



Arsenic

Arsenic is a non-radioactive contaminant associated with historic low-level radioactive waste (LLRW) in Port Hope.

As part of Port Hope Area Initiative (PHAI) activities, the waste is being cleaned up and sites remediated to meet specific levels for substances as set out in the Waste Nuclear Substance License, the regulatory document overseen by the Canadian Nuclear Safety Commission (CNSC).

What is arsenic?

Arsenic is a naturally occurring element present in small amounts in food, drinking water, and soil. It is also used in a variety of industrial and agricultural processes and products.

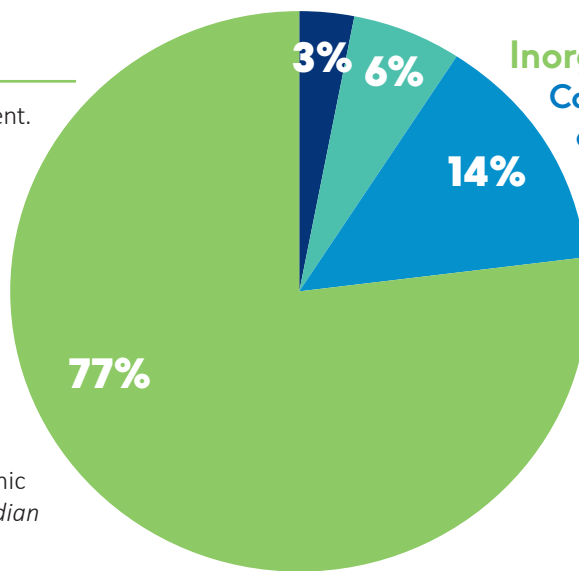
Arsenic – organic and inorganic

Organic arsenic occurs naturally in the environment. It can enter the food supply through water, soil or air. It is typically found at low levels in many types of foods such as seafood and shellfish.

Inorganic arsenic is usually found in the environment and can be found in food such as fruit juice, rice and apples.

People are exposed to arsenic every day, primarily through store-bought foods. Drinking water is the next biggest source. In Ontario, municipal water supply systems must comply with Ontario's Drinking Water Standard for arsenic of 0.01 mg/L, which was set based on the *Canadian Drinking Water Guideline*¹.

Arsenic concentrations in foods sold in Canada are low and have been stable for many years.



Inorganic Arsenic
Contribution to lifetime cancer risk for a typical Canadian, drinking municipal water.*

*Health Canada. 2006. *Arsenic in Drinking Water*.

- Store bought food
- Drinking water
- Soil/dust
- Home garden

What are the PHAI Cleanup Criteria?

The PHAI Cleanup Criteria sets the levels to which CNL will clean up soil in areas contaminated with LLRW.

Four contaminants are identified as "signature parameters" for LLRW.

33 As Arsenic 18 ppm*	92 U Uranium 23 ppm	88 Ra Radium 0.29 Bq/g**	90 Th Thorium 1.16 Bq/g
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*Parts per million ** Becquerel per gram

¹ Health Canada. 2006. *Guidelines for Canadian Drinking Water Quality: Guideline Technical Document — Arsenic*. Water Quality and Health Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

New criterion for arsenic

CNL has requested that the Canadian Nuclear Safety Commission consider a change in the cleanup criterion for arsenic from the **current 18 ppm to 50 ppm**.

CNL commissioned Canadian risk assessment experts, who frequently work with Health Canada and the Ontario Ministry of the Environment, Conservation and Parks to develop the revised criterion for arsenic.

The experts followed the appropriate risk assessment guidance set by Health Canada and the Ministry of the Environment, Conservation and Parks to determine the value of the revised criterion and they have also incorporated site-specific data collected in Port Hope to ensure the revised cleanup criterion reflects local conditions.



Inorganic arsenic in the Port Hope environment

Inorganic arsenic is both naturally occurring and present in some Port Hope soils from both past ore-refining practices (Eldorado Nuclear Ltd.) and because of other historical industrial practices not related to the nuclear industry. Inorganic arsenic does not bioaccumulate, become concentrated inside the bodies of living things. It does not move up the food chain from one species to another. Further, studies of trees growing in soil in Port Hope show that there is no uptake of LLRW by the trees. Studies undertaken

on fish tissues during the Environmental Assessment did not show measurable levels of contaminants related to the presence of LLRW in the environment.

