



**Final submission from the
Canadian Coalition for
Nuclear Responsibility**

**Mémoire définitif du
Regroupement pour la surveillance
du nucléaire**

In the Matter of the

À l'égard des

Canadian Nuclear Laboratories (CNL)

Laboratoires Nucléaires Canadiens (LNC)

Application from the CNL to amend its Chalk River Laboratories site licence to authorize the construction of a near surface disposal facility

Demande des LNC visant à modifier le permis du site des Laboratoires de Chalk River pour autoriser la construction d'une installation de gestion des déchets près de la surface

**Commission Public Hearing
Part 2**

**Audience publique de la Commission
Partie 2**

May and June 2022

Mai et juin 2022



The Canadian Coalition for Nuclear Responsibility (CCNR) strongly recommends that the Canadian Nuclear Safety Commission (CNSC) refrain from granting a licence amendment to Canadian Nuclear Laboratories (CNL) to authorize that privately-owned corporate entity to prepare the site for their proposed Near Surface Disposal Facility – which is intended to last in perpetuity. (Two-thirds of the radionuclides in the proposed inventory have half-lives of more than 1,000 years, and half of them have half-lives of more than 15,000 years. See the exhibit at the end of this document.)

1. The honour of the Crown

CCNR takes issue with CNSC staff's recommendation to the Commissioners, in CMD 22-H7, to grant the licence amendment. In support of its recommendation, staff asks the Commissioners to "determine that the CNSC, as an agent of the Crown, has upheld the honour of the Crown and has fulfilled its common law obligations to consult and where appropriate accommodate Indigenous peoples."

CCNR does not presume to speak on behalf of Indigenous peoples, but as Canadian citizens we wish to state clearly and unequivocally that if CNSC grants this licence amendment despite the lack of free, prior and informed consent from the Kebaowek and Kitigan Zibi First Nations, we will consider this act as one that dishonours Canada and all Canadians. Moreover, we – and, we believe, many other Canadians from coast to coast to coast – will regard such a decision on the part of CNSC as a serious blow to the entire process of reconciliation. It will set a terrible precedent across the country by suggesting that Indigenous consent is not a priority. Such a development could set back the cause of reconciliation for at least a generation or two.

Canada's Prime Minister, Justin Trudeau, has stated on numerous occasions that nothing is more important than the Nation to Nation relationship between Canada and its Indigenous peoples. A few years ago, Ontario Power Generation (OPG), after spending years developing plans for a Deep Geologic Disposal facility for low-level and intermediate-level radioactive wastes near Kincardine Ontario, abandoned that project when it became clear that the Saugeen Ojibway First Nation would not consent to it. OPG is not even a federal agency. In view of this example, how can CNSC as an agent of the Crown act otherwise without causing national embarrassment? CNSC cannot with honour licence the NSDF without Indigenous consent.

Moreover, CCNR believes that such a decision on the part of CNSC would be in direct contravention of [Canada's newly-minted Policy](#) on Radioactive Waste Management and Decommissioning.

On its web site, Natural Resources Canada (NRCan) proclaims that Canada's Radioactive Waste Policy is based on four priorities, one of which is this:

"recognition of Canada's deep commitment to building partnerships and advancing reconciliation with Indigenous peoples related to the management of radioactive waste and decommissioning, based on the recognition of rights, respect, collaboration and partnership."

A few paragraphs later we read that the federal government will strive for continuous improvement, to "ensure that it maintains alignment with International Atomic Energy Agency guidance and the implementation of the *United Nations Declaration on the Rights of Indigenous Peoples* in Canada." Article 29 of the UNDRIP document declares in part that "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."

The Canadian Radioactive Waste Policy is even more explicit on the importance of the Nation to Nation relationship between the Government of Canada and Indigenous rights holders. Part 3 of the document is entitled *Canada's commitment towards building partnerships and advancing reconciliation with Indigenous peoples* and it begins as follows:

"In the spirit of reconciliation and recognizing the unique status of Indigenous peoples in Canada, the federal government is committed to meaningful engagement with Indigenous peoples in Canada in the planning, development, and operation of radioactive waste management and decommissioning projects. Indigenous peoples, as rights holders and stewards of the land and water, are critical partners in Canada's vision and strategy for radioactive waste management and decommissioning that protects the health, safety, and security of people and the environment for current and future generations.

