

Natural Resources Canada Roundtable on Storage May 4, 2021

Questions:

As you read this discussion paper, please focus on and consider the following questions:

1. What are your views on how radioactive waste is currently stored in Canada? (begins page 2)
2. What should be the role of Government, the regulator, and waste owners with respect to radioactive waste storage? (begins page 9)

Submitted May 13, 2021

Thank you for this opportunity to comment on the questions above

I am a member of the Old Fort William Cottagers' Association (OFWCA). We are residents and cottagers in the community of Sheenboro/Fort William, Quebec. We are the first community downriver from Chalk River, Ontario. We have been paying close attention for the past five years to Canadian Nuclear Laboratories' (CNL) two proposals for radioactive waste disposal on the Ottawa River, at Chalk River and Rolphton, Ontario.

Recommendations for policy are based on information and experience over these past five years. Comments here will focus on CNL and Chalk River Laboratories.

I have submitted comments previously on the two prior Roundtables - Waste Minimization and Disposal.

As stated in the previously (submission on disposal submitted April 1, 2021), disposal of radioactive waste is not a solution. At this time, we do not have the knowledge or science to ensure that radioactive waste can be abandoned and will be safe and contained from the biosphere for eternity. There must be the possibility of retrieval.

Managing radioactive waste safely is a societal problem. The nuclear industry must not be left to make the decisions.

It is not working with the Nuclear Waste Management Organization and its proposal for a DGR (deep geological repository). And it is not working CNL's proposal for a massive mound for radioactive waste at Chalk River. Anyone saying they know that this material will be safe for thousands of years is not speaking truthfully. The greatest burden on future generations would be a disposal facility that goes wrong.

Canada must re-think the management of radioactive wastes. Disposal has been the goal - and storage has been considered as a temporary or interim-solution. But disposal is not a viable option that will protect present and future generations from radiation exposures. Radioactive waste must be placed in storage facilities where the wastes are retrievable.

Policies must be developed for the storage of the different categories of radioactive waste. Robust storage facilities, that meet or exceed International Atomic Energy Agency (IAEA) safety standards, must be designed that will contain wastes safely out of the biosphere.

Storage both in the short-term and long-term are the solutions. We must think in these terms and provide the absolute best storage facilities for the management of radioactive wastes now and into the future, at least until such a time that science provides a technique to eliminate or neutralize radioactive waste.

Question 1: What are your views on how radioactive waste is currently stored in Canada?

In NRCan's opening remarks for this Roundtable on Storage, it states "**In Canada, all radioactive wastes are currently managed in interim storage facilities that are safe, secure and environmentally sound.**"

My goodness, does NRCan actually believe this?

This **statement ignores failures** at many sites and does not engender trust.

Chalk River Laboratories

If one thinks about Chalk River Laboratories, one could hardly say that the above statement is accurate. For seven decades radioactive waste has been accumulating at this site, due to nuclear research and development activities, and the area is highly contaminated. Old buildings are contaminated. Three old reactor cores are buried in the sand. Fuel bays have had major leaks releasing tritium, strontium-90, and carbon-14. Radioactive plumes have been slowly but

steadily entering the air and the wetlands, lakes and creeks which flow into the Ottawa River. [Chalk River's Toxic Legacy](#) by Ian McLeod, Ottawa Citizen 2011.

CNL should have made remediation of this entire area their number one priority. Instead we have been waiting for five years as CNL proposed an unsuitable and unacceptable above-ground landfill type of facility to dispose of radioactive waste for eternity. This so called solution would only risk contaminating the river and region even further. And retrieval of the waste would be virtually impossible.

It is not a choice between the status quo and the proposed disposal facility - the so-called NSDF (near surface disposal facility). There are much better and safer alternatives that could be situated away from the Ottawa River and prevent contact with water.

Now, without more delays, full remediation must be undertaken at Chalk River.

