



## **Oral presentation**

### **Written submission from the Port Hope Community Health Concerns Committee**

In the Matter of the

#### **Canadian Nuclear Laboratories**

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Application to renew its waste nuclear  
substance licence for the Port Hope Project

#### **Commission Public Hearing**

**November 22, 2022**

## **Exposé oral**

### **Mémoire du Port Hope Community Health Concerns Committee**

À l'égard de

#### **Laboratoires Nucléaires Canadiens**

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Demande concernant le renouvellement du  
permis de déchets de substances nucléaires  
pour le projet de Port Hope

#### **Audience publique de la Commission**

**22 novembre 2022**

Submission from Dr. Gordon Edwards

Submission from Faye More

# **A Heap of Trouble**

## **Consolidating Radioactive Liabilities**

By Gordon Edwards, Ph.D.

a report commissioned by

The Port Hope Community Health Concerns Committee (PHCHCC)

Submitted to the Canadian Nuclear Safety Commission

For scheduled relicencing hearings

November 22, 2022

Recommendations of the  
Port Hope Community Health Concerns Committee

Recommendation 1: The Committee recommends that CNL not be granted a licence for the amalgamated PHP for any term longer than 3 years, given that many decisions having far-reaching consequences will likely have to be made in the coming few years, affecting this unprecedented and unproven attempt to safely sequester radioactive and non-radioactive toxic materials in a permanent or near-permanent manner in two earthen mounds.

Recommendation 2: The Committee requests CNSC to require CNL to ensure that any depictions of the Port Hope project, whether in images or words, be accurate and not intentionally distorted, with a clear explanation of any inaccuracies that may happen to appear in the diagrams or texts.

Recommendation 3: The Committee urges CNSC to require CNL to address the eventual decommissioning of the PHP LTWMF in **detail**, along the lines described in the EA Executive Summary, with a full costing of that option, and a corresponding financial guarantee .

Recommendation 4: The Committee urges CNSC to issue a licence to CNL PHP for no more than three years so that the citizens of Port hope and other stakeholders can give their views on the conditions that should be met by the licensee going forward in order to reconcile the Port Hope & Port Granby projects with Canada's radioactive waste policy and national strategy.

Recommendation 5: The Committee urges CNSC to caution CNL on the need to ensure that its representatives do not deny or downplay the legitimate health concerns that gave rise to the Port Hope Area Initiative in the first place, and that justify the federal government's expenditure of federal taxpayer's money on this, the most expensive municipal cleanup in Canadian history.

Recommendation 6: The Committee recommends that CNSC publish an estimate of excess lung cancer cases corresponding to a lifetime exposure to a radon concentration of 100 versus 200 becquerels per cubic metre, as a service to the people of Port Hope and the Canadian public, and in fulfillment of the CNSC mandate to disseminate objective information on such matters.

Recommendation 7: The Committee recommends to all the parties involved in the Port Hope Area Initiative that decontamination of properties be made mandatory and not just voluntary.

Recommendation 8: The Committee recommends that CNSC not accept any weakening of the agreed-upon cleanup criteria.

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## The Purpose of This Report

The present report was prepared for the Port Hope Community Health Concerns Committee (PHCHCC) – henceforth referred to as the Health Committee. The author of the report is Gordon Edwards whose [Curriculum Vitae](#) is posted on line.

The Health Committee is opposed to the proposed licencing of a Port Hope Project Waste Nuclear Substances Licence (PHP WNSL) for 10 years, under the auspices of Canadian Nuclear Laboratories (CNL). The Committee believes that a much shorter licence term is in order.

The proponent's request would amalgamate four licences into one, all of them associated with the Port Hope Area Initiative (PHAI). These four are the Port Hope Project (PHP), the Port Granby Project (PGP), and two licences having to do with temporary storage of wastes awaiting emplacement in a long-term waste management facility. The latter two licences govern the Pine Street Extension Temporary Storage Site (PSETSS) and the Port Hope Radioactive Waste Management Facility (PHRWMF).

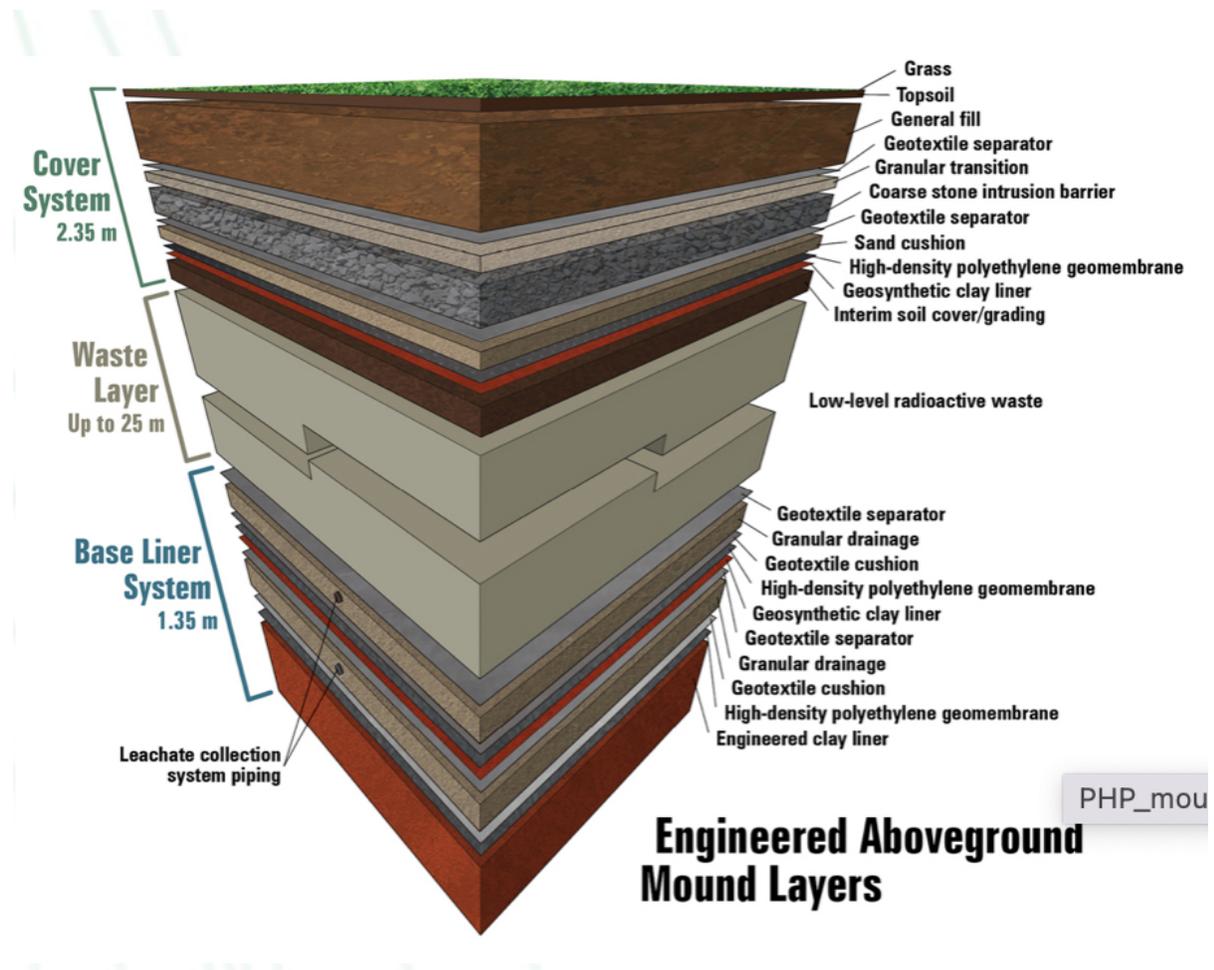
If this licence is granted for 10 years, important decisions related to the long-term management of large volumes of radioactive and non-radioactive contaminants will be made without adequate public review and oversight during an entire decade. The Health Committee finds this unacceptable, and requests a much shorter licence term of 3 years duration. Already CNL has plans to weaken the agreed-upon cleanup criteria but has removed those plans from this licencing process, thereby preventing detailed public debate on that proposal. The Committee is opposed to weakening the cleanup criteria

Recommendation 1: The Committee recommends that CNL not be granted a licence for the amalgamated PHP for any term longer than 3 years, given that many decisions having far-reaching consequences will likely have to be made in the coming few years, affecting this unprecedented and unproven attempt to safely sequester radioactive and non-radioactive toxic materials in a permanent or near-permanent manner in two earthen mounds.