"The federal government . . . acknowledges, respects and honours that First Nations, Inuit and Métis peoples have unique status and rights in Canada, as recognized and affirmed in the *Constitution Act, 1982*, and affirms that the honour of the Crown guides the conduct of the Crown in all of its dealings with Indigenous Peoples."

Contrary to the Canada's Radioactive Waste policy, the Keboawek and Kitigan Zibi nations were never involved in the original "planning" or "development" of the CNL project. In particular, they were apparently never engaged in any process of choosing or approving a location for any waste disposal facility, let alone the NSDF.

In the light of such an emphatic policy statement from the federal government, it is inappropriate for the Commissioners to approve the proposed licence amendment and still comply with the admonition from CNSC staff to "determine that the CNSC, as an agent of the Crown, has upheld the honour of the Crown." CCNR has read the eloquent and informative written submissions of the Keboawek and Kitigan Zibi nations and it seems clear that they are opposed to the choice of location for the NSDF as well as to many other aspects of the proposed facility.

CCNR recommends that the CNSC refrain from determining that "the CNSC, as an agent of the Crown, has upheld the honour of the Crown" if the Commissioners approve the requested licence amendment without the free, prior and informed consent of Indigenous peoples.

2. Protecting the Environment and the Health and Safety of Persons

In support of its principal recommendation regarding the approval of the licence amendment, CNSC staff also recommends that the Commissioners conclude that CNL "will make adequate provision for the protection of the environment, [and] the health and safety of persons."

CNSC claims that it makes science-based decisions. There is no science that can demonstrate that such a land-fill type facility will withstand the ravages of time. As Nobel-prize-winning Swedish physicist Hannes Alfvén wrote in 1972, in direct reference to the problem of permanently disposing of long-lived human-made radioactive wastes created by fission technology, "You cannot claim that a problem is solved simply by pointing to all the efforts that have been made to solve it."

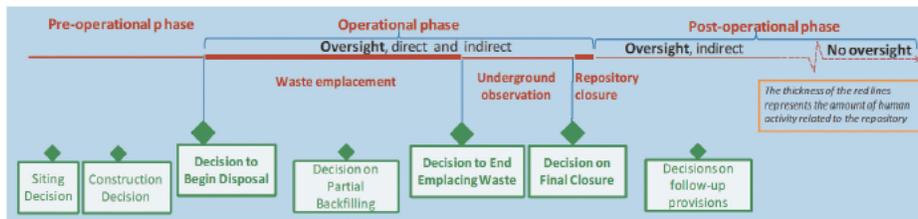
CCNR urges the Commissioners to refrain from concluding that CNL "will make adequate provision for the protection of the environment, [and] the health and safety of persons," since the multi-millennial nature of the proposed radioactive inventory, stored in a 5 to 7 story high earthen mound, largely above ground, places that undertaking beyond the realm of possibility.

3. Communicating with Future Generations

Canada's Policy on Radioactive Waste and Decommissioning is very explicit on the necessity to ensure "that responsibility for maintaining institutional controls over the long term, including the preservation of records and knowledge [pertaining to] management of radioactive wastes, is assigned, in an open and transparent manner, to an appropriate entity".

Since half of the radioactive poisons in the proposed NSDF inventory have half-lives of over 15,000 years, it is essential that detailed records be carefully recorded and preserved by a qualified governmental archival agency, capable of communicating all relevant information to future generations in a form that is readily understandable to them at that time. Without such records amnesia will set in and future generations will be ignorant of the nature of the radiotoxic legacy that we are leaving to them, perched on a height of land overlooking the Ottawa River.

The Nuclear Energy Agency of the OECD, of which Canada is a member, has dealt extensively with necessity to empower future generations to deal expeditiously with failures of containment over the very long term. Indeed, the Radioactive Waste Management Committee (RWMC) of the OECD-NEA launched an initiative on the "Preservation of Records, Knowledge and Memory (RK&M) Across Generations", known as the RK&M Initiative, that ran from March 2011 to April 2018. Twenty-one organisations from 14 countries, representing implementing agencies, regulators, policy makers, R&D institutions, and international and archiving agencies, plus the IAEA, contributed to the work. The Committee observed that RK&M preservation is best addressed while management plans are being designed and implemented and the necessary funding is allocated for that purpose. See the excerpt below from "Foundations and Guiding Principles for the preservation of records, knowledge and memory across generations – A Collective Statement of the NEA Radioactive Waste Management Committee."