- Wastes must be properly identified and placed in appropriate short-term storage systems - possibly in SMAGS on site until a safer and longer-term storage facility is approved and built.
- A shallow underground vault (SUV) is a possibility for a long-term storage facility. It must be located away from the Ottawa River where LLW & ILW wastes would be retrievable and safely contained and isolated from the biosphere.
- Groundwater treatment facilities must be upgraded to capture plumes where radioactive wastes have been buried in soil/sand.

Port Hope

The community of Port Hope is contaminated with uranium and arsenic. In spite of commitments from the federal government to cleanup Port Hope and ensure safe storage of contaminants, CNL is now attempting to weaken the cleanup criteria. CNL must live up to the commitments and not leave contamination for future generations.

Nuclear Facilities

Some obvious problems at nuclear facilities:

- Fuel rods have been left in wet storage pools for too long - beyond the recommended years 8 -10 years - before being placed in dry storage.
- Irradiated fuel bays are degrading due to age and are releasing tritium at Pickering and Bruce.

- Tritium is being released to groundwater from storage systems at the Western Waste Management Facility.
- Pickering is building a dry storage that is immediately beside Lake Ontario.
- Storage areas are not hardened against malevolent acts or extreme weather.
- Dry storage systems have not been subject to public review or monitoring.

Much work is needed to establish policies on Storage

Let's hope that this process will be fruitful. NRCan please do listen to people who are not working in the nuclear industry.

Storage

Aim to protect human life and health and the environment

The International Atomic Energy Agency's (IAEA) twenty-two requirements for ensuring a high level of "safety for protecting people and the environment from harmful effects of ionizing radiation" should be adopted.

"The IAEA safety standards establish fundamental safety principles, requirements and measures to control the radiation exposure of people and the release of radioactive material to the environment, to restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation, and to mitigate the consequences of such events if they were to occur. The standards apply to facilities and activities that give rise to radiation risks, including nuclear installations, the use of radiation and radioactive sources, the transport of radioactive material and the management of radioactive waste."

https://www-pub.iaea.org/MTCD/publications/PDF/Pub1368_web.pdf

Canada should meet these standards as a minimum.

Contrary to IAEA however, storage should be viewed as the solution, not as an interim solution with disposal as the goal.

Storage facilities should be near point of generation of nuclear waste but removed from water bodies. Consolidating nuclear waste in centralized storage facilities is not the correct plan as long distance transport of nuclear waste is not acceptable.

Recommendations - Basic Principles for Storage of Low- and Intermediate-Level Waste and Nuclear Fuel Waste

1. Waste must be securely and safely contained and isolated from the biosphere.

Facilities should be designed to minimize risk and maximize protection of human health and the environment.

2. Robust storage facilities should be designed for different classifications of waste ~ different solutions for each type of waste - HLW, ILW, LLW.

Facilities must meet IAEA safety standards at a minimum.

3. ILW and LLW might be in same facility but must be segregated and never mixed.

4. Facility must be designed for access and retrieval of waste packages/containers

5. Identification and classification

Every container must be labelled so that its contents are clearly identified and can be retrieved for repackaging.

6. Monitoring ~ Continuous comprehensive monitoring with necessary remediation. Safe management of radioactive waste, whether for short- or long-term duration, means a system of comprehensive monitoring that is part of the design feature of the storage facility to ensure integrity of containment with ability to replace containers and to remediate any problems or failures.

7. Storage facilities should not be sited near a body of water ~

-Short-term storage facilities for LLW and ILW could be located near point of generation but long-term storage facilities should not be sited near a body of water.

-Wet storage systems for nuclear fuel waste should be located near point of generation. Dry storage should be dispersed across the site and removed as far as possible from water body.

8. Transportation of radioactive waste must be limited

Transportation of nuclear waste over long distances must stop.

Transportation must be kept to a minimum - short distances (e.g. waste to be moved away from water body). In Scotland the “proximity principle” is followed - radioactive waste is managed close to point of generation.

9. Consolidation of wastes at a centralized facility should not be considered if it means long distance transport of radioactive waste

(eg. Western Waste Management Facility and Chalk River Laboratories).