## What's wrong with this picture?

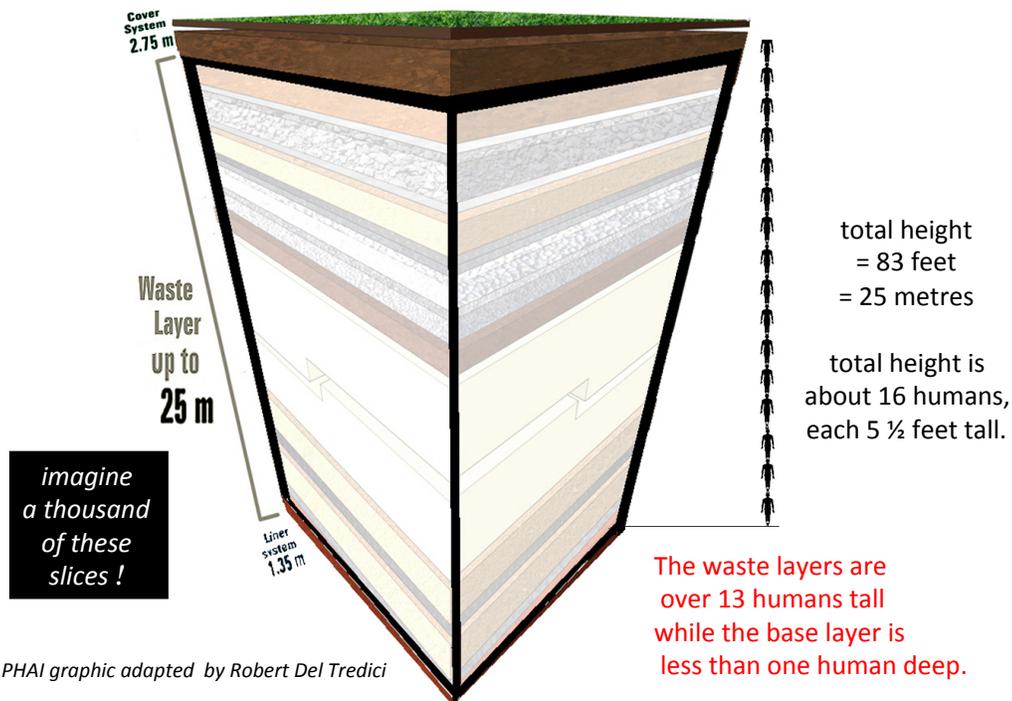
This is an artist's conception of a section of the Port Hope mound. It is taken from the PHAI web site – <https://www.phai.ca/port-hope-project/long-term-waste-management-facility/>

Although the base liner system is stated to be 1.35 metres thick, it looks in this diagram as if it is noticeably thicker than the 25 metre thick waste layer. It even appears to be a bit thicker than the 2.35 metre cover system. There is no indication on the web page that the measurements are so distorted. This is a public relations effort and a clear manipulation of perception. It is not scientifically accurate, and not responsible.



I asked Robert Del Tredici, an artist, author, and award-winning photographer, to modify the industry's image to make it a bit more accurate:

“Low level” radioactive waste mound proposed for Port Hope, Ontario.  
A surface dump, 5-7 stories tall, with a base = 70 hockey rinks, close to Lake Ontario.



Recommendation 2: The Committee requests CNSC to require CNL to ensure that any depictions of the Port Hope project, whether in images or words, be accurate and not intentionally distorted, with a clear explanation of any inaccuracies that may happen to appear in the diagrams or texts.

## The Nature of the Experiment

The Health Committee finds it imperative for the licensee (CNL) and the Canadian Nuclear Safety Commission (CNSC) to regard this entire enterprise as a vast untried experiment. Consider the extreme longevity of the waste materials such as uranium, thorium, radium, and arsenic, all of which will remain hazardous for countless millennia. Consider the unprecedented nature of the chosen management method, which is the emplacement of indestructible and practically eternal radioactive and non-radioactive poisons in two gigantic multi-storey mounds.

These two mounds at Port Granby and Port Hope are essentially above-ground earthen landfill operations that incorporate a few engineered elements. The contents are referred to as “low-level radioactive waste” although, in fact, the wastes resulting from uranium mining, milling, and refining, are not generally so described. In particular, alpha emitters having half-lives of more than a thousand years each are not normally called low-level wastes. Radium, in particular, has a world-wide reputation as an extraordinarily toxic radioactive substance – one of the most dangerous naturally occurring elements – along with its immediate progeny, radon gas.

Yet it seems to be tacitly assumed that these modest structures might manage to outlast the 5000-year-old Pyramids of Egypt, surviving the onslaughts of climate change, extreme weather, erosion, violent movements of the Earth, or intrusions by animals, plants and humans, breaching the containment of the mounds. As a matter of fact, the only temporal claim is that the engineered mounds may successfully contain the contents for 500 years and more, but there is no discussion whatsoever of what Canada will do for an encore when and if the mounds begin to fail.

In CMD22-H13, CNL states

“The engineered containment mounds of the PGP and PHP LTWMFs were designed to isolate the waste from the surrounding environment and safely manage the waste for over 500 years”. [p. 30]

And although mention is made in CMD22-H13 of a financial guarantee to cover decommissioning costs [p. 81], there is no clear indication of what decommissioning really means in this case. Does it mean retrieving all the waste from the mound and moving it to some other location or some other facility? Or what?

We have here a genuine conundrum. According to CNSC Regulatory Document REGDOC-2.11.2, *Decommissioning* is defined in terms of

“the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility, location or site where nuclear substances are managed, used, possessed or stored. Decommissioning actions are the

procedures, processes and work activities (e.g., storage with surveillance, decontamination, dismantling or cleanup) that are taken to retire a facility, location or site from service with due regard for the health and safety of people and the environment.”

This sounds a lot like abandonment. However, according to the Executive Summary of the Port Hope EA Report

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

Here the question of abandonment of the mound is ruled out as unacceptable, as long as the waste materials are “still contained within it.” In other words, the so-called Long Term Waste Management Facility is in truth just another temporary storage facility, but on a longer time scale. Here are some more thoughts from the EA Executive Summary:

A specific proposal for LTWMF decommissioning has not been identified or described at this time. The concept for long-term management of the waste in the LTWMF is, however, conducive to a variety of decommissioning possibilities because the material in storage can be readily and completely retrieved. Features of the LTWMF that support retrievability of the contained waste include that the facility is essentially constructed as an above-ground impoundment; physical elements encapsulating the waste, while being secure, long-lasting and of low permeability, are not structural barriers (e.g., concrete, steel) and can readily be removed to access the impoundment; and the waste in storage will be well-defined and delineated by the containment features.

To complicate matters even further, we have this passage from the original 2002 PHAI agreement <https://www.phai.ca/wp-content/uploads/Legal-Agreement.pdf>

“Decommissioning” means the actions taken to retire the facilities in the Town of Port Hope from service and decommissioning includes, inter alia, the dismantling and removal of all process equipment and buildings and the cleanup of the property on which facilities were located.

This sheds very little light. The EA Executive Summary seems to be the best.

## Policy and Strategy

In reality, Canada has not yet even formulated a fully acceptable radioactive waste policy, nor has it established a national radioactive waste strategy. Both of these are currently under consideration and review by the Government of Canada since 2020, following the International Atomic Energy Agency's 2019 IRRS report -

**IRRS Report** [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)

**Canada's Response** <http://nuclearsafety.gc.ca/eng/resources/international-cooperation/irrs/canada-response-irrs-2019.cfm#sec1-2>

At the request of the Government of Canada, an international team of 20 senior nuclear and radiation safety experts from 17 IAEA Member States, and four IAEA staff members, met with representatives of the Government of Canada for 11 days – from 3 to 13 September 2019 – to conduct an Integrated Regulatory Review Service (IRRS) mission. They identified serious gaps in Canada's regulation of radioactive waste

“The IRRS team found no evidence . . . contained in the policy framework or REGDOCs of a governmental policy or strategy related to radioactive waste management. The national policy on management of radioactive waste, should include decommissioning aspects, including the choice of possible decommissioning strategies or combinations of options.” [p. 20, IRSS Report]

The very first recommendation of the IRSS team was about radioactive waste:

“The Government should enhance the existing policy and establish the associated strategy to give effect to the principles stated in the Canadian Radioactive Waste Management Policy Framework.”

The Government of Canada has accepted this IAEA recommendation in a published response to the IRRS report on February 18 2020, saying

“Natural Resources Canada will review its existing policy for radioactive waste, and consider how it may be enhanced to give effect to the principles stated in the *Radioactive Waste Policy Framework*, including the establishment of an associated strategy.”