Planning for future RK&M preservation is best addressed while waste management plans are designed and implemented and funding is available. The long operational phase of the repository creates an opportunity for reflection and for the development of workable RK&M strategies. A systemic approach should be formulated whereby the various components of the RK&M system complement each other, provide for redundancy in the communication of messages and maximise the chances of survival of a recognisable and comprehensible message. Through this approach, synergies can be sought with societal institutions and international bodies, and agreements can be reached that are likely to survive beyond the closure of the repository and can thus contribute to RK&M preservation. Mechanisms outside radioactive waste management constitute an additional resource for waste management organisations and governments. A concerted approach at the international level will contribute to the further development of national strategies.

CCNR recommends that CNSC refrain from issuing a licence for any permanent above-ground or near-surface radioactive waste facility, designed to contain radionuclides whose half-lives exceed the expected lifetime of the facility, without provision for a detailed, competent and fully funded archival team assigned to the task of RK&M preservation on a multi-millennial time frame (so as not to contravene Canada's Policy).

4. Safety Culture and the Justification Principle

CCNR is appalled that neither the proponent nor the regulator displays a sufficiently mature safety culture when it comes to preventable radioactive exposures. All radioactive exposures should not only be kept within regulatory limits, and as low as reasonably achievable (ALARA), but should be completely eliminated or prevented wherever possible. This is because, based on existing scientific knowledge, there is no such thing as a completely safe level of exposure to carcinogens. If a large enough population is exposed to even a chronic small dose of carcinogen/mutagen exposure, there will be an increase in cancer incidence – and in genetic mutations – the excess cases being roughly proportional to the excess exposure to carcinogens/mutagens.

Eliminating unnecessary exposures is a fundamental principle of radiation protection espoused by the International Commission for Radiological Protection, a body from which CNSC draws many of its regulatory limits. The German government has enshrined this "justification principle" into law – no radioactive exposures are permitted without explicit justification. The International Atomic Energy Agency (through its IRRS Report on Canada's nuclear industry) has recommended that Canada also enshrine this principle in law. Canada has not accepted this recommendation, probably on the advice of CNSC staff. In its rationale the government indicates that there is no need to enshrine the justification principle into law because it is already in effect being implemented by only allowing "reasonable" exposures. CCNR has studied the situation carefully and has concluded that this is a misunderstanding, and that the justification principle is not in fact practiced by CNSC in any form whatsoever. CNSC has been asked to explain who decides what radioactive exposures are to be considered reasonable? Is it the proponent? Is it the CNSC staff? Is it the Commissioners? Is it the President of the CNSC? No answer is given. There is no evident science-based or legally-based mechanism to determine "reasonableness".

In our case, we have many long-lived radionuclides, each lasting many thousands or tens of thousands of years, located near a water body that provides drinking water for millions of people. Those millions of people will be multiplied by tens of thousands of years to give a present and future population of tens of billions of humans. If containment fails, and the NSDF leaks its inventory of long-lived radionuclides into the Ottawa River (even after many centuries have gone by), the long-lived toll of human misery can be considerable.

Bearing this in mind, every effort should be made to keep long-lived radionuclides such as plutonium (24,000 year half-life), chlorine-36 (301,000 year half-life), technetium-99 (210,000 year half-life), iodine-129 (17 million year half-life), carbon-14 (5,700 year half-life) out of the NSDF, as well as shorter-lived but extremely mobile radionuclides such as tritium (13.8 year half-life).

Nowhere in the environmental impact statement are such discussions to be found. One gets the distinct impression that CNL – with the permission of CNSC – is eager to put as much of that long-lived stuff into the mound as they can get away with, rather than the exact opposite – going to great lengths to prevent these long-lived materials from getting into the mound by diverting them into another waste stream altogether, slated for a much more rigorous confinement.

