reg Niganobe); and ENVI, [Evidence](#), 3 March 2022, 2005 (Chief Duncan Malcolm Michano).

206 ENVI, [Evidence](#), 15 February 2022, 1305 (Chief Reg Niganobe).

207 ENVI, [Evidence](#), 15 February 2022, 1245 (Chief Reg Niganobe).

208 Ibid.

209 ENVI, [Evidence](#), 15 February 2022, 1305 (Chief Reg Niganobe).



around reconciliation, it's a journey. I know the next time around we will maybe start a lot earlier, engage much further and just be better partners in this and have stronger relationships than have been established. All I can say is that we're constantly improving.”<sup>210</sup> The Committee emphasizes the need for free, prior and informed consent of Indigenous communities to host radioactive waste.

### **Recommendation 10**

**The Committee recommends that Government of Canada work with Indigenous communities to co-develop a consultation framework that upholds the right of Indigenous peoples to free, prior and informed consent as set out in article 29.2 of the *United Nations Declaration on the Rights of Indigenous Peoples*.**

## **PUBLIC INFORMATION AND EDUCATION**

**“[How] do we take some of this data and put it into a context for people that is understandable? Sometimes I find we're data rich but information poor.”<sup>211</sup>**

Rumina Velshi described the public’s perception around radioactive waste management as sometimes tainted with “genuine, real fear,” in part due to how radioactive waste is portrayed in the media. She added that the risks and how well radioactive waste is managed could be better explained.<sup>212</sup> Dr. Jeremy Whitlock explained that one of the reasons these conversations with Canadians are difficult is that the lifespan of radioactive waste—hundreds or millions of years—is beyond “the normal horizon of people’s imaginations.”<sup>213</sup>

James Scongack believed that there is a lot of work remaining to effectively communicate the facts about the nuclear industry, its safety, and its waste management.<sup>214</sup> Professor Jason Donev was concerned about the amount of misinformation about nuclear energy and waste, and would like to see public education

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210 ENVI, *Evidence*, 3 March 2022, 1910 (Rumina Velshi).

211 ENVI, *Evidence*, 15 February 2022, 1235 (James Scongack).

212 ENVI, *Evidence*, 3 March 2022, 1925 (Rumina Velshi).

213 ENVI, *Evidence*, 1 March 2022, 1115 (Dr. Jeremy Whitlock).

214 ENVI, *Evidence*, 15 February 2022, 1215 (James Scongack).



on nuclear energy issues.<sup>215</sup> He introduced the Committee to the acronym FEAR, or “False Evidence Appearing Real,” something which he believed happens with the nuclear industry and radioactive waste. He hoped to see the nuclear industry “work with the government to have more of these conversations about what people's fears are so we can separate out the false evidence appearing real from legitimate concerns and legitimate hazards.”<sup>216</sup>

Concerned citizen groups cited difficulties accessing information they sought from industry and regulators, or insufficient information provided.<sup>217</sup> The Committee noted that, although much of Canada’s radioactive waste regulatory information is available online (e.g., CNSC decisions and supporting documents), websites are not always user friendly. This may make finding specific documents and information difficult. Moreover, regulatory environmental monitoring data may be available but not put into context for the average Canadian.

#### **Recommendation 11**

**The Committee recommends that the Canadian Nuclear Safety Commission, Natural Resources Canada, Atomic Energy of Canada Limited (and its contractor, Canadian Nuclear Laboratories), and the Nuclear Waste Management Organization review their communications and websites to ensure**

- **documentation and information on Canada’s radioactive waste are divulged in full transparency and easy to find; and**
- **relevant technical documents are summarized for the layperson.**

#### **Recommendation 12**

**The Committee recommends that the Government of Canada invest in scientific-based public education initiatives on nuclear energy and nuclear waste storage.**

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215 ENVI, [Evidence](#), 15 February 2022, 1305 (Prof. Jason Donev).

216 ENVI, [Evidence](#), 15 February 2022, 1325 (Prof. Jason Donev).

217 Concerned Citizens of Renfrew County and Area, the Old Fort William Cottagers Association, and Ralliement contre la pollution radioactive, [Critical Flaws, Errors and Omissions in CNSC Staff's Environmental Assessment Report and Case to Approve the Chalk River Mound](#), Brief submitted to ENVI, March 2022; and Ralliement contre la pollution radioactive, [Presentation of the Ralliement contre la pollution radioactive to the House of Commons Environment Committee](#), Brief submitted to ENVI, February 2022.



## CONCLUSION

The Committee's attention to this study was timely because the issue raised is of proven political and regulatory relevance. During 2022, NRCan is revising its *Radioactive Waste Management Policy* for Canada, the NWMO will publish its *Radioactive Waste Management Strategy*, and the Commissioner of the Environment and Sustainable Development (through the Auditor General of Canada) will publish a report specifically on the issue.

As the CNSC moves closer to licencing CNL for the Chalk River NSDF project, it seems clear that the work done by the Committee could provide positive guidance to the government and organizations involved.

As Canada seeks to decarbonize its energy grid and achieve net zero emissions by 2050, nuclear power will be part of the energy mix and issues of waste management must be addressed. Rigorous consideration is needed to deal appropriately with radioactive waste since decisions made in the near future will have repercussions decades, centuries and even millennia from now.

An approach based on transparency and rigour in characterizing substances is crucial. Citizen involvement is a pillar of democracy and a consultative approach that demonstrates respect for the people is vital. Solutions to the challenges of storing radioactive waste for the long term are needed. The Government of Canada must make careful choices about how to oversee the nuclear industry and the radioactive waste it generates, as these choices have the potential to affect human and environmental health, safety and public trust in the nuclear industry.

## APPENDIX A LIST OF WITNESSES

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The following table lists the witnesses who appeared before the committee at its meetings related to this report. Transcripts of all public meetings related to this report are available on the committee’s [webpage for this study](#).