CNL has been implementing its own Integrated Waste Strategy that calls for federally owned and commercial wastes to be consolidated at Chalk River Laboratories. This means transporting waste from across the country. For example, 2000 shipments of radioactive waste are being transported from Whiteshell in Pinawa, Manitoba to Chalk River - a 1900 km journey. Canadian Nuclear Safety Commission (CNSC) has now approved shipping nuclear waste 600 km to Chalk River from Douglas Point. This makes little sense when the waste could be stored at Bruce Power. Not only is there a risk of an accident during transport but all communities en route are unnecessarily put at risk of radiation exposure, without their knowledge or consent.

Stop shipping wastes to Chalk River, an entirely unsuitable location next to the Ottawa River.

10. Importation of radioactive waste from other countries must be prohibited

Secretive plans to import nuclear waste from other countries was revealed by CBC in April, 2021. Legislation should be passed to prohibit the importation of radioactive waste. If Canada or a company within Canada sells nuclear reactors to another country - that country must take responsibility for the radioactive waste that is produced by that nuclear reactor.

<https://www.cbc.ca/news/canada/montreal/chretien-nuclear-waste-project-1.5971996?cmp=rss>

11. Continuous security of radioactive waste facility

Storage systems should be hardened against extreme weather and malevolent acts

12. Inventory of all radioactive waste contained in a facility must be available and maintained

13. Information for care of radioactive waste must be passed from one generation to the next

14. Continual containment improvement from generation to generation

As new materials and technology are discovered containers should be upgraded until a more permanent solution is possible.

15. Duty to Consult ~ Indigenous groups and the public should be consulted and engaged during all phases

16. Public must have open access to all information

Small Modular Nuclear Reactors and Radioactive Waste

The rationale for these small modular nuclear reactors is to help mitigate climate change. Please, SMRs will not be available, if they ever are, for another ten years. Immediate action is required to fight climate change.

Currently there are no plans for how the radioactive waste that would be generated by these nuclear reactors will be stored. At least, there is no public information. Will Canada have nuclear waste sites strewn all over the country in remote areas? Will radioactive waste be transported all over the country to some storage site? Think again Canada. No SMR should be licensed without a concrete detailed plan for short- and long-term storage. Storage plans must be completely costed. This is necessary before launching these nuclear reactors far and wide and risking radioactive contamination. Exporting them? How will other countries provide for safe management of the waste? Why isn't Canada investing in renewable energy (solar and wind) that does not produce hazardous radioactive waste and is immediately available to provide energy?

The various models of SMRs will use different types of fuel than CANDU reactors creating new kinds of waste that we don't already have in Canada. SMRs use either plutonium or enriched uranium as fuel. They could spark a chain reaction if immersed in water or if they are too close together. If the area where they are stored becomes flooded this could initiate a dangerous "criticality accident".

SMRs using high assay low-enriched uranium (HALEU)

SMRs using enriched uranium raise nonproliferation and security concerns. Where will the enriched uranium be produced, how will it be transported in

Canada? Physical protection requirements and enhanced security are serious considerations and must be factored into policies and costs for the management of the waste.

Plutonium Extraction is an international concern

Plutonium can be used as fuel and some small modular nuclear reactor companies are proposing to extract plutonium from used irradiated CANDU nuclear fuel. Canada does not currently extract plutonium from reactor fuel waste. The Moltex reactor proposal in New Brunswick received over \$50 million in federal funding. Plutonium extraction greatly increases health, environmental and weapons proliferation risks. Many misleading and false statements are being made. Plutonium extraction will not reduce the amount of radioactive waste or shorten the time needed to store the waste. There is a real risk of radioactive contamination with this process. CNL is also involved in this process conducting research at Chalk River Laboratories.

Certainly Canada should not be creating more radioactive waste and experimenting in a process that will create dangerous new waste streams and increase the risk nuclear proliferation. Global Affairs Canada should intervene.

Canada should be investing in renewable energy - e.g. solar and wind vs. nuclear to fight climate change. Solar and wind do not produce hazardous radioactive waste and are available now.