Since then, Natural Resources Canada has conducted extensive consultations with hundreds of non-governmental organizations across Canada, as well as industry, and has published a draft policy on Radioactive Waste that is currently undergoing revision following extensive and detailed comments from the public and other stakeholders.

In the meantime, the nuclear industry – represented by the nuclear-utility-owned NWMO (Nuclear Waste Management Organization) – has produced a Draft Radioactive Waste Strategy document that is far from finalized. At the instigation of Seamus O'Regan, then Minister of Natural Resources, NWMO solicited the views of public interest groups, but the majority of those groups boycotted the NWMO process.

The boycotting groups stated their misgivings to the Minister from the outset, citing the perceived conflict of interest in having the industry that produces most of Canada's radioactive waste crafting a national strategy to their own liking. Public interest groups have recently written to Minister of Natural Resources Wilkinson to explain once again, as they have done on several occasions before, why Canadians feel that they need to interact directly with their elected Government on this matter rather than accepting the industry as a conduit for their views. Among other things, they feel it is illogical to articulate a strategy before there is agreement on a policy for radioactive waste.

<p>Recommendation 4: The Committee urges CNSC to issue a licence to CNL PHP for no more than three years so that the citizens of Port Hope and other stakeholders can give their views on the conditions that should be met by the licensee going forward in order to reconcile the Port Hope &amp; Port Granby projects with Canada's radioactive waste policy and national strategy.</p>
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## **The Subversion of Science**

There is a fundamental problem that afflicts any polluting industry, and the nuclear industry is no exception. Good public relations requires putting the industry's best foot

forward – emphasizing the benefits and either ignoring or belittling the dangers that pollution may pose to the health and safety of persons and the environment.

Nuclear proponents are often inclined to use language that is not scientifically precise while at the same time using their scientific credentials to garner public acceptance and support. For example, nuclear energy is called “clean” rather than “non-carbon emitting”; reprocessing is called “recycling used fuel” rather than “extracting plutonium from used fuel”; radiation exposure is called “safe” rather than “permitted”; and so on. Such careless language creates a kind of cognitive dissonance that breeds confusion, causes social division and stokes anger. People on both sides of the nuclear debate come to think of the others as deliberately deceptive and untrustworthy. Ultimately, this helps nobody.

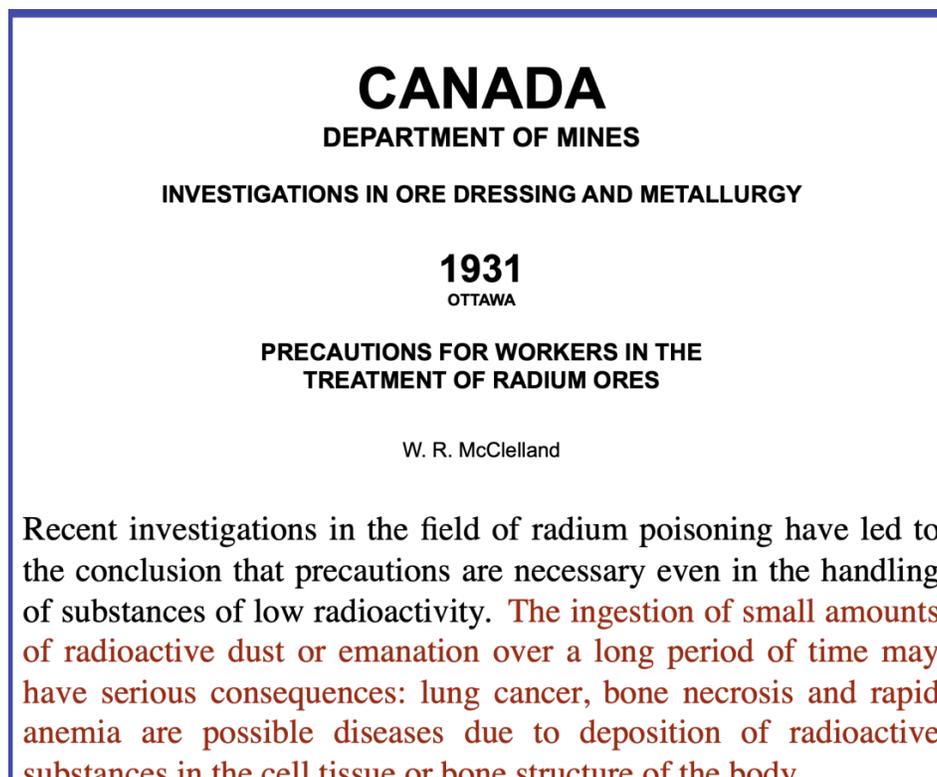
In Port Hope, when the extent of the radioactive contamination problems first became public knowledge in 1975-76, some nuclear authorities referred to maximum allowable exposures to radiation as “recommended” doses. This misuse of language sowed anger and confusion at the time. The Port Hope Evening Guide quoted one man, who after attending a public meeting and listening to a panel of nuclear authorities use such confusing words, said: “Before I came to this meeting I was scared. Now I’m terrified.”

By not being up-front about the dangers associated with nuclear materials and by not making those dangers perfectly clear to everyone, stupid and regrettable actions sometimes ensue. Had Eldorado workers and Port Hope residents been made well aware of the dangers of radioactive materials at the outset, managers in the crown corporation Eldorado Nuclear Limited would not have encouraged its employees and local construction companies to “help themselves” to the voluminous harmless-looking sandy residues – the radioactive raffinate – left behind in the process of refining radium-bearing and uranium-bearing concentrates from mines and mills all over Canada.

In their defence, nuclear authorities sometimes say that the dangers were not known in the very early years. But this is untrue – the deadly dangers of handling radium were widely reported on in the scientific and medical literature as early as the 1920s, and the

lung-cancer potential of radon was fully appreciated and well documented by the 1930s. Certainly Marcel Pochon, a world authority on radium who worked with Marie Curie in Paris, knew the dangers. He was brought to Port Hope by Gilbert LaBine to design the radium refinery. "Radium is highly dangerous," he told a Port Hope newspaper reporter in 1933. "The slightest fraction of a milligram taken into the system leads to cancer, anaemia, and disease of the hip bones. Not a doctor on earth can save the unfortunate Person who is affected." As if to underscore his point, Marie Curie died the next year, 1934 – and her daughter Irene died in 1956 – both from pernicious aemia caused by chronic exposures to the alpha radiation given off by radium samples.

As early as 1931, before the first atomic bombs or nuclear reactors had ever been conceived, the Canadian Department of Mines published a report on these dangers for the benefit of government technicians in Ottawa tasked with performing assays of small samples of the radioactive ore – pitchblende – discovered by Gilbert Labine at Port Radium, on the eastern shore of Great Bear Lake, 100 km south of the Arctic Circle:



This information was readily available. It just wasn't communicated to the miners, the ore carriers, those who worked at the refinery, or those who lived in the Port Hope area.

Misrepresenting the dangers of radioactive materials is not a thing of the past. It is very much alive in Port Hope today. CNL representatives are routinely telling Port Hope residents and visitors, with an air of great assurance, that this billion-two-hundred-million dollar cleanup of Port Hope properties has nothing to do with the health and safety of persons. The exact line is something like this: "The Port Hope Area Initiative is not a health cleanup, it is an environmental cleanup." I heard this line with my own ears when given a virtual tour of Port Hope (on zoom) accompanied by Deputy Grand Council Chief James Marsden of the Anishinabek Nation and a prominent member of the Alderville First Nation. Others have told me they had the same experience. The suggestion is that the cleanup is merely cosmetic. This sets the stage for weakening the cleanup criteria.

Radioactivity cannot be seen, it cannot be tasted or smelled, it cannot even be felt. Why would anyone want to spend over a billion dollars cleaning up something that is neither evident nor harmful? It's not a nuisance, it's not an eyesore, so if it's not a danger, why all the fuss? Why does the Port Hope Area Initiative even exist?

I recently learned of a couple in Port Hope who agreed to have their property remediated after being told it would take a month or two to do so. That was five years ago and the remediation of their property is still ongoing. They recently found that the siding had been removed from three sides of their house because there is contamination in the walls, and yet they are told that there are no health concerns.

Why are trees cut down to dig up radioactive contaminants if there is no harm from such materials? The Commissioners can well understand how mixed messaging fosters frustration and, in the worst instances, may prevent the cleanup work from being done.