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Canadian Coalition for Nuclear Responsibility</b> Gordon Edwards, President	2022/02/03	3
<b>Canadian Nuclear Association</b> John Gorman, President and Chief Executive Officer	2022/02/03	3
<b>Concerned Citizens of Renfrew County and Area</b> Ole Hendrickson, Researcher	2022/02/03	3
<b>Nuclear Waste Management Organization</b> Laurie Swami, President and Chief Executive Officer	2022/02/03	3
<b>Ontario Power Generation Inc.</b> Jason Van Wart, Vice-President Nuclear Sustainability Services	2022/02/03	3
<b>As an individual</b> Prof. Jason Donev, Senior Instructor, Department of Physics and Astronomy University of Calgary Thomas Isaacs, Private Consultant	2022/02/15	5
<b>Bruce Power</b> James Scongack, Chief Development Officer and Executive Vice President Operations	2022/02/15	5
<b>Canadian Coalition for Nuclear Responsibility</b> Gordon Edwards, President	2022/02/15	5
<b>Chiefs of Ontario</b> Reg Niganobe, Grand Council Chief Anishinabek Nation	2022/02/15	5

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Ralliement contre la pollution radioactive</b>	2022/02/15	5
Ginette Charbonneau, Physicist and Spokesperson		
Gilles Provost, Retired Journalist and Spokesperson		
<b>As an individual</b>	2022/03/01	6
Dr. M. V. Ramana, Professor School of Public Policy and Global Affairs, University of British Columbia		
Dr. Jeremy Whitlock, Section Head, Concepts and Approaches Department of Safeguards, International Atomic Energy Agency		
<b>Atomic Energy of Canada Limited</b>	2022/03/01	6
Fred Dermakar, President and Chief Executive Officer		
Alastair MacDonald, Vice-President Waste and Decommissioning		
<b>Canadian Nuclear Laboratories</b>	2022/03/01	6
Joseph McBrearty, President and Chief Executive Officer		
Meggan Vickard, General Manager Waste Services		
<b>Hydro-Québec</b>	2022/03/01	6
Patrice Desbiens, Deputy Director Gentilly-2 Facilities		
<b>Biigtigong Nishnaabeg</b>	2022/03/03	7
Chief Duncan Malcolm Michano		
<b>Canadian Nuclear Safety Commission</b>	2022/03/03	7
Ramzi Jammal, Executive Vice-President and Chief Regulatory Operations Officer		
Kavita Murthy, Director General Nuclear Cycle and Facilities Regulation		
Rumina Velshi, President and Chief Executive Officer		

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Department of Natural Resources</b> Jim Delaney, Director Uranium and Radioactive Waste Division  Justin Hannah, Director Nuclear Energy Division  Mollie Johnson, Assistant Deputy Minister Low Carbon Energy Sector	2022/03/03	7
<b>Department of the Environment</b> Mary Taylor, Director General Environmental Protection Operations	2022/03/03	7
<b>Impact Assessment Agency of Canada</b> Steve Chapman, Director General National Programs	2022/03/03	7



## **APPENDIX B LIST OF BRIEFS**

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The following is an alphabetical list of organizations and individuals who submitted briefs to the committee related to this report. For more information, please consult the committee's [webpage for this study](#).

**Baron, Sarah Gabrielle**

**Canadian Coalition for Nuclear Responsibility**

**Canadian Environmental Law Association**

**Concerned Citizens of Manitoba**

**Concerned Citizens of Renfrew County and Area**

**Council of Canadians**

**Daigle, Simon J.**

**Filteau, Paul**

**Greer, Sandy**

**Harley, Mary Lou**

**Hughes, Elaine**

**Lawrence, Steve**

**McDonald, Glen**

**Northwatch**

**Nuclear Waste Management Organization**

**Nuclear Waste Watch**

**O'Donnell, Susan**

**Old Fort William Cottagers' Association**

**Pineau, Ian**

**Port Hope Community Health Concerns Committee**

**Protect Our Waterways - No Nuclear Waste South Bruce**

**Ralliement contre la pollution radioactive**

**Reddin, Tony**

**Regroupement des organismes environnementaux en énergie**

**Stemshorn, Barry**

**Tippett, Paula**

**Turner, William**

**Unger, Juan Pedro**

**Whitlock, Dr. Jeremy**

**Wylie, Gail**



# REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* ([Meetings Nos. 3, 5-8, 17-21 and 23-25](#)) is tabled.

Respectfully submitted,

Francis Scarpaleggia  
Chair



**BLOC QUÉBÉCOIS SUPPLEMENTARY REPORT  
RADIOACTIVE WASTE: THE CAUTION AND DILIGENCE REQUIRED FOR THE COMMUNITY  
AND THE ENVIRONMENT**

## **INTRODUCTION**

The Bloc Québécois wishes to thank the members of the Committee and the staff of the Library of Parliament for their work on this study. This also extends to all the witnesses, individuals and organizations who informed the study and the experts who contributed to the public debate on the topic by submitting their observations through letters and briefs. This input will undoubtedly be worth revisiting in the near future. The Canadian governance of radioactive waste raises important issues that will have a significant impact on future generations.

Our hope is that over the next few years, the public will become increasingly aware of the issues surrounding nuclear waste, and that this will provide an opportunity to address the shortcomings of this study.

To give them the consideration they deserve, we wish to highlight the informative contributions of both experts and members of the public that were not included in this report.

Below is an overview of some of the points that warrant more attention, followed by the Bloc Québécois recommendations that were not supported by the Committee.