<https://www.theglobeandmail.com/business/article-renewable-energy-sources-grew-at-fastest-rate-in-two-decades-last-year/>

Policy Recommendations ~ Small Modular Nuclear Reactors

- 1. Small modular nuclear reactors should not even be considered until policies are in place and there are clear plans for the radioactive waste**
- 2. No SMR should be licensed without a detailed plan for short- and long-term storage for the used nuclear fuel, including costs**
- 3. Plutonium extraction should not be allowed without Parliamentary debate and a broad consensus of Canadians**

Policy Recommendations for Decommissioning Small Modular Nuclear Reactors will be the subject of Roundtable #4 on Decommissioning.

Question 2: What should be the role of Government, the regulator, and waste owners with respect to radioactive waste storage.

Recommendations: Waste Owners/Producers/Proponents

1. Information must be easily accessible to indigenous communities and the public. Private companies must make all information available.

2. Transparency is crucial

3. Waste Classification must be precise and clearly communicated

Change is required in the way Canada is currently classifying radioactive waste. Very precise definitions with the boundary between low-level and intermediate-level must be clearly defined and they must be followed.

4. Segregation of intermediate and low level radioactive waste is essential

5. Proponents must include in the environmental impact statement a complete inventory of ALL radionuclides

Each radionuclide must be listed and quantified with activity levels and half-lives indicated. This information must be communicated to indigenous people and the public in a clear understandable language without scientific symbols.

6. Proponents must engage with indigenous communities and the public

Engagement with the public should occur consistently and at every stage of the process.

7. Proponents must not buy goodwill/consent. This practice should be prohibited

A community's consent to host should signify an active, equal partnership between potential host community and proponent.

Paying or offering money (bribes) to communities prior to the approval of a project is unacceptable (this is currently being done by both CNL and NWMO). Article March 25, 2021 Toronto Star | **Ontario communities are divided over allowing burial of radioactive waste in exchange for cash**

<https://www.thestar.com/opinion/contributors/2021/03/25/ontario-communities-are-divided-over-allowing-burial-of-radioactive-waste-in-exchange-for-cash.htm>

and May 7, 2021 Colin Butler CBC | **'Goodwill' money from proposed nuclear waste site pours into declining Ontario farm town. What if it stops?**

<https://www.cbc.ca/news/canada/london/nuclear-waste-disposal-site-teeswater-south-bruce-1.6013827>

8. From production to management of radioactive wastes in storage facilities including continued monitoring and security

Producers/owners of waste are responsible for cost of waste management systems. Proponents that are not owners or producers but propose and design a facility should also bear some responsibility for costs. The private consortium managing CNL signed a contract with the formal federal government that ensured minimal liabilities leaving the government and tax payers liable financially. This is definitely not a good situation. If Go-Co contracts are made they should not favour industry at the expense of the public. Better still, the federal government should consider discontinuing the Go-Co contract and possibly re-constitute Atomic Energy of Canada Limited to work on the safe management of radioactive waste in storage facilities.

Indigenous rights

All proposals for radioactive waste storage affecting unceded lands and waters require approval by indigenous peoples.

UNDRIP

- Article 29(1) of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) states that “Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their homelands and resources.”
- Article 29(2) of the UNDRIP states that “States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the homelands of Indigenous peoples without their free, prior and informed consent.”

- Article 32(1) of the UNDRIP states that “Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their homelands and other resources.”

The Joint Declaration between the Anishinabek Nation and the Iroquois Caucus

In May of 2017, the Anishinabek Nation and the Iroquois Caucus issued a Joint Declaration that stated their opposition to the transportation and abandonment of radioactive waste on their territory as they have an “intimate relationship to the land [and] waters” and believe that they “need to protect the lands, waters and all living things for future generations”. The Joint Declaration asserts the five principles for radioactive waste: no abandonment; better containment and more packaging; monitored and retrievable storage; away from major water bodies; and no imports or exports.

Future Generations

Entire radioactive waste inventory at every radioactive waste storage site

The entire radioactive waste inventory must be properly archived by people who are professionals in that field and who are trained in the long-term preservation of records, knowledge and memory about cultural legacies across generations.