Even though cobalt-60 is relatively short-lived (5.7 year half-life), for example, everyone knows that it is an extremely powerful gamma emitter and requires shielding to protect the workers who must handle these sealed sources – which are imported into Chalk River from profit-making private companies that sell those sources to its customers. We learned during the February 2022 hearings that these cobalt-60 sources are responsible for 99 % of all the initial radioactivity in the mound, yet none of them have to be placed in the mound at all! The total mass of all these sources is only a few kilograms, and those sources can easily be stored in an existing concrete bunker on the Chalk River site called a SMAG (shielded modular above ground storage building) taking up very little space and decaying gradually to much lower levels of gamma radiation.

The determination of CNL and CNSC to "smuggle" these intensely radioactive cobalt-60 sources into the so-called "low-level" radioactive waste facility simply serves to undermine public confidence in the integrity of both the proponent and the regulator. Indeed, neither CNL nor CNSC ever volunteered the information that 99% of the radioactivity in the mound would be caused by the presence of only a few kilograms of cobalt-60 sealed sources. The public perception is that neither the proponent nor the regulator is willing to be open and transparent.

It certainly does not speak well of their "safety culture" as it is even more dangerous for the workers to have to put these sources into the mound. Moreover, the heat generation and gamma radiation from these sources may very well compromise the integrity of the biomembranes used in the NSDF – due to many decades of heat and gamma ray exposure, especially if the shielding of the cobalt-60 sources is cracked or crushed by the weight of the toxic overburden.

Returning to Canada's Radioactive Waste Policy, we read that "Waste generators and waste owners will . . . prevent and minimize the generation, volumes and activity levels of their radioactive wastes, [and] optimize waste management, through appropriate facility design

measures". Obviously, minimizing the waste in the NSDF means keeping things out of it as much as possible, not putting extra things into it that do not have to go there.

In a short time, despite limited access to the NSDF site and even more limited resources to work with, Keboawek Nation was able to document several important species inhabiting the NSDF locale that were not even recognized in the CNL's EIS. So the EIS has been shown to be a profoundly flawed document, not only failing to describe the actual environment properly but also unable or unwilling to even talk about the potential biological impacts of the many very long-lived radionuclides in the mound after the expected lifetime of the facility – some 500 years or so – has expired. No real environment, and no real impacts either, in that report.

CCNR recommends that the Commission order a restart to the entire environmental assessment process, beginning with site selection (along with a sober and serious consideration of alternative sites), progressing to the waste inventory (while minimizing the radioactive and toxic inventory of any near-surface facility that might be planned), and being scrupulously honest, open and transparent at all times, fully engaging the Indigenous peoples of the Algonquin nations from the very beginning. This would necessitate a new Environmental Impact Statement that would accurately describe the actual environment and thoroughly discuss the potential environmental impacts of each of the constituents in any proposed facility.

5. A Tale of Two Dumps – Port Hope and Chalk River

The government of Canada has assumed responsibility for dealing with extensive radioactive contamination of several sites, including the Chalk River site and the Port Hope site. Most of the contamination at these two sites was caused by the actions of, or negligence by two Crown Corporations – Eldorado Nuclear Limited (ENL) in the case of Port Hope, and Atomic Energy of Canada Limited (AECL) in the case of Chalk River. In both cases, Canada's nuclear regulator did not intervene until others blew the whistle.

Other federally-owned sites with major contamination include the Whiteshell Nuclear Research Establishment (WNRE) at Pinawa, Manitoba (including the WR-1 research reactor); the Gentilly-1 reactor at Bécancour, Quebec; the Douglas Point reactor at Kincardine, Ontario; the Nuclear Power Demonstration (NPD) reactor at Rolphton, Ontario; and a number of other smaller sites.

At both Port Hope and Chalk River, there is a voluminous legacy of radioactive waste including a great deal of contaminated soil and hundreds of contaminated buildings. Contaminants consist of radioactive and non-radioactive toxic waste materials that were mismanaged over a period of decades, especially in the early years of the nuclear age.

However, there is a sharp distinction between the two sites in terms of what the waste inventory is, how the waste problem has been addressed, and how the people of the region have been treated. The traditional owners of the land associated with the Chalk River site are the Algonquins of the region. These indigenous Algonquin communities have been deprived of the rights and privileges enjoyed by the settler populations of Port Hope, Port Granby, and dozens of

other Ontario communities that were approached as potential willing host communities to receive the Port Hope wastes.