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As a reminder, the following are the Committee's terms of reference for this study, as per the motion of 3 February 2022 (emphasis ours):

On Thursday, 3 February 2022, the Committee adopted the following motion:

*That, pursuant to Standing Order 108(2), the committee undertake a study **for a comprehensive review of nuclear waste governance in Canada and its impacts on the environment, including the issues raised by the import of these wastes and the trade in medical technologies**; that the committee invite the Minister of the Environment and Climate Change, the Minister of Natural Resources, representatives of the Canadian Nuclear Safety Commission (CNSC), Atomic Energy of Canada Ltd. (AECL) and Canadian Nuclear Laboratories (CNL), experts, and other stakeholders; that the committee hold a minimum of four meetings; that the committee report its findings and recommendations to the House.<sup>1</sup>*

### **Why study radioactive waste governance now, in 2022?**

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The study introduced by the Bloc Québécois was timely, as 2022 is a decisive year in the Canadian nuclear sector:

- 1) the Department of Natural Resources will release its updated *Policy on Radioactive Waste Management*;
- 2) the Nuclear Waste Management Organization (NWMO) is also expected to release its *Nuclear Waste Management Strategy*; and

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<sup>1</sup> <https://www.ourcommons.ca/Committees/en/ENVI/StudyActivity?studyActivityId=11488326>

3) the Office of the Auditor General of Canada (through the Commissioner of the Environment and Sustainable Development) will release a report specifically on the issue of radioactive waste.

In February and May 2022, the Canadian Nuclear Safety Commission (CNSC) held its final public hearings on the Chalk River NSDF and Rolphton nuclear reactor entombment project, leaving open a possible operating license grant for the site (in Ontario, near the Ottawa River), as early as June 2022.

The Bloc Québécois, along with various Indigenous organizations and communities,<sup>2</sup> wanted the licensing process for the Chalk River/ Rolphton project to be suspended by the Minister of Natural Resources. Through the Committee's work and upcoming report from the Auditor General's office, it was our belief that this would have allowed a better informed CNSC decision-making process. Increased diligence, at a time when major resources and projects are underway, made a suspension suitable. Until a more comprehensive picture is available ahead of the final decision-making process, a suspension could have reduced the potential harms of a premature license grant.

The organizations queried as part of this study, offered the Committee testimony and briefs which introduced multiple issues that warrant further analysis. There is no denying the fact that this study involves highly complex information. We had to consider the many scientific and technical expert opinions, international experience, as well as issues peripheral to the waste itself (scientific research, commercial structures on emerging technologies, the role of lobbies, security analysis, etc.).

### **Properly reflecting public concerns**

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For several years, and especially since 2016, many citizens' organisations dedicated to environmental protection, as well as scientists and radioactive waste experts, have expressed concerns about Canadian governance in this area.

The Bloc Québécois does not believe that the recommendations in this report fulfill their expected function or role, which is to provide guidance to the government and all members of Parliament on the pathways which will allow policies to be improved and issues to be resolved. This must be accomplished with a concern for thoroughness, balance, and transparency and although we are in agreement with most of the reports' content, its recommendations do not faithfully or accurately reflect some of the compelling testimony or the quantity of written contributions (briefs).

It is insightful that, of the 41 briefs received,<sup>3</sup> 36 were submitted by individuals and organizations documenting their concerns, reporting questionable regulations or regulations containing irregularities or inconsistencies, as well as disturbing experiences during local consultations.

The Bloc Québécois deplores the attempt by some members of the Committee (from the very first meeting) to divert the purpose of this study. The Bloc Québécois motion clearly indicated a study of nuclear waste governance in Canada, not a study on the development of the industry or new technologies. However, some members knowingly refocused testimony on the importance of the industry, potential markets, the cost benefits of developing SMRs, etc.<sup>4</sup>

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<sup>2</sup> "CNSC Kebaowek First Nation (KFN) Request for Stop of NSDF Hearing Schedule," letter dated 31 January 2022 criticizing the CNSC's public hearings process: <https://nuclearsafety.gc.ca/eng/the-commission/pdf/LetterFromKFN-RequestAdjournHearing.pdf>.

<sup>3</sup> <https://www.ourcommons.ca/Committees/en/ENVI/StudyActivity?studyActivityId=11488326>

<sup>4</sup> See the transcript at 11:38 on 15 February 2022: <https://www.ourcommons.ca/DocumentViewer/en/44-1/ENVI/meeting-3/evidence> and this comment by Dr. Gordon Edwards at 11:44 on 15 February: "At the last committee hearing and at this one as

By leaving so little space in this report for testimony and evidence that are at odds with the nuclear industry's vision, it becomes disingenuous to claim how important it is to "listen to the public" and carry public consultations in this spirit, whether they are organized by the industry or by a House of Commons standing committee.

If there truly is political will to listen to the communities most directly affected by these issues, then they must be given the necessary (and deserved) consideration: by doing so, problems raised can be rectified and a climate of trust and respect can give way to enhanced and transparent consultation processes leading to free and informed consent.

The Bloc Québécois's energy policy does not support the development of the nuclear industry. This said, we do acknowledge that it is a legitimate preference for other political and economic stakeholders. However, it seems to us that it would be in the interest of the proponents of nuclear power to improve the decision-making processes and waste governance if they wish to get the social licence required for their future success.

In light this, we expected that members of the Committee, government, and official opposition members, look more closely at the serious challenges which are inherent to nuclear industry: the management of radioactive waste.

### **Appearance of a conflict of interest – CNSC and Natural Resources Canada**

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With the impending CNSC decision to authorize the Near Surface Disposal Facility (NSDF) project and the irregularities that were identified and publicly condemned, it would have been advisable for the Committee to take into account more of the concerns raised by witnesses and detailed in the briefs. Issues raised in most of the written submissions were an alleged lack of transparency on behalf of the Nuclear Waste Management Organization (NWMO), the Crown corporation Atomic Energy of Canada Limited (AECL) (and its supplier, privately owned Canadian Nuclear Laboratories (CNL)), the lacking approach in the maintenance of national inventories, the lack of transparency in accessing these data, and the appearance of an alleged conflict of interest with the NWMO structure and between the CNSC and Department of Natural Resources.