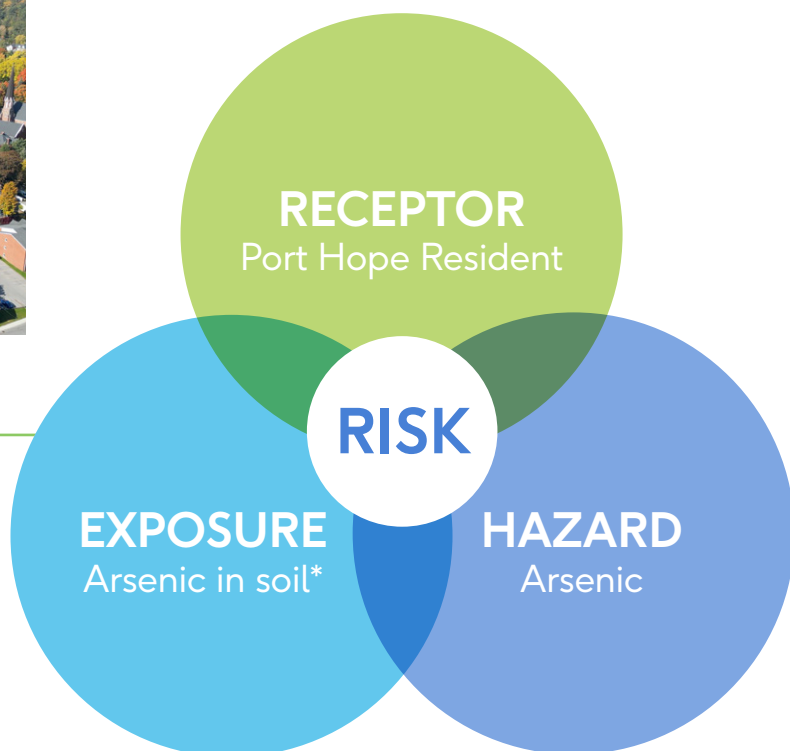
Additionally, inorganic arsenic does not break down in soil but can be slowly carried through soil by groundwater movement. That is why low levels of inorganic arsenic can be found on properties even after the LLRW has been removed.



Risk assessment

A risk assessment is a highly conservative process designed to evaluate the potential health and environmental risks associated with exposure to contaminants. It estimates potential adverse effects on human and ecological receptors and seeks to be protective of human health and the environment. The assessment considers three factors: receptor, exposure and hazard. **All three factors must be present for a risk to be identified.**

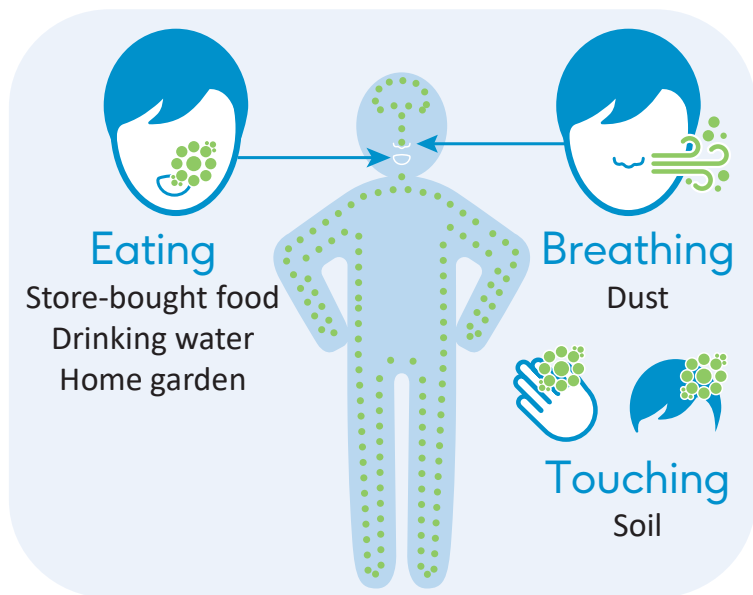
Figure 1 – Elements of Risk



A risk assessment assumes:

- Exposure through all pathways (eating, breathing, touching)
- Maximum exposure – 365 days per year
- Maximum concentration associated with exposure – in this case, 50 ppm
- Exposure occurs for an individual's lifetime (80 years) – assuming they never leave the community or the source of maximum exposure