When the CNSC (Canadian Nuclear Safety Commission) was created under the Nuclear Safety and Control Act to replace the AECB (Atomic Energy Control Board), the Commission was mandated to "*disseminate objective scientific, technical and regulatory*

*the environment and on the health and safety of persons, of the development, production, possession and use” of nuclear energy and nuclear substances.*

Recommendation 5: The Committee urges CNSC to caution CNL on the need to ensure that its representatives do not deny or downplay the legitimate health concerns that gave rise to the Port Hope Area Initiative in the first place, and that justify the federal government’s expenditure of federal taxpayer’s money on this, the most expensive municipal cleanup in Canadian history.

## **Radon Standards**

In the mid-1970s, many homes and other buildings in Port Hope were found to be suffering from excessive radon concentrations indoors, often due to the use of radium-containing residues from the Eldorado refinery. Radium-226 is a radioactive heavy metal. It is a natural decay product of uranium, and the immediate precursor of radon-222. Radon, in turn gives rise to a handful of other radioactive solids called radon progeny.

When an atom of radium-226 disintegrates, it turns into an atom of radon gas. Radon is a radioactive noble gas, which – like helium and neon – does not chemically react with other elements, and therefore cannot be filtered out of the air or precipitated. Because of the alpha particles emitted by disintegrating radon gas atoms and by some of the radon progeny when inhaled into the lungs, radon is the number one cause of lung cancer in non-smokers. Lung cancer has a very high mortality rate, making up almost 25 % of all cancer deaths, so radon – and hence radium – pose significant health risks.

By 1977 (perhaps earlier) a radon clean-up standard had been adopted for Port Hope homes that had been decontaminated. Radon is a naturally occurring radioactive gas that cannot be eliminated completely, so what level of radon exposure should be considered acceptable? The Atomic Energy Control Board settled on 0.02 “working levels” (WL) as the Port Hope cleanup standard. (The “working level” was a unit of radon concentration in air that had been used in uranium mines for many years.)

In 1978 the uranium miners' union, United Steelworkers, brought me to Elliot Lake to serve as an expert witness on radon standards being proposed for new homes under construction at that time in Elliot Lake. I was very surprised to see that the proposed standard for new homes in Elliot Lake was 0.02 WL – exactly the same as the cleanup standard for contaminated homes in Port Hope. This struck me as odd, and disquieting, for I thought that new homes should aim higher and adopt tighter standards than old homes that had to be cleansed of contamination.

Using only the data submitted to the Environmental Assessment Hearing by the Ontario Ministry of Housing, I was able to demonstrate quite simply that if people were to spend their lives in homes with radon levels at the permissible level – 0.02 WL – there would be a 31 percent increase in lung cancer cases. In absolute numbers, that would mean an extra 17 lung cancers per 1000 exposed people, over and above the 54 per 1000 that was already documented in Ontario. I published a summary of my testimony in a paper entitled “Estimating Lung Cancers”, posted online at [www.ccnr.org/lung\\_cancers.html](http://www.ccnr.org/lung_cancers.html).

My calculations were given further credibility by the British Columbia Medical Association. In 1980 the BCMA published a 473-page book entitled “Health Hazards of Uranium Mining” [ see [www.ccnr.org/bcma.html](http://www.ccnr.org/bcma.html) ] in which they cited my results and concluded that they fit very well with the results of other researchers. At that point the Atomic Energy Control Board hired a young epidemiologist from McGill University, Duncan Thomas, and asked him to do a completely independent study of health data from all around the world – Ontario, Newfoundland, South Africa, Colorado, Sweden, etc. – in relation to radon and other alpha emitters. When the report “Risk Estimates for the Health Effects of Alpha Radiation” was completed in 1982, the report completely confirmed the validity of my calculation, but reached an even more alarming conclusion – lifetime exposure to 0.02 WL at home would, according to Dr. Thomas' best estimates, result in a 40 % increase in lung cancers. [ see [www.ccnr.org/thomas\\_1982.html](http://www.ccnr.org/thomas_1982.html) ]

The current standard for a permissible concentration of radon in homes in Canada is 200 becquerels/cubic metre. That is in the same ballpark as 0.02 WL, perhaps more permissive. One web site dealing with Canada's radon standards concludes that 0.02 WL is about 185 becquerels per cubic metre. Thus the current Canadian standard of 200 becquerels per cubic metre is no better – and slightly worse – than 0.02 WL. The World Health Organization (WHO) recommends a maximum permissible concentration of radon at 100 becquerels per cubic metre. [http://certi.us/Downloads/Canada\\_Meas\\_BW.pdf](http://certi.us/Downloads/Canada_Meas_BW.pdf)

**Equilibrium Equation Example 3  
Calculate Radon**

How much radon is needed to create 0.020 WL in a room assumed to have an equilibrium factor of 40% EF?

$$R_n = \frac{WL \times 3700}{EF} = \frac{0.020 \times 3700}{0.4} = 185 \text{ Bq/M}^3$$

Note: Canada (and others) assume an EF of 40% (0.4)

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Recommendation 6: The Committee recommends that CNSC publish an estimate of excess lung cancer cases corresponding to a lifetime exposure to a radon concentration of 100 versus 200 becquerels per cubic metre, as a service to the people of Port Hope and the Canadian public, in fulfillment of the CNSC mandate to disseminate objective information on such matters.

## Voluntary or Mandatory?

In the original 2002 PHAI Agreement it is written:

1. (a) Canada shall clean up properties contaminated with Historic Low-Level Radioactive Waste so that all such properties will be able to be used for all current and foreseeable unrestricted uses.

2. (b) Through the cleanup process, other contaminants may be found commingled with the Historic Low-Level Radioactive Waste, and in such cases, Canada shall clean up the commingled waste material. In circumstances in which the other contaminants cease to be commingled with the Historic Low-Level Radioactive Waste, Canada shall not be obligated to remove the non-commingled other contaminants.

<https://www.phai.ca/wp-content/uploads/Legal-Agreement.pdf>

According to these paragraphs, all properties are to be decontaminated so that they can all be used freely for all current and foreseeable unrestricted use. Nevertheless, the Committee is of the opinion that decontamination of properties if is being done on a voluntary basis rather than a mandatory basis. Combined with the messaging that the cleanup is not health-related in the first place, it appears that the objectives of the PHAI agreement may be put at risk.

Recommendation 7: The Committee recommends to all the parties involved in the Port Hope Area Initiative that decontamination of properties be made mandatory and not just voluntary.
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## **Weakening of Standards?**

CNL has made it very clear that it intends to have the cleanup standards weakened for both uranium and arsenic. In other words, they will ask CNSC to amend the licence in order to be allowed to leave more uranium and more arsenic behind, without removing it as required according to the already agreed-upon cleanup criteria.

One of the reasons CNL has put forth for weakening the standards is that the residents of Port Hope do not want to have certain beautiful trees cut down, which CNL says would be necessary if the original cleanup criteria are enforced.

The Committee is completely opposed to weakening the cleanup standards. The Committee notes that CNL has been systematically planting the idea in people's minds that the Port Hope cleanup is unrelated to health concerns, thereby leading many residents to believe that existing criteria may be frivolous or merely cosmetic in nature.

It is evident that CNL has made little or no attempt to search for other ways to meet the existing cleanup criteria without sacrificing all the trees in question. For example, there is a process called electrokinetic remediation:

*Technology Description: Electrokinetic remediation is based on the theory that a low-density current will mobilize contaminants in the form of charged species. A current passed between electrodes is intended to cause water, ions, and particulates to move through the soil, waste, and water (Ref. 14.8). Contaminants arriving at the electrodes can be removed by means of electroplating or electrodeposition, precipitation or coprecipitation, adsorption, complexing with ion exchange resins, or by pumping of water (or other fluid) near the electrode. One full-scale application reduced arsenic concentrations in soil from greater than 250 mg/kg to less than 30 mg/kg. One ex situ pilot-scale application reduced arsenic in groundwater from 0.6 mg/L to 0.013 mg/L.*

[https://www.epa.gov/sites/default/files/2015-04/documents/arsenic\\_report.pdf](https://www.epa.gov/sites/default/files/2015-04/documents/arsenic_report.pdf)

However, if it comes to a choice, the Health Committee would choose to see the job completed as negotiated and agreed upon years ago. The Committee's perspective is in complete agreement with that of then Grand Council Chief Glen Hare of the Anishinabek Nation, who wrote to Prime Minister Justin Trudeau on January 13 2021 as follows:

*Canadian Nuclear Laboratories has asked the Canadian Nuclear Safety Commission for permission to increase the permissible levels of residual uranium (following cleanup) from 23 to 35 ppm, and to increase the permissible levels of residual arsenic from 18 to 100 ppm.*

*In other words, CNL wants to leave up to 52 percent more uranium contamination in place than previously promised, and up to 450 percent more arsenic than previously agreed.*

*This is deeply troubling. It is another case of a promise broken to the detriment of the land, the water, and future generations. According to the PHAI web page sited above, the existing criteria were developed "through a co-operative effort involving the PHAI, scientific specialists, federal and provincial government agencies, peer reviewers, the municipalities and members of the public," and the cleanup [excavation] "will meet or go beyond the criteria to ensure the long-term safety of the public and the environment." By significantly weakening the cleanup criteria this commitment becomes null and void.*

[www.ccnr.org/PHAI\\_ANIC\\_Trudeau\\_2021.pdf](http://www.ccnr.org/PHAI_ANIC_Trudeau_2021.pdf)

Recommendation 8: The Committee recommends that CNSC not accept any weakening of the agreed-upon cleanup criteria.