*"We have to avoid not only conflict of interest, which is real, but even the appearance of conflict of interest."*

Dr. Gordon Edwards - 15 February 2022 at 12:04

*"I do not think the current reporting structure constitutes an effective separation. Unfortunately, the situation for any regulatory agency is like that of Pompeia, Julius Caesar's wife, of whom, Caesar is supposed to have said, 'Caesar's wife must be above suspicion.'"*

M. V. Ramana, Professor and Simons Chair in Disarmament, Global and Human Security, UBC<sup>5</sup>

One of Natural Resources Canada's mandates is to develop and promote nuclear energy. However, the regulatory body, CNSC, has the responsibility "to protect health, safety, security and the environment," and, reports to Parliament, albeit exclusively through the Minister of Natural Resources.

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*well, industry spokesmen are clearly much more interested in singing the praises of nuclear power and selling the idea of new reactors than saying anything useful about nuclear waste."*

<sup>5</sup> Post-appearance brief:

<https://www.ourcommons.ca/content/Committee/441/ENVI/WebDoc/WD11812332/11812332/RamanaMV-e.pdf>

In regulating a technology promoted by the department, the CNSC could be drawn to adopt practices which would encourage its rapid deployment, rather than ensure a higher level of caution.

Industry witnesses repeatedly dismissed the public concerns and whistleblowing about the CNSC not acting at arm's length. Nevertheless, several witnesses and most of the briefs received by the Committee raised the appearance of a conflict of interest and recommended various solutions.<sup>6</sup>

Unfortunately, these concerns are not adequately reflected in the Committee's report. The Committee failed to provide an accurate overview of the cases that illustrated how the alleged conflict of interest might manifest itself. As examples: the short deadlines in the consultation process, the refusal to release information requested, and so forth.

The Bloc Québécois submitted a balanced, implementable recommendation that would have placed Environment and Climate Change Canada in the CNSC's authority process, side-by-side with Natural Resources Canada. The Committee rejected our proposal.

### **The Chalk River NSDF and Rolphton's reactor project**

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There are several problems with the Chalk River NSDF project and the entombment of the CANDU demonstration reactor at Rolphton. Unfortunately, this report cannot be relied upon to resolve them.

The critical principle of keeping radioactive waste away from source water is not being followed. In many respects, the project runs counter to the International Atomic Energy Agency (IAEA) recommendations and guidelines<sup>7</sup> and to the five nuclear waste principles agreed upon by the Anishinabek Nation and the Iroquois Caucus (adopted by the leaders of 133 First Nations in Ontario).<sup>8</sup> There was the same lack of consideration for the potential hazards associated with the site and its underground characteristics: Chalk River is located at the intersection of geological fractures<sup>9</sup> and in the Western Quebec Seismic Zone, a seismic belt that spans the Ottawa Valley from Montreal to Temiscaming, as well as the Laurentians and parts of Eastern Ontario. Here again, the IAEA urges extreme caution.<sup>10</sup> A significant volume of various radioactive wastes will be buried in the NSDF. Witnesses and experts pointed to the lack of clarity and identification of the substances to be placed in the mound.

The Bloc Québécois is extremely concerned about the hazards this project entails. The NSDF poses risks to the main tributary of the Ottawa River, a source of drinking water for millions.

The CNSC will also conduct a final review of the entombment of the Rolphton nuclear demonstration reactor in the coming weeks and months. The first reactor to provide electricity in Canada, it was shut down in 1987. The reactor was of no concern for federal authorities until 2018, when CNL (created 4 years prior) offered to entomb the reactor in concrete, on site. The IAEA calls for this procedure **only** in case of emergencies and severe accidents.

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<sup>6</sup> See the 41 briefs <https://www.ourcommons.ca/Committees/en/ENVI/StudyActivity?studyActivityId=11488326>

<sup>7</sup> IAEA - See Appendix II "Guidance and Data Needs for Site Investigation and Site Characterization" in *Safety Standards – Near Surface Disposal Facilities for Radioactive Waste*, IAEA, pp. 88–101. [https://www-pub.iaea.org/MTCD/publications/PDF/Pub1637\\_web.pdf](https://www-pub.iaea.org/MTCD/publications/PDF/Pub1637_web.pdf)

<sup>8</sup> ENVI, *Evidence*, 15 February 2022, 1245 (Chief Reg Niganobe); and ENVI, *Evidence*, 15 February 2022, 1330 (Chief Reg Niganobe).

<sup>9</sup> In 1983, AECL published conference proceedings (438 pages), *Geophysical and Related Geoscience Research at Chalk River, Ontario*, which state on page 39: "since their formation, the fractures have been repeatedly reactivated by subsequent tectonic events. A detailed assessment of reactivation history is a prerequisite for any future long-term stability analyses." [https://inis.iaea.org/collection/NCLCollectionStore/\\_Public/23/066/23066580.pdf](https://inis.iaea.org/collection/NCLCollectionStore/_Public/23/066/23066580.pdf)

<sup>10</sup> IAEA, *ibid.*

The Bloc Québécois sees this as a careless solution for the consortium, which allows them to avoid the more costly procedure of dismantling the structure but would have allowed more reliable long-term safety thresholds.

Given the flaws of these two projects, it is not surprising that the IAEA made suggestions and recommendations to the CNSC in 2019, following the peer review conducted by the *Integrated Regulatory Review Service* (IRRS) study.<sup>11</sup> Through this review, it was made clear that Canada was not irreproachable with its management of nuclear waste and this alone, justifies the involvement of elected members of Parliament on the issue at hand.

## Waste categories

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A number of witnesses quite rightfully addressed the physical aspects of Canada's radioactive waste legacy. However, several issues remain, one of which is particularly significant: the redefinition of what constitutes intermediate level radioactive waste, hidden inside CNSC "mega-regulation" in June 2020.<sup>12</sup>

AECL retiree and Deep River resident William Turner provided the Committee with a well detailed brief<sup>13</sup> on this issue. Gilles Provost, science journalist and co-spokesperson for Ralliement contre la pollution radioactive and a witness as part of this study, wrote in *Le Devoir* on June 13, 2020:

*"... we then run into a scientific absurdity: in physics, the level of radioactivity of a given substance depends on its decay rate. The faster it decays, the higher its activity. This means that a radioactive material with [higher] activity according to the law of physics, would now be low-level waste according to the new definition released by the Canadian Nuclear Safety Commission!"<sup>14</sup> [TRANSLATION]*

Can the impressive reduction of intermediate level waste inventories be explained, at least in part, by this new classification? This new characterisation is having a real impact, however, since the Chalk River NSDF is designed to accommodate only low-level waste.

