

AECL is responsible for managing the Government of Canada's radioactive waste and decommissioning liabilities.



## AECL's Inventory of Radioactive Waste

Radioactive waste is a by-product of nuclear science and technology. AECL's inventory includes waste created by nuclear fuel fabrication, nuclear reactor development, medical radioisotope development and production, and other activities. It also includes contaminated soil and debris from the decommissioning of obsolete structures at our sites.

AECL's mandate includes the ongoing management of radioactive waste in a manner that is safe and environmentally responsible. It also includes the cleanup of waste generated by other entities for which the Government of Canada assigned responsibility to AECL in 2015, referred to as Historic waste.

## AECL's waste inventory (December 31, 2022)

- **Low-level waste** includes items such as mop heads, cloths, gloves and other protective clothing that may have been contaminated while being used in the workplace. Over 98% of the nuclear waste in Canada by volume is low-level waste.
- **Intermediate-level** waste includes items that have had more direct contact with radioactive substances such as ion-exchange resins and reactor components.
- **High-level waste** is used fuel. It is generated at nuclear power plants and research reactors and is highly radioactive.

AECL provides regular updates on its radioactive waste inventory. As a large amount of radioactive waste owned by AECL has been stored for decades, the updated inventory records will change and become more precise as the waste and sites are cleaned up and remediated.

AECL manages waste in line with the best practices of the day, and the best available information. Over seven decades, AECL's operations have evolved to meet modern standards of the nuclear industry.

Because some of the older waste is contained in various containers (including, for example, trenches, and near surface concrete boxes and cylinders), some of the reported volume in the inventory is based on assumptions. This means that instead of opening containers and conducting a full inventory of the actual waste, which would unnecessarily expose workers to hazardous conditions, assumptions are made on the volume of waste in the containers. These assumptions are based in part on old paper records, as well as operational experience where *some* containers were more recently opened and inventoried. The information gathered from this exercise is used to extrapolate volumes in other similar containers.

There is an increase in the volume of Intermediate Level Waste reported in the 2022 update compared to the 2019 report. This increase is due to revised assumptions based on operational experience – i.e. more containers were opened and inventoried, which led to adjusted assumptions on the waste

volumes in other containers. Furthermore, some of the increase is the result of a full review of the waste accounting, and adjustments made as a result. Notably, a certain volume of waste was previously included in future years projections, instead of being captured as existing waste. In other cases, some volumes have been reduced due to waste minimization approaches, including methods to physically reduce the size of the waste materials for example through incineration and compacting.

The inventory numbers have also changed due to new waste generated by CNL at AECL sites across the country from ongoing operations, and from decommissioning activities. The new waste also includes recent amounts from external sources including Canadian hospitals, universities, research entities and industry clients. This is aligned with existing commercial arrangements that have been in effect for decades.

The waste continues to be safely stored at AECL sites, in accordance with requirements and oversight of the Canadian Nuclear Safety Commission, Canada's independent nuclear regulator.

**High-Level Radioactive Waste Inventory, 2022**

| <b>Site</b>   | <b>Number of fuel bundles</b> | <b>Estimated volume (m<sup>3</sup>)</b> | <b>Mass of uranium (kg)</b> |
|---|-------------------------------|---|-----------------------------|
| Chalk River Laboratories (Operating) <sup>[1]</sup> | 10,138 <sup>[2]</sup>         | 123                                     | 25,292                      |
| Chalk River Laboratories (Waste Management Area G)  | 4,886                         | 20                                      | 65,385                      |
| Whiteshell Laboratories                             | 2,290                         | 29                                      | 23,834                      |
| Douglas Point Prototype Reactor                     | 22,256                        | 89                                      | 299,827                     |
| Gentilly-1 Prototype Reactor                        | 3,213                         | 13                                      | 67,596                      |
| <b>Total</b>  | <b>42,783</b>                 | <b>274</b>                              | <b>481,934</b>              |

[1] This represents what was previously reflected as Waste Management Area B and National Research Universal Reactor in the 2019 report

[2] Inventory is reported as fuel bundles, rods, fuel assemblies and/or other items

**Intermediate-Level Radioactive Waste Inventory, 2022**

| <b>Site</b>                         | <b>Waste from operations (m<sup>3</sup>)</b> | <b>Decommissioning waste (m<sup>3</sup>)</b> | <b>Total (m<sup>3</sup>)</b> |
|-------------------------------------|--|--|------------------------------|
| Chalk River Laboratories            | 5,509  | 309  | 5,818                        |
| Whiteshell Laboratories             | 0  | 989  | 989                          |
| Douglas Point Prototype Reactor     | 0  | 6  | 6                            |
| Gentilly-1 Prototype Reactor        | 0  | 2  | 2                            |
| Nuclear Power Demonstration Reactor | 0  | 389  | 389                          |
| <b>Total</b>                        | <b>5,509</b>                                 | <b>1,695</b>                                 | <b>7,204</b>                 |

**Low-Level Radioactive Waste Inventory, 2022**

| <b>Site</b>                     | <b>Decommissioning waste (m<sup>3</sup>)</b> | <b>Decommissioning contaminated soil (m<sup>3</sup>)</b> | <b>Waste from operation (m<sup>3</sup>)</b> | <b>Contaminated soil from operations (m<sup>3</sup>)</b> | <b>Total (m<sup>3</sup>)</b> |
|---------------------------------|--|--|---|--|------------------------------|
| Chalk River Laboratories        | 20,959                                       | 5,427  | 160,064                                     | 164,202  | 350,652                      |
| Whiteshell Laboratories         | 20,515                                       | -  | -   | -  | 20,515                       |
| Douglas Point Prototype Reactor | 62   | -  | -   | -  | 62                           |

|                                     |        |       |         |         |         |
|-------------------------------------|--------|-------|---------|---------|---------|
| Gentilly-1 Prototype Reactor        | 1      | -     | -       | -       | 1       |
| Nuclear Power Demonstration Reactor | 2,289  | -     | -       | -       | 2,289   |
| Total                               | 43,826 | 5,427 | 160,064 | 164,202 | 373,519 |

#### Historic Low-Level Radioactive Waste Inventory, 2022

| Site  | Total (m <sup>3</sup> ) |
|---|-------------------------|
| Port Hope (part of the Port Hope Area Initiative)   | 765,081 <sup>[1]</sup>  |
| Port Granby (part of the Port Hope Area Initiative) | 802,800                 |
| Greater Toronto Area                                | 4,900                   |
| Total   | 1,572,781               |

[1] Waste emplaced into Long-Term Waste Management Facility or currently in a historic temporary storage location