All of the settler communities in question were given the right of refusal, which the Algonquins have not been offered. These settler communities all enjoyed extensive consultations prior to any final decision as to either the site or the technological options for a toxic waste storage facility – privileges that have not been available to the Algonquins.

The settler communities were provided with funds and resources to educate themselves on the nature of the wastes and the options for dealing with those wastes long before any irrevocable decision was made as to how to manage the wastes in the long term. Not so with the Algonquin peoples – not until the eleventh hour, when all the important decisions had already been made.

Two of the settler communities – Port Hope and Port Granby – were able to negotiate a signed agreement with the Government of Canada, called the Port Hope Area Initiative (PHAI) Agreement. The settlers were able to lay down terms and specify details of the planned cleanup of more than one million cubic metres of radioactive and non-radioactive toxic wastes.

These wastes were to be consolidated in an engineered mound at the old Welcome waste dump, just north and west of the town of Port Hope, about three kilometres from Lake Ontario. In addition, wastes from the old Port Granby dump site were to be consolidated in another engineered mound, less than one kilometre from the Lake.

However, it was made clear in the Port Hope Area Initiative Agreement and the subsequent Environmental Assessment, that the two engineered mounds are not to be regarded as permanent solutions, but as temporary storage facilities, good for a few centuries at most. None of the radioactive waste materials in the two mounds will have disappeared in the course of a few centuries, and in fact the waste inventory in each mound will not be less than it was at the outset. The amount of radioactivity will probably be quite a bit more after that period of time, due to in-breeding of the so-called “radioactive progeny” – byproducts of radioactive decay that will serve to increase the total radioactivity in the mounds.

For example, if pure radon-222 gas were kept in a sealed glass vial, it will only take a couple of hours for the radioactivity to increase by almost a factor of five. That's because some of radon atoms will have disintegrated, turning into atoms of polonium-218, bismuth-214, lead-214, and polonium-214 – all of which are much more radioactive (per gram) than radon-222. After a couple of hours, there is an “equilibrium” established between the five radioactive elements, meaning they all have attained the same level of activity. Therefore, the total radioactivity is almost five times greater than it was originally. Although the amount of radon-222 is a bit less than it was at the outset, due to radioactive disintegration, that loss is pretty slight.

In the executive summary of the Environmental Assessment document for the Long Term Waste Management Facility (LTWMF) planned for Port Hope Area, we read:

For purposes of this EA, the term “*abandonment*” is interpreted to mean the cessation of all forms of planned, designed human intervention at the decommissioned LTWMF for the purposes of managing or controlling potential environmental or human health and safety concerns associated with it. Abandonment of the LTWMF prior to its decommissioning (i.e., with waste materials still contained within it) is not considered viable or responsible stewardship.

https://www.phai.ca/wp-content/uploads/EA_ExecutiveSummary_PH.pdf

The last sentence implies that decommissioning of a given waste storage facility cannot be considered as an accomplished fact as long as there are “any waste materials still contained within it.” Thus decommissioning requires moving the waste to another location.

The Government of Canada created a federal agency called the Siting Process Task Force (SPTF) whose task it was to try to find a willing host community somewhere in Ontario to accept all of the Port Hope area wastes for emplacement in a state-of-the-art containment facility that would be permanent, in exchange for negotiated benefits. Any community that agreed to participate enjoyed the right of refusal.

The Siting Task Force operated for eight years and made funding available during that time to any “candidate community” to be spent on self-education and community consultation. There was a determined effort by the Task Force to find an alternative site for the Port Hope wastes. There were a large number of information meetings that took place not only in the town of Port Hope but in dozens of communities throughout Ontario who might be willing to be a willing host community to accept the Port Hope wastes in exchange for specified benefits to be negotiated.

When that effort failed, there were further consultations with the people of of Port Hope and Port Granby, leading to a negotiated and signed agreement drawn up between the Port Hope and Port Granby communities and the Government of Canada, called the Port Hope Area Initiative (PHAI) Agreement. In that agreement important details of the proposed cleanup of radioactive and non-radioactive toxic materials were specified. In particular, the emplacement of those toxic materials in an engineered mound was to be considered as a temporary measure, for a period of a few centuries, but with the understanding that this was not to be construed as a permanent solution to the problem.