It appears that, as a result of these regulations, intermediate level waste (according to physics) will end up in the mound, mixed in with low-level waste.

CNSC witnesses asked about this, did not inform the members on this matter.

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<sup>11</sup> Canadian Nuclear Safety Commission - <https://www.nuclearsafety.gc.ca/eng/resources/international-cooperation/irrs/canada-response-irrs-2019.cfm#intro> and Integrated Regulatory Review Service, Report produced in Canada – 2019 [https://www.iaea.org/sites/default/files/documents/review-missions/irrs\\_canada\\_2019\\_final\\_report.pdf](https://www.iaea.org/sites/default/files/documents/review-missions/irrs_canada_2019_final_report.pdf)

<sup>12</sup> However, in May 2020, the CNSC described intermediate level wastes as follows: "Intermediate level wastes are radioactive to a level where shielding is required to protect workers during handling." [https://nuclearsafety.gc.ca/eng/resources/environmental-protection/environmental-assessments/ea\\_06\\_03\\_17520.cfm](https://nuclearsafety.gc.ca/eng/resources/environmental-protection/environmental-assessments/ea_06_03_17520.cfm)

<sup>13</sup> <https://www.ourcommons.ca/Committees/en/ENVI/StudyActivity?studyActivityId=11488326>

<sup>14</sup> "Des déchets radioactifs de faible activité?", Gilles Provost, *Le Devoir*, 13 June 2020. <https://www.ledevoir.com/opinion/libre-opinion/580766/des-dechets-radioactifs-de-faible-activite>, translated version here: <https://concernedcitizens.net/tag/dechets-radioactifs/> Also reported by the Canadian Environmental Law Association <https://cela.ca/wp-content/uploads/2020/06/Sham-Regulation-of-Radioactive-Waste-in-Canada-For-Distribution.pdf>

## Inventory at Chalk River

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Canada's radioactive waste inventory at Chalk River is 98% waste from the cobalt-60 trade, produced and sold as a medical radioisotope. The Bloc Québécois recognizes and values the global production and trade of medical radioisotopes. However, re-importation (as per trade agreements) should be discussed and analyzed in terms of the impacts these trade arrangements have on Canada's ability to act in the best interests of its citizens and the environment.

CNL official Meghan Vickerd was asked to provide relevant information in a written response<sup>15</sup> in order to shed light on this commercial arrangement. However, given the privilege of confidentiality voiced by the private CNL consortium, members will not be informed of the extent to which Canada will continue to inherit the radioactive waste generated by its medical isotope business.

Invoking corporate secrecy provides cover for CNL: this should alert parliamentarians to exercise caution when it comes to the responsibilities of this consortium and the authority exercised by the Crown corporation AECL in its duty be transparent and accountable. The fact that Canada has been described as a "favourable regulatory environment" by CNL <sup>16</sup>(through the nuclear industry stakeholder *Nuclear Energy Insider*) should be enough to encourage the reopening of the Seaborn Panel (discussed in the report).

The cost of the federal waste management program has quadrupled (to over \$4 billion) since AECL outsourced management and operation of its sites and facilities to Canadian Nuclear Laboratories in 2014-2015.

This fact alone warrants a comprehensive assessment of nuclear waste governance in Canada. The reported transparency issues cannot be tolerated further.

## Permanence of the deep geological repository – South Bruce

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The Committee was presented with the issue of site determination for a deep geological repository (DGR), a desirable solution for securing high and intermediate level waste. The Nuclear Waste Management Organization (NWMO) is mandated to manage only spent fuel (high level) waste and it appears that it will lead the selection process of a future DGR site. One site actively sought by the NWMO (and the Government of Canada) is South Bruce, Ignace County, 30 km from Lake Huron.

From the onset, witnesses in favour of this project and their point of view are presented in the report almost unilaterally, while the statements and briefs (up to 14 pages) that address the NWMO's practices are not sufficiently addressed.

The Bloc Québécois wishes to highlight the following points, which are entirely omitted from the report:

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<sup>15</sup> The questions: (1) What income do Canadian Nuclear Laboratories receive for storing the cobalt-60 sources that are imported? (2) How much cobalt-60 repatriated from abroad is in Canada and where will this waste be stored? 1 March 2022 - <https://www.ourcommons.ca/DocumentViewer/en/44-1/ENVI/meeting-6/evidence#Int-11548844>

<sup>16</sup> Nuclear Energy Insider uses precise terminology: "...a benign regulatory environment" in 2018, for an Annual Summit held in Atlanta. CNL submitted a brief entitled "*Future SMR deployment in Canada*", available here: [https://concernedcitizensnet.files.wordpress.com/2020/12/smr-webinar\\_report-copy.pdf](https://concernedcitizensnet.files.wordpress.com/2020/12/smr-webinar_report-copy.pdf)



- the NWMO’s property buyout policies for the Municipality of South Bruce and the lack of dialogue with residents requesting a referendum on the creation of the DGR in their community;<sup>17</sup>
- the DAD (Decide–Announce–Defend) strategy, which, according to several observers, guides the NWMO’s consultation processes in the community;<sup>18</sup>
- the disruption to commercial (agricultural and tourism) activities in the immediate area and legitimacy of citizens concerns on groundwater contamination.
- the questionable funds provided to the municipality by the NWMO, totalling \$9.4 million, which were spent, namely, to hire municipal employees supportive of the project and fund what are considered as “good/well-being projects for the municipality;<sup>19</sup> and
- the fact that hundreds of residents have been requesting explanations by the NWMO on what is considered misrepresentations on their behalf over the past several years, with no result.<sup>20</sup>

The contents of the Protect Our Waterways brief is alarming. As with most of the briefs that raise issues around radioactive waste governance in Canada, the topics of conflict of interest, accountability, independence of designated organizations, and lack of transparency, all were raised in South Bruce.