## Things Could Get Worse

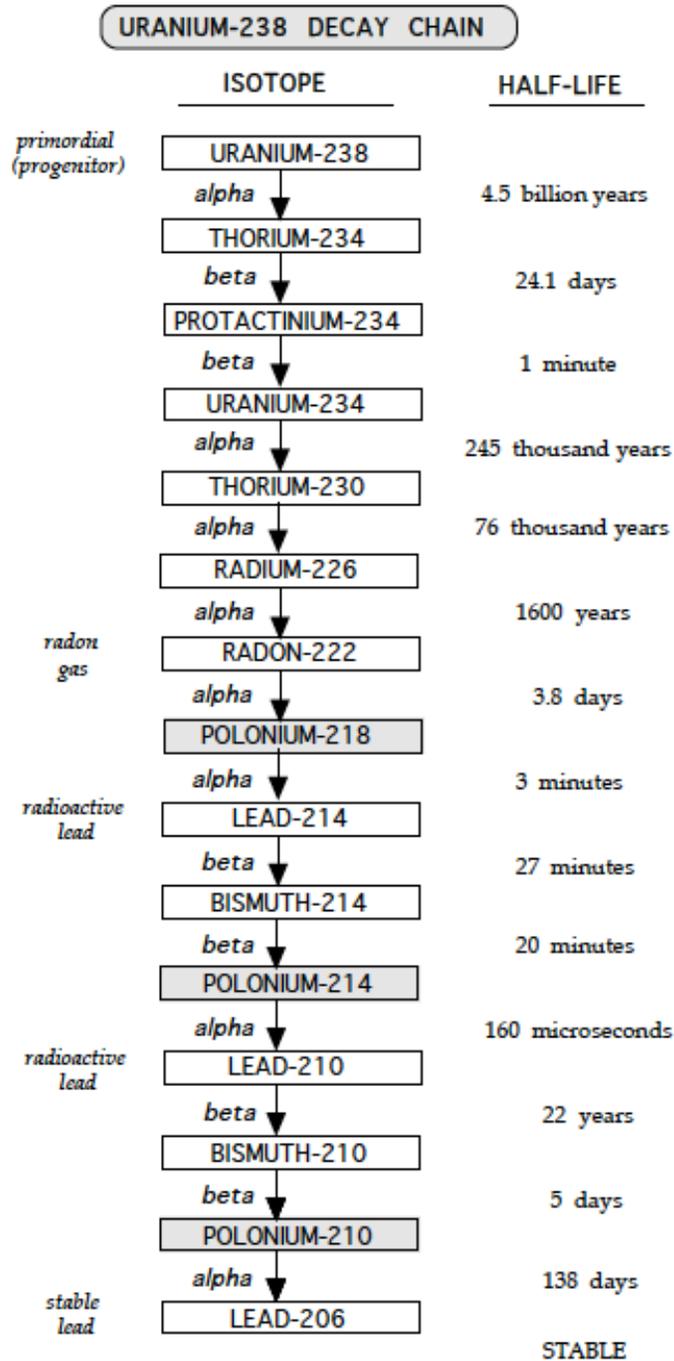
A fundamental principle of radioactivity leads to surprising and counter-intuitive conclusion: the radioactivity in the sealed mound will grow ever larger as time goes on, and the diversity of radioactive materials in the mound will increase dramatically as well. So when the mound is finally opened up, whether on purpose or by accident, the radioactive inventory will be much more complicated and the levels of radiation (including penetrating gamma radiation) will be a lot greater than when the mound was first sealed. Things not only **could** get worse, they **will** get worse!

The explanation is mathematical. When a radioactive atom disintegrates, it is transformed into a completely different element, called a “decay product”. If that decay product is also radioactive, then when it disintegrates, it turns into yet another decay product. In some cases this process continues for quite a few steps, producing a panoply of radioactive elements called the decay products or progeny of the original radioactive element – the one that gave rise to all the others. The entire process is called a “decay chain”. It terminates in a stable (non-radioactive) element which does not disintegrate.

On the next page we see the entire decay chain of uranium-238, by far the most common type of uranium found in ore deposits. Because uranium-238 has a 4.5 billion year half-life, it has generally lain in the Earth, undisturbed, for a very very long time. That is such a long time that equilibrium has been achieved between uranium-238 and all of its radioactive decay products. They all have exactly the same amount of radioactivity, measured in becquerels. (A becquerel is one disintegration per second)

When “old” uranium is mined, the number of becquerels is the same for every single one of the radioactive elements in the decay chain, including uranium-238 itself. If uranium-238 were taken away and all the other radioactive elements in the decay chain were left behind, the U-238 would only account for about 1/14 of the total radioactivity (which is shared equally among all 14 radioactive members.) Notice that the last item in the decay chain is lead-206, which is stable (non-radioactive), so it doesn't count.

This decay chain has some of the most dangerous radioactive materials found in nature, such as radium-226, radon-222 and polonium-210 (used by Putin's men to murder an ex-KGB agent, Alexander Litvinenko.) Every atom of radium, and every atom of radon, started out as an atom of uranium. Hence the contamination in Port Hope.



Part-way down the uranium decay chain you see Radium-226. That's one of the things that they are going to be putting in the Port Hope mound (and the Poort Granby mound as well). But radium atoms disintegrate to produce radioactive radon atoms, which then produce radioactive polonium atoms, which then produce radioactive lead and bismuth atoms. In a pretty short time (about a month) radium has produced five companions, and – guess what – they all have the same degree of radioactivity (measured in becquerels) that the radium had originally. So the radioactivity in the mound is now six times greater than it was originally (from radium alone), and there are now six varieties of radioactive materials instead of just one.

If you wait just a little longer – about 150 years – two more radioactive elements will be added to the list of decay products of radium. They are lead-210 and polonium-210. So the radioactivity is now 8 times greater than it was from radium alone, and there are 8 different radioactive varieties instead of just one.

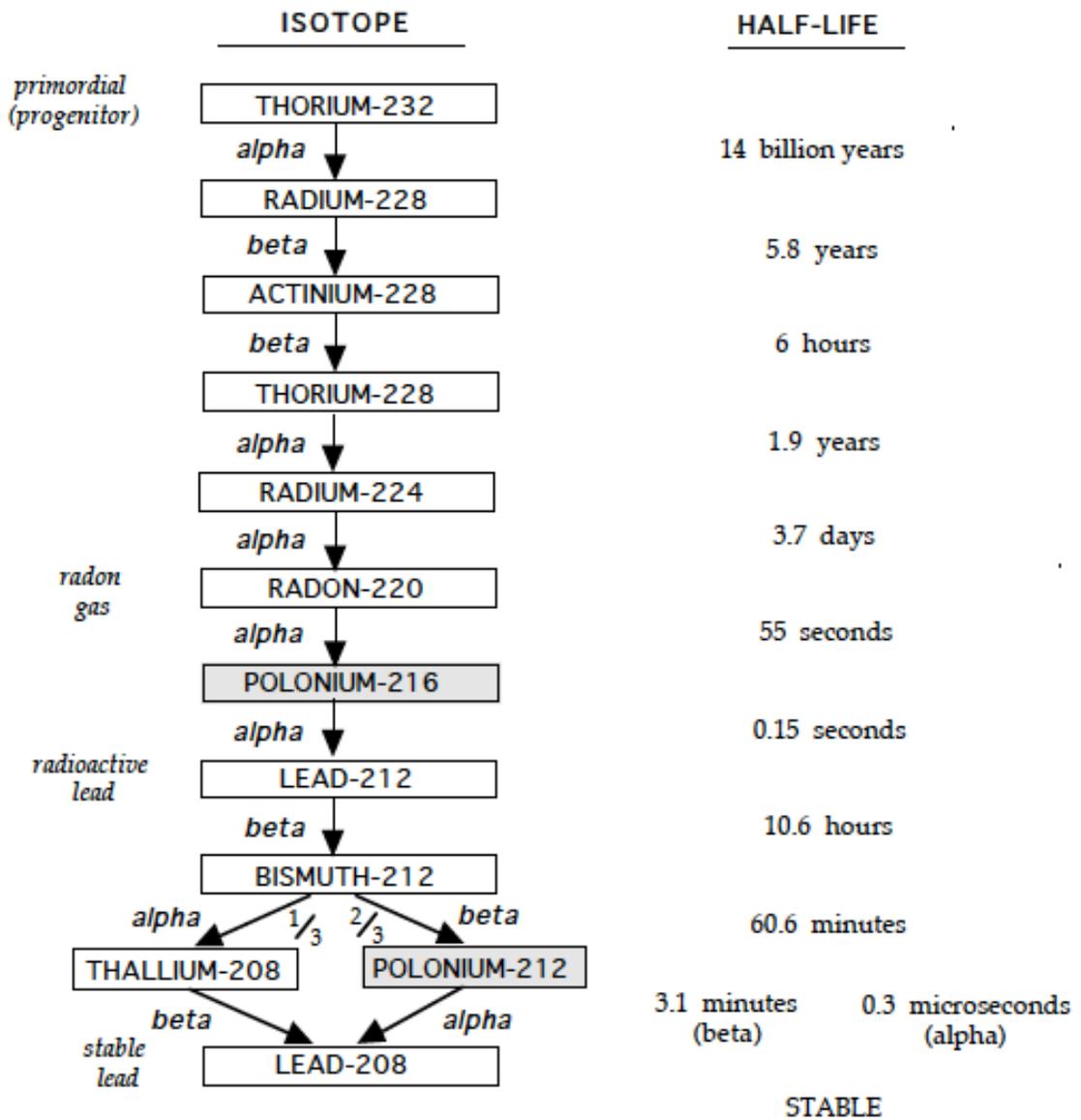
The same thing happens with thorium-232, another constituent of the mound which is not nearly as prominent in the list of radioactive contents as thorium-230. The next page shows the complete decay chain of thorium-232.