In the case of Chalk River, the traditional owners of the land – who are the Algonquins of the region – were never consulted or informed about the siting of the proposed NSDF waste facility until after the fact. The site had already been chosen by the privately owned and managed company, CNL, according to criteria that have never been made public. Presumably, CNL judged the site to be convenient for their purposes, as there never was any detailed effort to find another site, nor was there any detailed justification for the chosen site on grounds related to the protection of the health and safety of people and the environment. Was protection of the Ottawa River also absent from the criteria that presumably led to the choice of this precise site?

Given this history, we see that the engineered mounds at Port Hope and Port Granby do not represent the state-of-the-art permanent disposal facility that CNL claims is the case with the almost identical NSDF. In fact, any one of the three engineered mounds can be more properly

regarded as a “booby prize” compared with the original plan to find a “willing host community” and develop a much more elaborate disposal facility came to nought.

While the proposed NSDF at Chalk River has a superficial resemblance to the PHAI mounds, it is in fact profoundly different. First and foremost, the PHAI mounds contain only naturally occurring radioactive materials (NORM), whereas the NSDF contains mainly human-made post-fission radioactive waste materials that were created by the use of nuclear technology. Never, in the entire history of Canada to date, has permission been given to “permanently” dispose of such human-made radioactive poisons. The NSDF has no precedent whatsoever.

CCNR recommends that CNSC recognize the disparity in the treatment Port Hope and Port Granby residents in their struggle to "clean up" extensive long-lived radioactive contamination in their communities, and the treatment of the traditional rights holders of the land on which the Chalk River facility is located – namely the Indigenous Algonquin peoples – and refrain from granting CNL a licence until those disparities are remedied.

Radionuclides such as plutonium-239, cesium-137, strontium-90, cobalt-60, and most of the other radionuclides that are scheduled to go into the NSDF, were never found in nature prior to 1939 – whereas NORM materials have always been part of our environment. Human activities (nuclear reactors) have created enormous amounts of these dangerous materials. All these radioactive materials act differently in the environment and in the human body. Many of them follow pathways that are not followed by any naturally occurring radioactive materials. That makes radioactive waste management a daunting and difficult problem.

Tritium (radioactive hydrogen) and carbon-14 are special. These radioactive materials have always been in the human environment at a very low level. They are created through the action of cosmic rays from outer space acting on the upper atmosphere. Unlike most of the other radioactive materials we are talking about, these two are quite detectable in nature. However, virtually all of the tritium and carbon-14 that is planned to go into the NSDF is in fact human-made. They are mass-produced as an unintended byproduct of the fission of uranium and plutonium atoms, which takes place in every nuclear reactor.

Tritium and carbon-14 are biologically special because they are the building blocks of life. Every organic molecule in our body has carbon atoms and hydrogen atoms. That includes our DNA molecules that determine who we are. Unlike most other radioactive elements, tritium and carbon-14 can be built right into our DNA molecules where they can do a great deal of damage when they disintegrate.

Moreover, tritium and carbon-14 are very mobile in the environment. Tritium forms radioactive water molecules that can be given off into the atmosphere as vapour and then come back to earth as radioactive rain drops or radioactive snow flakes. Tritium in the form of liquid water molecules can also enter our drinking water. There is no municipal water treatment plant or any kind of filter that can remove tritium from our drinking water, it goes right into us. Studies have shown that a pregnant mother drinking tritium-contaminated water passes a lot of it into her unborn child, so that the developing foetus gets a higher radiation dose than the mother.

Carbon-14 is also very mobile in the environment. It can escape from a waste facility as radioactive carbon dioxide, for example, and can enter into all living things. Carbon, after all, is the basis of organic life. We are all carbon-based life forms. If the carbon is radioactive, damage can be done.

So this raises an important question. Why should large amounts of tritium and carbon-14 be put into the NSDF in the first place? We know that the tritium is going to run down into Perch Lake as radioactive water, and we know that CNL's water treatment plant will not succeed in removing any of the tritium before it flows into the Ottawa River. So why put it in the mound in the first place? Shouldn't it be kept in tightly sealed drums and stored far away from the water? Similar comments go for carbon-14, which happens to have a half-life of 5,700 years. That means that, however much carbon-14 you put into the NSDF, half of it will still be there after 5,700 years have gone by. By comparison, the oldest pyramids in Egypt are only 5,000 years old. Does anybody believe that the NSDF mound is going to outlast the Pyramids of Egypt?