Canada must comply with, and fulfill its responsibilities, aim for exemplary governance which is inextricably linked to all public consultation processes focused regarding radioactive waste installations.

### **Indigenous, non-Indigenous: similar challenges**

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The Committee heard testimony from two witnesses, members of Indigenous communities. The Bloc Québécois is satisfied that some excerpts of their testimony have been included in the report. Mr. Michano and Mr. Niganobe<sup>21</sup> did not hold back their criticism towards the of the organizations who held consultations with Indigenous communities.

*“Many communities have disagreed that these processes are welcoming and accessible at this current time... Whatever process you are going through now, whether it be the [CNSC] or the [NWMO], they definitely aren’t working in our favour...”*

*“For communities that are far behind the Canadian standard in terms of infrastructure, housing and all these other sorts of different things—forgotten communities—it’s coercion at this point... That coercion tactic of offering money, hundreds of thousands of dollars and*

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<sup>17</sup> See “NWMO’s Property Value Protection Program,” brief: <https://www.ourcommons.ca/Content/Committee/441/ENVI/Brief/BR11636704/br-external/McDonaldGlen-e.pdf> and the brief submitted by Protect Our Waterways – No Nuclear Waste South Bruce (POW-NNW) <https://www.ourcommons.ca/Content/Committee/441/ENVI/Brief/BR11636705/br-external/ProtectOurWaterways-NoNuclearWasteSouthBruce-e.pdf>

<sup>18</sup> Addressed in POW-NNW, as well as William Turner in the following briefs: <https://www.ourcommons.ca/Content/Committee/441/ENVI/Brief/BR11603262/br-external/TurnerWilliam-3-10571765-003-f.pdf> and pp. 3-7 of <https://www.ourcommons.ca/Content/Committee/441/ENVI/Brief/BR11636707/br-external/TurnerWilliam-6-e.pdf>

<sup>19</sup> Protect Our Waterways – No Nuclear Waste South Bruce (POW-NNW) <https://www.ourcommons.ca/Content/Committee/441/ENVI/Brief/BR11636705/br-external/ProtectOurWaterways-NoNuclearWasteSouthBruce-e.pdf>

<sup>20</sup> Ibid.

<sup>21</sup> Reg Niganobe, elected Grand Council Chief of the Anishinabek nation and part of the Sturgeon clan; he represents 39 of the 133 First Nations in Ontario.

*the potential to have these jobs sounds like a benefit to the communities, but they're being forced to take it because there is no other way out.*"<sup>22</sup>

The NWMO agrees that Indigenous knowledge and Western science are part of a good decision-making process when this process is based on mutual trust and a respectful exchange of information. However, witness testimony and the content of several briefs depict a very different attitude toward Indigenous AND non-Indigenous communities dealing with the NWMO, on-site.

In addition, several Indigenous communities have condemned how their communities are dependant on the Canadian government under the *Indian Act*. The Bloc Québécois stands in solidarity with the First Peoples in their demands and points to its historic and unequivocal support for the United Nations Declaration on the Rights of Indigenous Peoples. AECL and CNL must do the same. According to Article 29(2):

*"States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent."*<sup>23</sup>

We recognize that concerned individuals and organisations having voiced their concerns and contributed to this study, either through testimony or briefs, did not obtain the same level of interest when the time came to prepare the Committee's report. Members discussed on the "merit" of including – or not – content from briefs.

The Bloc Québécois believes that a committee study that raises interest in the population to the extent that contributions are researched and referenced, and are submitted in a single copy,<sup>24</sup> deserve consideration. Obviously, when so many briefs suggest positions that do not align with those of the industry and the regulator, this can be reflected in content choices. The editorial choices made for this report came from government and official opposition members. From our perspective, this does not serve the public or the publics' interests.

The quantity and quality of the briefs received by the Committee in connection with this study sends, in our view, a very meaningful message. When these voices feel they are not being heard - whether it be in the communications or consultations organized by the NWMO, the CNSC or CNL – citizens turn to the public authority in which they have the most trust and believe they will truly be heard: the democratically elected representatives, sitting in the House of Commons. In this case, they chose to speak through the call for briefs process of Permanent House Committee.

## CONCLUSION

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It is reckless to use words such as "independence," "transparency," "accountability," "rigour," "compliance"—and other comparable terms—to describe radioactive waste governance in Canada and, in the same breath, dismiss individuals and organizations (including many academics, as well as technical and scientific experts from the industry) who specifically bring up alarming issues that affect human health and the environment.

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<sup>22</sup> ENVI Committee, 15 February 2022, <https://www.ourcommons.ca/DocumentViewer/en/44-1/ENVI/meeting-5/evidence>

<sup>23</sup> [https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP\\_E\\_web.pdf](https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf)

<sup>24</sup> A single copy is an original document that is not duplicated (copied and pasted) by numerous members of a given organization. Committees regularly receive letters—not briefs—that are identical copies of each other.

The Bloc Québécois does not object to the recommendations made by Committee members. However, it is sub-standard that these are not more specific and prescriptive. Current energy related policymaking, decisions and pathways being considered by the Canadian government, precisely require such recommendations.

Whether or not Canada chooses to develop nuclear power, it is already having to deal with the issue of radioactive waste. In the interest of protecting the environment and public health, this waste must be managed as flawlessly as possible and certainly, meet the highest international standards.

This study initiated by the Bloc Québécois shows that robust corrective actions must be taken, particularly in terms of transparency and decision-making processes, specifically when it comes to social acceptability in local communities where facilities for disposal of radioactive waste are planned.