Pass information from one generation to the next

Manage the waste with the best containment with complete identification of what is contained so that it can be retrieved and repackaged when needed. All the information for care must be passed from one generation to the next.

Role of the regulator

There is little trust in Canada’s regulatory system

First and foremost, the role of our nuclear regulator, the Canadian Nuclear Safety Commission (CNSC), should be protecting Canadians and the environment from radioactive hazards produced by nuclear reactors. However, it seems that the CNSC is focused on helping proponents get through the environmental assessment process successfully.

Instead of ensuring that proponents adhere to rigorous regulations, CNSC appears to assist proponents. Recently CNSC has been modifying regulations to benefit the nuclear industry and to make the process smoother and easier for

proponents. The Canadian Environmental Law Association and NGO's are calling these "sham regulations".

Note: Globe & Mail article 23 March 2021- re: CNSC granting OPG 10 yr license for Pickering in 2018 by "lifting key regulatory roadblocks ... a pattern of placing the industry's interests over those of the public."

<https://www.theglobeandmail.com/canada/article-canadas-nuclear-regulator-overlooked-dubious-data-when-renewing/>

The CNSC grants licenses no matter how vigorously they are opposed. It is believed that the CNSC has never refused to grant a license.

Though the CNSC may be referred to internationally as a "world class regulator" (because the CNSC is favourable to the nuclear industry), the International Atomic Energy Agency in its recent review of Canada's nuclear framework, identified numerous deficiencies.

Though the CNSC may say that everything is totally "safe", it is very difficult to believe when the concerns have been ignored. CNSC is woefully inadequate. CNSC claims to be following science. However, when CNSC ignores scientists who criticize a proposal, what is one to believe.

Dr. Sunil Nijhawan, a nuclear engineer and consultant who once worked for OPG (Ontario Power Generation), gave damning testimony at the NRCan Roundtable on March 24, 2021 on Disposal - saying that the CNSC is "incapable of regulating" and "lies continuously".

Recommendations for Role of Regulator

1. The nuclear regulator's mandate must be to protect Canadians, their health, and the environment now and for generations to come

2. Transparency and truth are essential

Transparency is necessary to engender trust in this mandate to protect Canadians, their health, and the environment.

3. The regulator must be truly independent

Currently the CNSC is not independent and is dominated by the nuclear industry.

Independence is key and the CNSC must not be influenced by the nuclear industry. The CNSC should report through the Minister of the Environment and Climate Change which is more in line with CNSC's mandate.

4. Engagement with the public and the indigenous community

This is extremely important. Engagement should be a dialogue of mutual respect. Instead of trying to sell and convince the public, the regulator should be defending the public interest.

5. The regulator needs to regulate

The regulator must hold a proponent accountable. Regulations need to have teeth. The regulator must be free to refuse a license.

6. Regulations must be prescriptive

Regulations should be established through a public process. They should be prescriptive and objective.

The proponent shall not call the shots and shall not make its own decisions.

7. The regulator should have a balance of experts

Experts in numerous fields such as nuclear science, ecology, health etc.

8. Regulator should not be making decisions that are irreversible

Role of Government

1. There should be a completely independent Waste Management Agency (apart from the CNSC and apart from the Ministry of Natural Resources) establishing and implementing policy for the management of radioactive waste

New policies must be implemented by this new independent body (not CNSC)

This Waste Management Agency should be entirely independent of the government and the nuclear industry. It should report to parliament regularly and be open and transparent with the public.

Several countries have established independent agencies for the long-term management of radioactive waste and the decommissioning of nuclear facilities – agencies that have no direct ties to the nuclear industry or to the nuclear regulator: e.g. ANDRA in France, NDA in the UK, BGE in Germany.

2. The regulator should not report to a body that is promoting the nuclear industry

The IAEA strongly advises against a regulator reporting to a body that is promoting what the regulator is meant to regulate.

The regulator should not be reporting through the Ministry of Natural Resources but to the Ministry of the Environment and Climate Change and possibly also to Health and Indigenous Affairs.