It is important to note that the two mounds at Port Hope and Port Granby will not be receiving any radioactive waste tritium or radioactive waste carbon. So the escape pathways and the biological importance of radioactive hydrogen and radioactive carbon have nothing at all to do with the PHAI mounds. Only the NSDF poses these dangers to humans and to the environment.

In passing, it is worth noting that the Government of Canada has established an "acceptable" concentration of tritium in drinking water. It is 7,000 becquerels per litre. A becquerel is one radioactive disintegration per second. So 7,000 becquerels per litre means that if you had a one litre bottle of water, and you drank down, then inside your body that water would be undergoing 7,000 disintegrations (very tiny explosions at the atomic level) every second. That's 420,000 disintegrations every minute, or 25 million 200 thousand disintegrations every hour. This is considered "acceptable". The question is, acceptable to whom?

Because of repeated expressions of concern from the public, the Ontario government asked two scientific bodies (on two different occasions) to study the question of how many cancers can be caused by tritium ingestion and whether 7,000 becquerels per litre would be sufficiently safe. In both cases, the two bodies of experts concluded (independently!) that the permissible exposure to tritium in drinking water should be reduced to 20 becquerels per litre. In other words, on grounds of protecting human health, these toxicology experts concluded that the tritium levels allowed by the government of Canada are about 350 times too high. In plain language, that means 350 times more cancers than what you will get with 20 becquerels per litre.

Now it is important to realize that in fact, tritium levels in our drinking water are well below the 20 becquerels per litre concentration, so we are nowhere close to that 7,000 level. But what it does reveal is a very disturbing attitude on the part of the government of Canada toward the regulation of radioactive wastes and the industry's dismissive attitude towards the dangers of unnecessary radioactive exposures. It is not very reassuring. And the CNSC staff fits right into that same pattern of trivialization of risk and denial of harm.

Radioactive Materials Proposed for the Mega-Dump

<u>Radioactive Material</u>	<u>Chemical Symbol</u>	<u>Total Activity in becquerels</u>	<u>Half-Life in years</u>
Americium-241	Am-241	51.9 trillion	432
Americium-243	Am-243	19.7 billion	7.4 thousand
Carbon-14	C-14	44.1 trillion	7 thousand
Chlorine-36	Cl-36	193 billion	301 thousand
Cobalt-60	Co-60	4.4 quadrillion	5.3
Cesium-135	Cs-135	6.6 billion	2.3 million
Cesium-137	Cs-137	531 quadrillion	30.1
Hydrogen-3	H-3 (T)	4.8 quadrillion	12.3
Iodine-129	I-129	1.48 trillion	15.7 million
Molybdenum-93	Mo-93	35.1 million	4 thousand
Niobium-94	Nb-94	29.7 trillion	20.3 thousand
Nickel-59	Ni-59	66.8 billion	76 thousand
Nickel-63	Ni-63	25.3 trillion	101
Neptunium-237	Np-237	3.57 billion	2.1 million
Plutonium-239	Pu-239	2.01 trillion	24 thousand
Plutonium-240	Pu-240	3.13 trillion	6.6 thousand
Plutonium-241	Pu-241	102 billion	14.3
Plutonium-242	Pu-242	9.37 billion	375 thousand
Radium-226	Ra-226	579 billion	1.6 thousand
Selenium-79	Se-79	2.16 billion	295 thousand
Silver-108m	Ag-108m	203 billion	438
Strontium-90	Sr-90	1.66 quadrillion	28.9
Technetium-99	Tc-99	6.88 trillion	216 thousand
Tin-126	Sn-126	3.16 billion	223 thousand
Uranium-233	U-233	18.8 billion	159 thousand
Uranium-234	U-234	3.86 trillion	245.5 thousand
Uranium-235	U-235	249 billion	704 million
Uranium-238	U-238	12.4 trillion	4.5 billion
Zirconium-93	Zr-93	11.8 trillion	1.5 million

Reference: NSDF EIS, Table 5.7.6-1, "Bounding NSDF Project Waste Radionuclide Inventory to be placed in the ECM"