After about 50 years in the mound, thorium-232 will have produced all of the decay products in the entire decay chain, and they will all have the same radioactivity (measured in becquerels) as the original thorium-232 that was placed in the mound at the outset.

So the original stash of thorium-232 will now be accompanied by 10 additional radioactive varieties, the whole ensemble being 10 times more radioactive than the original thorium-232.

When the mound was first built, the only things going into it were radium, thorium, uranium, and arsenic. But by the time the mound is ready to be decommissioned or refurbished, there will also be isotopes of actinium, bismuth, lead, radon polonium, and thallium. And the radiation levels, including gamma radiation, will be a lot more intense.

**THORIUM-232 DECAY CHAIN**



**"THE THORIUM SERIES"**



Port Hope Community Health  
Concerns Committee  
Port Hope, ON

October 14, 2022

Dear CNSC Chair and Commissioners:

**Re: Intervention to CNSC for Licensing of AECL/Canadian Nuclear Laboratories (CNL)/ Port Hope Area Initiative (PHAI) remediation of radioactive wastes in Port Hope, Ontario.**

The Port Hope Community Health Concerns Committee (PHCHCC) is a non-profit volunteer organization of current and former residents established in 1995 concerned for the health and safety of residents and workers due to the operations of two nuclear facilities within the town and 80 plus years of exposure to radioactive emissions and wastes. We submit this intervention to identify key issues and recommendations regarding the license application of AECL/ CNL and Port Hope Area Initiative.

**1. Proposed change of Port Hope cleanup criteria:** Canadian Nuclear Laboratories (CNL) submitted a proposal to CNSC in March 2020 to weaken cleanup criteria for radioactive wastes in Port Hope which would result in an increase of the volume of contamination left behind for future generations. Initially this request was included in this license application however it has now been withdrawn by CNL with the plan that it will be re-submitted after the public hearing has concluded and a license issued. We object to the manner in which this very important issue is being handled and to any proposed change that will leave more contaminants such as arsenic for current and future generations after the cleanup is completed.

**Recommendation:** Refuse any AECL/ CNL proposal to weaken the cleanup criteria and ensure existing federal commitments to the community are kept to remediate wastes as promised.

## Background

PHCHCC strongly objects to a proposal submitted in March 2020 by Canadian Nuclear Laboratories (CNL) to the CNSC for approval to substantially weaken the cleanup criteria for the remainder of 1.2M cubic metres of radioactive waste throughout Port Hope, Ontario. This proposal is apparently based on proponent self-interest, misinformation and lacks any public interest foundation. It is contrary to public health considerations, unacceptable and should be rejected.

Since the 1930's generations of residents have been exposed daily and via different pathways to the radiation, heavy metals and chemicals of the nuclear industry in our town. We have been required to wait more than 50 years, since contamination of the town became known to the government through the investigations of nuclear engineer Dr. Douglas Andrews in the late 1960's, for a proper cleanup from the operations and careless waste disposal practices of Eldorado Nuclear Ltd., a former Crown Corporation.

In 2001 the federal government finally committed \$238M and in 2012 increased that commitment to \$1.2B to clean-up an estimated 1.7 million cubic metres of historic radioactive wastes in both Port Hope and nearby Port Granby. Legal agreements were signed in 2001 with the municipalities of Port Hope and Port Granby with cleanup criteria to be determined collaboratively. The people of Port Hope were assured the wastes would be safely stored in a temporary storage facility in Port Hope and the community would be left with a "pristine environment".

Initially CNL sought CNSC approval to arbitrarily establish new criteria and authorize PHAI to leave almost 50% more uranium (up to 35 ppm from 25) and 450% more arsenic (up to 100 ppm from 18) in the soil than the present criteria which were agreed to years ago after extensive consultations. This plan would result in more contamination left in Port Hope after the cleanup for future generations than is planned. The current criteria are already a major compromise as post-cleanup will leave soil levels of uranium up to 23 ppm which exceeds the Ontario Ministry of Environment soil standard (2011) of 2.5 ppm of uranium. The Ontario MOE soil standard of 18 ppm would be met for arsenic (*Ref: "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", Ontario MOEE, April, 2011*).

Our understanding as of this writing is that CNL intends to submit a new proposal after this hearing and licensing decision which requests approval to change only the arsenic levels to 58 ppm. The decision will happen away from even this limited public hearing process. It is also happening while a federal process is underway to establish a national strategy for management of radioactive wastes in Canada where the cleanup of Port

Hope and such AECL/CNL actions should have been a focus of discussion and review for obvious reasons of its importance but was not, unfortunately.

To change criteria now, when private property and municipal roadway remediations in Port Hope are finally underway, will deliberately leave substantial contamination throughout the town in unidentified and unmonitored locations. Why do this? The obvious conclusion is to save time, effort and money for CNL and the federal government while leaving people at risk into the future. Such incremental changes that weaken cleanup commitments to our community perpetuates what needs to be finally fixed, the secrecy and passing on of hidden exposures and risks to future generations.

The federal commitment to our community is described on the website of CNL's Port Hope Area Initiative (PHAI) as follows:

***The criteria were developed through a co-operative effort involving the PHAI, scientific specialists, federal and provincial agencies, peer reviewers, the municipalities and members of the public. Developing criteria to direct the cleanup of contaminated sites has been fundamental to the Port Hope Area Initiative. Cleanup criteria establish the levels to which each radioactive and non-radioactive contaminant found in soil, harbour sediments, water and groundwater contaminated with historic low-level radioactive waste will be cleaned up. Criteria also apply to radon levels in houses. Cleanup criteria are important because they address the question, "When is a property clean?"***

*Principles to guide the clean-up process were built on the statement in the Legal Agreement that:*

***"Canada shall clean up properties contaminated with historic low-level radioactive waste so that all such properties will be able to be used for all current and foreseeable unrestricted uses."***

*Contaminants associated with low-level radioactive waste are mainly radium-226, thorium-230, uranium and arsenic. **Cleanup (excavation) will meet or go beyond the criteria to ensure the long-term safety of the public and the environment.***

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**2. Contaminated property cleanup must be mandatory:** Property owners can refuse cleanups of contamination under current CNL policies which clearly contravene the legal agreement and commitments. Removal of contaminated material must be mandatory as a public health issue.

**Recommendation:** The federal commitments for a "pristine environment" with unfettered and safe future use must apply to all properties regardless of public or private property owner preferences. Cleanup of radioactive material must be mandatory and proceed as a matter of public health and properties restored at federal cost. We are all

only temporary stewards of the land and waters. Trees should be planted, landscapes restored to minimize local impacts.