3. A whole of government approach ~ Decisions should be debated by the Federal Cabinet ultimately

The regulator should not have sole power to determine if a proposal is accepted. There should be oversight and checks and balances in the system.

4. Waste Classification needs major overhaul

Currently the definitions are vague - leading to a great deal of confusion. For optimum levels of safety, precise boundaries between very low-level, low-level and intermediate-level waste are required. It actually seems that CNSC is allowing waste owners to implement their own waste classification systems and to vary them for any waste management system. This is bad practice and opens the door to unsafe management of radioactive waste. This must be rectified.

5. The Auditor General should evaluate Go-Co contract with CNEA

Is the 10-year Go-Co contract signed in 2015 with CNEA (Canadian National Energy Alliance ~ a profit-driven, private consortium) to manage and operate CNL and to clean up Chalk River, Port Hope and other federal nuclear facilities providing “value for money”. CNL has been receiving nearly \$1 billion per year from the government.

Radioactivity and Health ~ Need for research and review

6. Health investigations

Investigations should be responsibility of government but done independently.

“There is no safe level of exposure to any man-made radioactive material.

All discharges, no matter how small, into our air and water can cause cancer and many other diseases as well as genetic damage and birth defects” according to Dr. Eric Notebaert, Canadian Association of Physicians for the Environment.

7. Review “acceptable” levels

Canada’s permissive guidelines are questionable. Allowable limits of tritium and radioactive pollution in our water should be lowered drastically, yet this has been ignored in favour of the nuclear industry. Tritium levels especially must be reviewed and revised.. For example: acceptable tritium levels in Canada: 7000 Bq/Litre vs.100 in Europe and 14.7 in California. Because of the very large quantities of tritium produced by CANDU reactors, Canada’s standard for tritium in drinking water has remained unacceptably high. The Ontario Drinking Water Advisory Committee has recommended 20 becquerels per litre.

8. Review environmental release limits of radioactive wastes into air and water

Review models used in Canada to calculate allowable exposures.

9. Cumulative effects

Review release limits and acceptable levels in light of cumulative effects.

Dr. Ian Fairlie writes about the "biological and health effects of exposures to tritium" and the "risks faced by people living near nuclear facilities". His conclusions are "broadly applicable to all nuclear facilities".

"Much evidence from cell/animal studies and radiation biology theory indicates that tritium is more hazardous than gamma rays and most X-rays. However the International Commission on Radiological Protection (ICRP) continues to underestimate tritium’s hazard... the most common form of tritium is water, ie radioactive water, means that, when tritium is emitted from nuclear facilities, it rapidly contaminates all biota in adjacent areas. Tritium binds with organic matter to form organically bound tritium (OBT) with long residence times in tissues and organs"

<https://www.ianfairlie.org/news/the-hazards-of-tritium/>

10. Precautionary principle and pollution prevention approach should be given the same dominance in future radioactive waste management policies as the polluter pays principle

Current radioactive waste policy only explicitly recognizes the polluter pays principle. The precautionary approach and pollution prevention principles are equally important under Canadian environmental law, and as such all three principles should guide future radioactive waste management policy.

Intergovernmental Recommendation: Decisions should be debated by the ministers and cabinet

Radioactive waste policy must explicitly underline that a radioactive waste facility must not only comply with federal law but also provincial and municipal legislation and regulations.

Conclusion

The Federal Government should stop CNL's proposed radioactive waste disposal facility at Chalk River and NWMO's proposed DGR in Ontario. People believe that the risks are far too great to proceed with the NSDF or with a DGR. Permanent disposal and abandonment of radioactive waste without the possibility of retrieval must be off the table.

There are alternatives that will provide for safe short-term and long-term management of man-made radioactive waste that will contain and isolate these hazardous elements from the biosphere.

Canada must stop thinking of the storage of radioactive waste as a temporary or interim-solution. Storage is **the** solution and policies need to reflect this. This must be Canada's focus.

Canada should design the best possible storage facilities and be a positive example for the world.

Thank you.

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