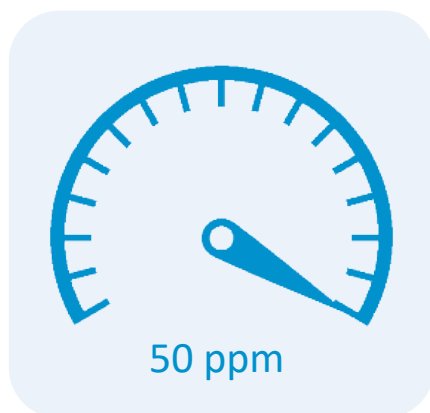
All Exposure Pathways



Continuous Exposure



Maximum Concentration



Infant to Age 80

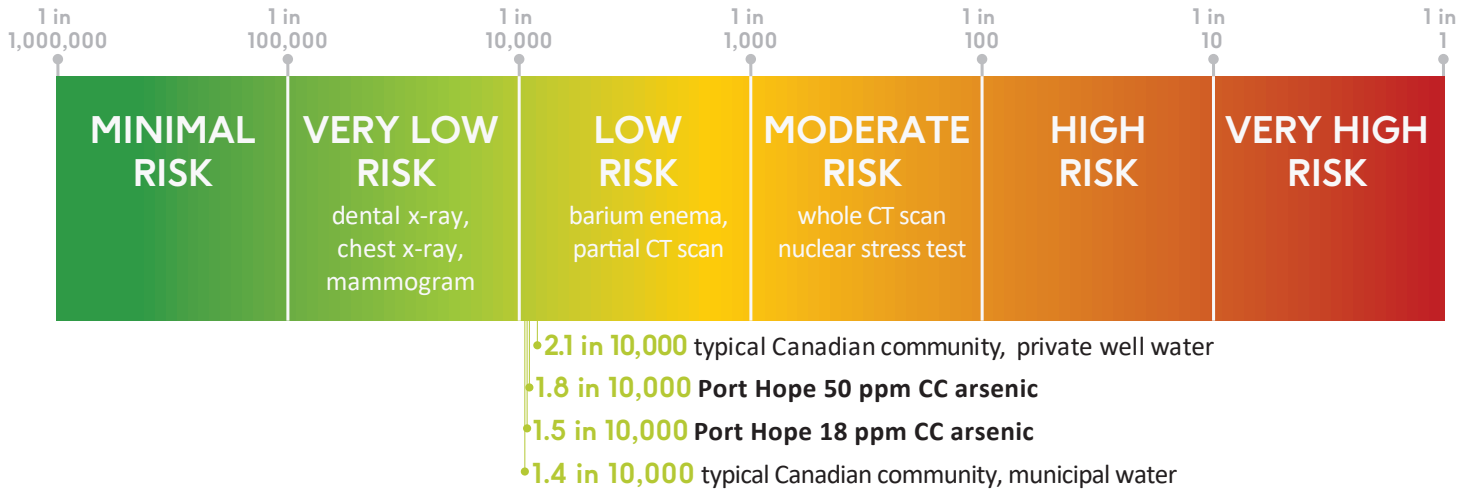


Long-term exposure to extremely high levels of arsenic can produce a wide range of health effects, including specific types of cancer, and developmental effects on a developing infant in the womb.

Risk Assessment Results – Port Hope

Results of the risk assessment that was completed to change the criterion for arsenic indicated a low increase in risk to residents within Port Hope and did not change the risk profile for residents given the levels of arsenic currently present in the local environment. This is because the two largest sources of

arsenic are store-bought food and drinking water. The increase in risk falls within the same range as is present in other Canadian communities without known sources of arsenic contamination, depending on their local geologic conditions and sources of drinking water.



Practicing basic soil hygiene is the best way to minimize exposure to substances in soil. See the *Soil Hygiene Fact Sheet* for more information.

How can I learn more?

Health Canada. Arsenic in Drinking Water. 2006.

<https://www.canada.ca/en/health-canada/services/healthy-living/your-health/environment/arsenic-drinking-water.html>

Health Canada. Arsenic. Arsenic - Canada.ca

<https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/environmental-contaminants/arsenic.html>

Join the Conversation!

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