Background:

Of serious concern and a contravention of the federal commitments above, is the CNL Special Circumstances Protocol quoted below which grants to Port Hope property owners the choice to leave contamination in place and refuse a cleanup for a variety of reasons including convenience or aesthetics. This is totally unacceptable policy and practice and CNL must be stopped to avoid perpetuating exposures to toxic materials and their inevitable spread to other properties and unsuspecting residents as has been happening for generations. The cleanup must end this. It is a federal responsibility to restore properties, compensate for diminished values and minimize inconvenience for the people.

*Obligations • Per the Legal Agreement that governs the PHAI, if Contaminants of Potential Concern (COPC) are identified at any stage during soil testing on your property, CNL is required to notify you (the property owner), the Municipality of Port Hope and the Ministry of Environment, Conservation and Parks of the type and locations of COPC.*

*CNL has a Special Circumstances Protocol that may be applied in situations that prevent the complete remediation of low-level radioactive waste. The Special Circumstances Protocol is only used when LLRW removal is not considered safe, practical or reasonably achievable. Situations that might require special circumstances include restricted access and property-specific physical, operational, environmental, or social constraints that may be encountered during the design phase or the cleanup work on the property.*

*(PHAI Pamphlet: Cleaning Up Residences and Privately Owned Properties*

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**3. Implement Independent health monitoring:** No individual or community health monitoring is occurring during the cleanup despite PHCHCC repeated requests over many years. False and misleading information is being given to the public by PHAI with respect to the history and health risks of the wastes..

**Recommendation:** That CNSC require independent health monitoring of the population and studies including individuals and families directly exposed to contamination on their properties and regularly update disease incidence and mortality data from 2000 to the present and in future 5 year periods. Inaccurate and misleading claims that there have been no health impacts to Port Hope people must be corrected and removed from any presentations by PHAI/CNL. The photos below illustrate our exposures everywhere.

### Background:

There are critical facts that support the need for health investigations during and following the cleanup time period due to latency periods for diseases:

1. The type of uranium and arsenic in the Port Hope environment is biologically available to individuals through many pathways. Every individual has an individual daily dose, there is no such thing as “average dose” in our reality.
2. It is not natural uranium comparable to the soil in other communities, it is residue of mined high grade ore, ceramized and therefore insoluble uranium and arsenic from industrial processes which continue today in Port Hope under Cameco Corporation. The biological cellular impacts of industrialized uranium, and the synergistic impacts with all of the other toxins are not factored into calculations of “dose” to individuals used by the industry and government.
3. There is also scientific confirmation from urine bioassays of ill former Eldorado/Cameco workers (PHCHCC/UMRC, 2007) of transuranic isotopes of uranium (e.g.  $^{236}\text{U}$ ) which should not even be present in Port Hope, in their bodies many years after employment. One ill former Cameco/Zircotec worker has repeatedly been refused any compensation for his life-threatening injuries requiring a double lung transplant, resulting from uranium poisoning in the workplace.
4. It is well documented by federal and provincial bodies over many decades that particles of industrial uranium, arsenic, fluoride and other toxins for humans are present in the wastes, have been in our air, soil, vegetation and water which present great biological risks when inhaled and ingested. The material leaches into waterways including Lake Ontario
5. Federal health data for Port Hope (CNSC/Health Canada) published in 1997, 2000, 2002 show concerning elevated rates of cancer, circulatory, respiratory, neurological and other diseases in Port Hope deserving of followup investigations. This is prior to the digging and remediation occurring now on a large scale throughout the town.
6. The Ontario Ministry of Environment has stated that inhaled uranium particles have 200 times more biological impact than ingestion. Our primary exposure pathway is daily inhalation.

It is irresponsible to conduct a mass cleanup of radioactive wastes throughout an active community without also taking every precaution possible and monitoring health impacts on the people living here. To say as officials have over many years that no impacts are expected and therefore no monitoring is necessary is not founded on either common sense or science. The fact that cleanup has been allowed to happen without appropriate independent health monitoring sadly reinforces the lack of public health importance attached to this project and the years of exposures of the people to this industry's wastes by the government and its agents. It is far more than an engineering problem to solve.

The photos below illustrate several open area PHAI cleanup sites occurring in Port Hope beside occupied homes, a school, playgrounds, fishing and boating areas, workplaces, sidewalks, recreation etc. etc. There is constant public exposure to dust from activities, vehicles and people entering and leaving the sites, walking by, etc.

Absence of evidence is not evidence of absence of cleanup impacts - no claims can truthfully be made, as is happening by officials, that no harm has resulted from cleanup activities or presence of the wastes. Bear in mind we also have daily emissions to air and water from two nuclear facilities within the town so there are many sources and pathways of exposure to toxins. The photos from AECL show examples of our internal and external exposures everywhere.

We are very concerned that during a public presentation on November 12, 2020, PHAI communications staff made a number of factually inaccurate statements below for which they did not provide evidence

- the contamination throughout Port Hope does not present health risks;
- the harmful material was taken away in the 1970s and 80's and material remaining is not a risk to people;
- this is a cleanup for the environment not to protect health;
- this cleanup is only happening because of public demands
- there is no evidence of health effects from years of exposure to toxic material

Our members have lived through all of it and know these statements are not true. Information given to the public must be accurate.

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#### **4. License Application/ Approvals Sought:**

AECL/CNL/PHAI are seeking the necessary approvals to amend the federal legal agreement with Port Hope which would allow the following to happen:

- a) 10 year license which amalgamates four current licenses including Port Granby
- b) a proposal is pending to change and weaken the cleanup criteria for remediation which will leave more uranium and arsenic behind in Port Hope;
- b) reduce waste volume so the Port Hope cleanup can be completed faster before 2028;
- c) the transfer of 6500 m<sup>3</sup> of contaminated sludge over the next 5 years ( 300 + truckloads ) from the Port Granby Wastewater Treatment Plant (now closed Clarington site) to the Port Hope site despite public reassurances for many years that this would not be allowed;
- d) save significant costs for the contractors by reducing transportation to the US or Chalk River.

Important details have not been made public so we are left to ask, what is going on?? The Port Hope storage facility is already too small for the volume of waste known to be in Port Hope with more still to be discovered. Why was the Port Granby site allowed to be officially capped and closed when work there obviously was not finished?

The community has been told for many years that the highest levels of contaminated wastes were taken to Port Granby in years past. According to a November 2020 report to Port Hope council the alternate destinations for this sludge are to be Chalk River or

the US if it does not come to Port Hope. Does the content of this sludge, the types and levels of contamination exceed current criteria for the low level waste acceptable for the Port Hope site? This seems to be another change not in its best interests which Port Hope is being pushed to accept for the convenience of the federal government.

AECL/CNL/PHAI appear to justify these proposals by saying cost savings from the requests are needed to complete the Port Hope project with the budget they have. They are clearly seeking cheaper, faster methods which puts pressure on the community to go along with changes to get the cleanup we are entitled to. Why is this happening now when much work remains to be done here? How many more accommodations will Port Hope be asked to make year after year before the cleanup is finally and properly done?

**Recommendations:**

1. That a 5 year license be granted to continue Phase 2 with conditions as follows.
2. That the Port Granby license remain individual, not amalgamated.
3. That a comprehensive independent audit and operational review of all aspects of the AECL/CNL/PHAI operations in Port Hope since 2012 be undertaken with issues and solutions identified for successful completion of a thorough cleanup as promised including a concern to re-examine what is and is not determined to be historic waste or left in spite of elevated readings as normally occurring radioactive material (NORM).
4. A detailed project work-plan for the future then be developed publicly with all key stakeholders.
5. That the necessary funds be guaranteed by the federal government to ensure that all commitments are met in whatever timeline is necessary for successful cleanup of our community.

Submitted for consideration of CNSC Commissioners by

Faye More, Chair

On behalf of the Port Hope Community Health Concerns Committee

Contact: [more\\_faye@yahoo.com](mailto:more_faye@yahoo.com)

Photos below

[Reference: CMD 18-M30.6](#)



Fanny Down the Ganny. Approaching the bridge at Clayton's Crossing, April 5

Photo source: PortHopeHistory.ca



PHCHCC photo 2022

Open area radioactive waste remediation site on Shuter Street, Port Hope alongside occupied homes.