Under the leadership of Pauline Marois's Parti Québécois government, Quebec made the choice to leave nuclear power behind. Quebec has the resources to accomplish the energy transition and move closer towards a truly net-zero future, without nuclear technologies. As a pro-independence political party, the Bloc Québécois stands in solidarity with those communities in Canada facing the hardships and serious problems of becoming "host-communities" for these hazardous materials. We firmly believe that Quebec and Canada each have the capability to develop energy sectors that will keep long-term dangers of radioactive waste at bay. The work that we have put into this study must serve our people, as well as Canada's.

#### **Recommendations submitted by the Bloc Québécois**

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1. The Committee recommends that, in order to shed light on the business circumstances for importing low level radioactive waste into Canada, the Government of Canada work with the Crown corporation Atomic Energy of Canada Limited (AECL) and Canadian Nuclear Laboratories (CNL) to hold public hearings; and that these hearings include inventories and clear guidance to manage these wastes.
2. The Committee recommends that, in order to ensure a very thorough assessment of the risks of radioactive waste treatments, all radioactive waste management or production projects currently under assessment, and those not yet authorized, be assessed under the *Impact Assessment Act* (IAA) by the Impact Assessment Agency of Canada; and that no project be authorized under the *Canadian Environmental Assessment Act, 2012*.
3. The Committee recommends that, in order to eliminate the appearance of conflicts of interest and thereby improve public trust in radioactive waste management and the nuclear industry in Canada, the Government of Canada make the necessary changes to the *Nuclear Safety and Control Act* and the *Financial Administration Act* so that the Canadian Nuclear Safety Commission reports to Parliament through the Minister of the Environment and Climate Change and the Minister of Natural Resources.
4. The Committee recommends that the Government of Canada, through the Department of Natural Resources, review its governance practices on the boards of directors of AECL and the CNSC to ensure that they are different from each other; and that seats be set aside for members of Indigenous and non-Indigenous communities.

5. The Committee recommends that, in order to respect the principles of public consultation, the 140 municipalities and the large number of Indigenous communities that have specifically called for more rigour in the Chalk River NSDF project, Environment and Climate Change Canada and the Impact Assessment Agency of Canada conduct a regional environmental study as soon as possible.
6. The Committee recommends that the Government of Canada implement the recommendations of the Seaborn Panel; and that the regulatory and legislative changes that would result from implementing the panel's recommendations be developed and considered without delay.
7. The Committee recommends that the Government of Canada actively work with the Nuclear Waste Management Organization (NWMO) this year to ensure that the siting of the deep geological repository (DGR), to be announced by the end of 2023, is subject to rigorous consultation with affected communities; and that Natural Resources Canada, in the renewal of its *Radioactive Waste Policy Framework* currently underway, plan to work specifically with Atomic Energy of Canada Limited (AECL) to map suitable sites specifically for intermediate level radioactive waste.
8. The Committee recommends that the Department of Natural Resources, in order to address the lack of planning for securing low level waste stockpiles, require the Crown corporation AECL and CNL to conduct a study on international best practices for the permanent burial of this class of waste.
9. The Committee recommends that the Government of Canada, in order to ensure the stability of non-proliferation agreements and to avoid the safety risks associated with the practice of reprocessing radioactive materials, prohibit by regulation or legislation all reprocessing of used fuel and plutonium extraction.

## Supplementary Report of the New Democratic Party of Canada

New Democrats would like to thank all the witnesses who appeared before the Standing Committee on the Environment and Sustainable Development and those who submitted written briefs during the Committee's study of radioactive waste governance in Canada.

While we support some of the recommendations in the report, we differ on some of the conclusions and are concerned that important perspectives and recommendations have not been addressed.

The focus of this study was the governance of radioactive waste in Canada. It was not within the scope of this study to look at the role of nuclear power generation in Canada's energy mix. Regardless of the future of nuclear power generation in Canada, existing radioactive waste and waste that will be created by existing and future nuclear power generation is a pressing issue that must be dealt with seriously to protect the health and safety of Canadians and the environment.

The committee heard from witnesses and received numerous briefs that raised concerns about the governance of radioactive waste in Canada, with particular focus on the consultation for the proposed Near Surface Disposal Facility (NSDF) at Chalk River and the search for a suitable site for a future Deep Geological Repository (DGR). It is important that these concerns are taken seriously, and that Canadians are able to meaningfully participate in the process around decisions that could have serious consequences to the environment and the health and safety of Canadians, now and into the future.

With regards to the governance structure for radioactive waste, the committee heard concerns about potential and perceived conflicts of interest and concerns about independence from industry. The Canadian Nuclear Safety Commission (CNSC) currently reports to Parliament through the Minister of Natural Resources, who is responsible for promoting and regulating the nuclear industry. While this may not create an actual conflict of interest, it was clear from witness testimony that the perception of the possibility of a conflict of interest impacts public trust in Canada's radioactive waste management.

To eliminate the appearance of a potential conflict of interest and ensure that Canada is in alignment with guidance from the International Atomic Energy Agency (IAEA), New Democrats recommend that the government make the necessary changes under *the Nuclear Safety Control Act* and the *Financial Administration Act* so that the Canadian Nuclear Safety Commission report to Parliament through the Minister of Environment and Climate Change, instead of through the Minister of Natural Resources.

The Nuclear Waste Management Organization (NWMO), which is responsible for the management of used nuclear fuel, is funded by, and comprised of nuclear energy producers, effectively putting industry in charge of designing and implementing Canada's plan for the safe, long-term management of used nuclear fuel. Multiple witnesses and briefs raised concerns about putting industry in charge of developing plans for the safe management of their own waste, or as Chief Duncan Malcom Michano described it, "putting the fox in charge of the

chicken coop.” In fact, in creating the NWMO in 2002, the Chretien government ignored the unanimous recommendation of the Seaborn Panel in 1998 to create an independent "arm's length" radioactive waste organisation.

New Democrats support the recommendation heard from many witnesses and briefs, and the Seaborn Panel, to have a body independent from industry manage radioactive waste.

The Near Surface Disposal Facility (NSDF) at Chalk River is currently undergoing final regulatory licensing approval by the CNSC. The CNSC is concluding its environmental assessment of the NSDF under the *Canadian Environmental Assessment Act, 2012*. Several witnesses spoke in favour of taking a regional approach to environmental risk assessment along the Ottawa River in relation to this proposed facility, given that there are several other nuclear facilities located in the Ottawa Valley. The City of Ottawa had previously requested a regional assessment under the new *Impact Assessment Act* that was turned down by the Minister of Environment. A regional assessment under the *Impact Assessment Act* would have more stringent requirements for consultation, particularly with Indigenous peoples, and provide separation between the entity that decides if a proposed radioactive waste storage project can proceed to the regulatory stage and the regulator that licenses the project (the CNSC).

New Democrats strongly recommend that the government conduct a regional environmental assessment of radioactive waste projects in the Ottawa Valley under the *Impact Assessment Act*.

Some witnesses advocated for perpetual, or rolling, stewardship of radioactive waste, as an alternative to abandonment. The Chiefs of Ontario have outlined five principles on radioactive waste, which have been adopted by the leadership of 133 First Nations in Ontario, including that “there should be no abandonment but rather a policy of perpetual stewardship.” Dr. Gordon Edwards pointed out that three final repositories, DGRs developed to store low- and intermediate-level waste, have experienced failures so far. New Democrats are concerned by the recommendation that the government acknowledge that DGRs are the safest way to store high-level radioactive waste without further consideration of perpetual stewardship as an alternative.

With regard to the potential future use of small modular reactors (SMR), a technology the Liberal government is pursuing, the committee heard testimony from expert witnesses that reactor technology used in SMRs is different than that of the nuclear reactors currently used in Canada and would produce radioactive waste requiring different waste management and disposal. Witnesses testified that the radioactive waste from some SMRs might not be suitable for long-term storage without significant pre-processing, and Dr. M.V. Ramana emphasized that this reprocessing of high-level waste separates uranium and plutonium, which can be used as fissile material in nuclear weapons. Natural Resources Canada’s *Draft Policy for Radioactive Waste Management and Decommissioning* currently allows for reprocessing of high-level waste.

New Democrats welcome the recommendation that any research and development work related to SMR technology rigorously document and categorize in their analyses the radioactive

waste that will be generated, and that a plan be developed to manage this waste as part of Canada's *Policy for Radioactive Waste and Decommissioning*. However, we also strongly recommend that the government revise Natural Resources Canada's *Draft Policy for Radioactive Waste Management and Decommissioning* to ensure that no reprocessing of high-level radioactive waste or extraction of plutonium is allowed in Canada. Similarly, we have concerns with the recommendation that the government invest in research in reducing, reusing, and recycling radioactive waste, as we feel it does not adequately address concerns around reprocessing and plutonium extraction.

The committee also heard concerns about the importing of radioactive waste into Canada. The NWMO has committed not to import high-level waste and to only manage high-level waste generated in Canada, but there is currently no regulation or law requiring it. The Chiefs of Ontario's *Five Principles on Nuclear Waste* includes the principle that "exports and imports of waste should be forbidden except in truly exceptional cases after full consultation with all those whose lands and waters are being put at risk."

New Democrats recommend that the government take steps to put in place regulatory restrictions on importing foreign high-level radioactive waste.

The government-owned contractor-operated (GoCo) model used by Atomic Energy of Canada Limited (AECL) and Canadian Nuclear Laboratories (CNL) was a concern for some witnesses. AECL was originally a Crown corporation, but now operates with a GoCo model with CNL. AECL owns the facilities and contracts out to CNL for the day-to-day operations. But, under the Harper government the assets of AECL's CANDU Reactor Division were sold to SNC-Lavalin in 2011, and in 2015 CNL transferred all of its shares to a private-sector consortium, the Canadian National Energy Alliance (CNEA), which in turn is run by the companies SNC-Lavalin, Fluor and Jacobs. This arrangement means that SNC-Lavalin effectively owns and operates many of Canada's nuclear assets.

New Democrats recommend that the government restore AECL as a Crown corporation to ensure public control and oversight of federal nuclear facilities and radioactive waste.

Numerous witnesses and briefs expressed dissatisfaction with consultation processes around radioactive waste management. This dissatisfaction was most strongly expressed by Chief Reg Niganobe of the Anishinabek Nation and Chief Duncan Malcom Michano. Public trust is crucial for the safe and effective management of radioactive waste. In this regard it is clear the government is falling short. Participants in consultations with both the CNSC and NWMO expressed distrust in the process and recalled feeling dismissed and patronized. Chief Niganobe recalled an incident when an NWMO representative told his community: "We could explain it to you, but you wouldn't understand it anyway."

Chief Niganobe emphasized that no decisions concerning radioactive waste storage, the development of small modular reactors, transportation or decommissioning can be made absent of the free, prior and informed consent on Indigenous peoples, as set out in article 29.2 of the *United Nations Declaration on the Rights of Indigenous Peoples*, and that transparency and full disclosure are essential, but not a substitute for full engagement. He suggested that

Canada could start the work on creating an effective and broad consultation policy. Additionally, the Kebaowek First Nation has been asking for a consultation framework between themselves and the CNSC but have not had that request met.

New Democrats strongly welcome the recommendation that the government work with Indigenous communities to co-develop a consultation framework that upholds the right of Indigenous peoples to free, prior and informed consent as set out in article 29.2 of the *United Nations Declaration on the Rights of Indigenous Peoples*.

Regardless of the role nuclear energy will play in Canada going forward, the governance of radioactive waste is an issue that must be dealt with seriously and rigorously to protect the health and safety of Canadians and the environment. Due to the nature of radioactive waste, the consequences of decisions made now will continue to be felt far into the future. It is essential that decisions surrounding radioactive waste management are made based on the best available scientific evidence, and through a governance structure that ensures transparency and meaningful engagement with the communities that will be most directly affected.