*Photo: PHCHCC January, 2021  
Alexander Street, Port Hope: Open area radioactive waste remediation site in an occupied neighborhood.*



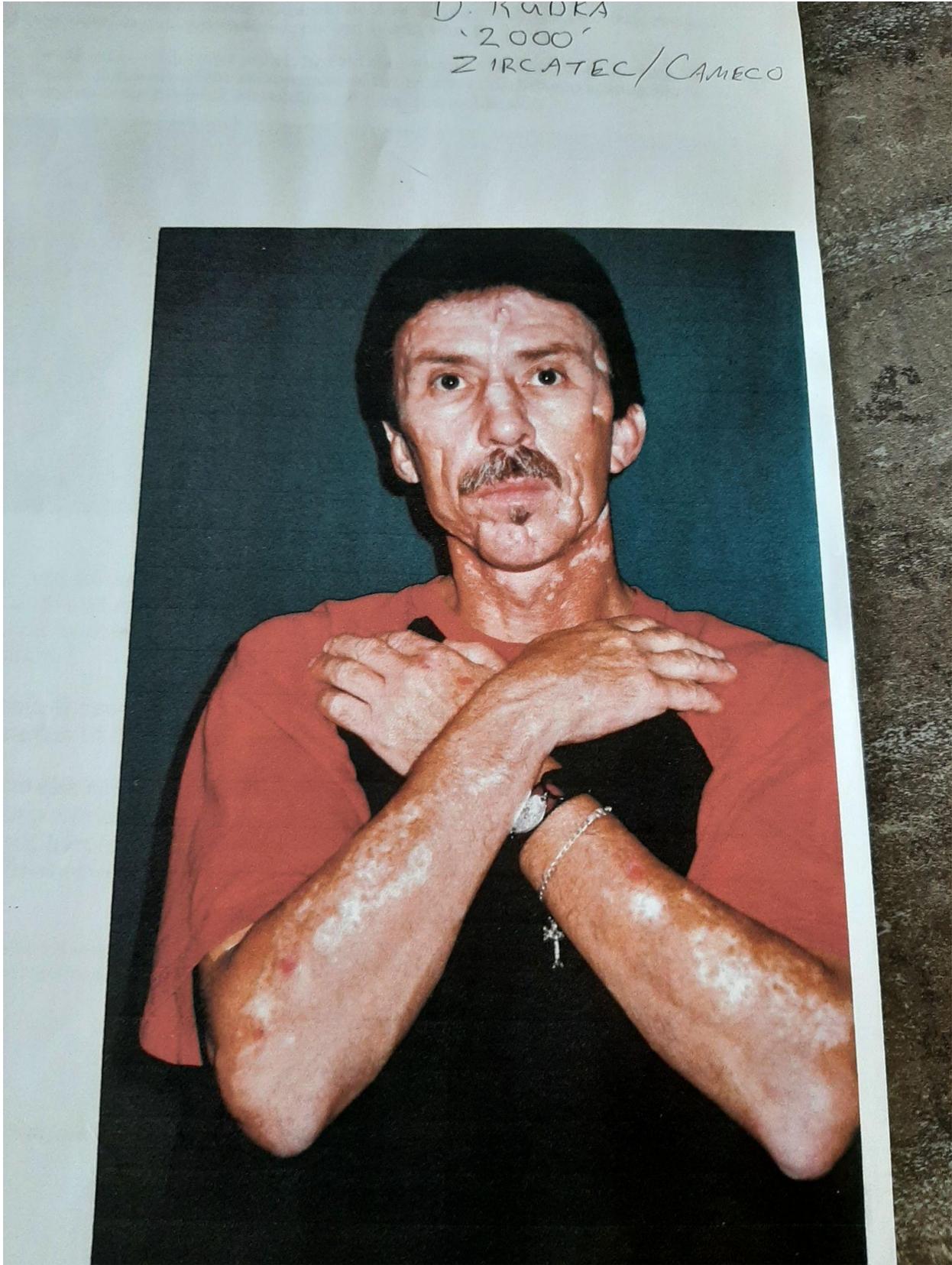
*Photo: PHCHCC January 2021*

*Mill Street South, Port Hope: Open area radioactive waste remediation site, former site of Fire Museum,*



Monkey Mountain/Highland Drive/Pine Street extension major site: Former town landfill site on a hill where Eldorado wastes including yellowcake and discarded building material co-mingled.

Dr. Douglas Andrews warned in the late 1960's of contamination flowing downhill contaminating properties. Town sports complex just out of the picture to the left along with the high school further up the road to the west. Homes were built on this road to the east.



Former Cameco employee Dan Rudka continues his fight for WSIB for uranium poisoning.



*Photo: PHCHCC February 2021  
Mill Street South, Port Hope east beach playground on and beside several radioactive waste remediation sites and in an area of highest deposition for Cameco emissions.*

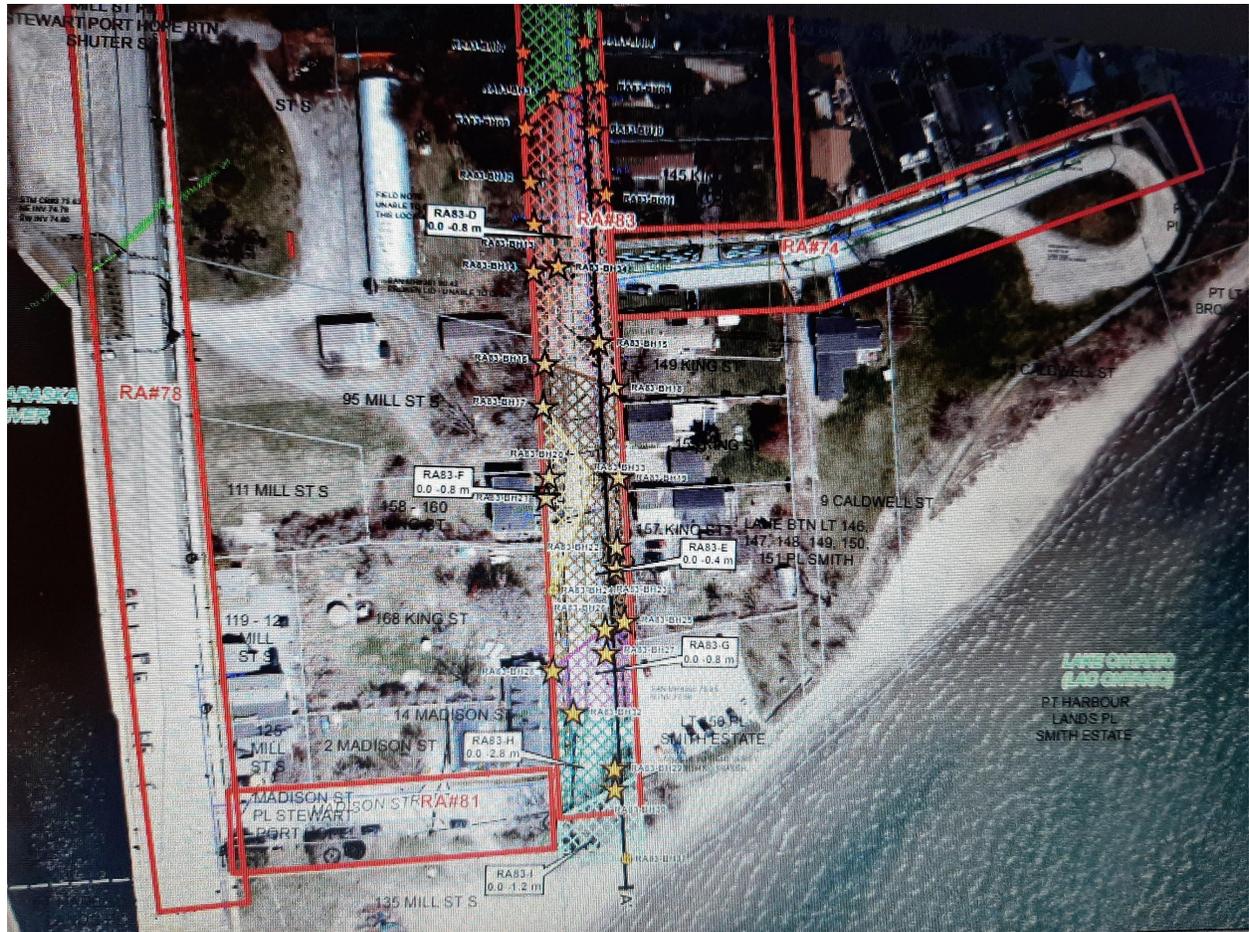


*Photo: PHCHCC February, 2021*

*Toronto Road, Port Hope: Open area radioactive waste remediation site across from school, beside busy main road and sidewalk and occupied home.*



*Photo: PHCHCC January 2021:  
Mill Street South, Port Hope open area radioactive waste remediation site surrounded  
by occupied homes, beside harbour and entry road/ sidewalk to nearby east beach  
playground..*



Source: AECL ATIP Response - investigations of municipal roads and frontages in neighbourhoods in southeast Port Hope on Lake Ontario.