DEEP GEOLOGICAL REPOSITORIES

FACTSHEET

A NEXT STEP

At a glance

- International best practice for intermediate- and high-level waste requiring isolation for more than a few hundred years.
- Requires suitable geology.
- Makes use of natural and engineered barriers.
- In operation in Hungary and the U.S.

Deep geological repositories (DGRs) are recognized internationally as a best-practice method to dispose of waste that requires isolation for more than a few hundred years, such as intermediate-level waste (ILW) or high-level waste. A deep geological repository typically consists of a network of underground tunnels and placement rooms for radioactive waste constructed several hundred meters below the surface. Repositories are designed to use a system of multiple barriers: Engineered barriers such as waste containers and natural barriers like the rock itself work together to contain the waste and isolate it from people and the environment.

The key to siting a DGR is identifying a stable host rock formation that is predictable, consistent, and solid. Stable host rock formations provide a major barrier that:

- physically isolates the waste;
- protects against accidental human intrusion until radioactivity has reduced to safe levels; and
- controls the movement of radionuclides in the long term.

Engineered barriers, such as the packaging and shaping of waste, are added to the natural barrier provided by the rock as necessary.

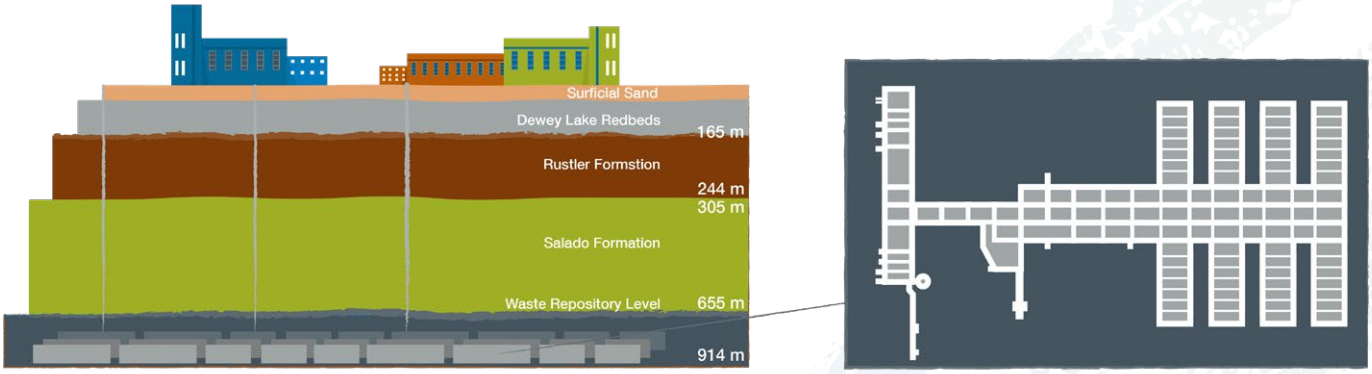
#RadWastePlan
@RadWastePlan
radwasteplanning.ca

INTERNATIONAL EXPERIENCE

The U.S. and Hungary dispose of some low-level waste (LLW) and all of their intermediate-level waste using DGRs designed to meet their specific requirements and standards. Germany is currently building a low- and intermediate-level waste (L&ILW) DGR at Konrad, in southeast Lower Saxony, for operation by the mid 2020s. DGRs are also planned for France's long-lived L&ILW, and Switzerland is considering different DGR options to manage a variety of waste.

USA

The Waste Isolation Pilot Plant (WIPP), near Carlsbad, New Mexico, is currently the world's only operating DGR for long-lived L&ILW. The U.S. Department of Energy operates the facility to dispose of waste generated by defence-related activities. WIPP has been operating since 1999 and currently contains about 90,000 cubic meters of L&ILW. Because it stores long-lived waste, WIPP is built approximately 655 meters (2,150 feet) underground, as seen in Figure 14. It is inside a salt formation, which serves as its main barrier. It has a capacity of 175,000 cubic meters. There are eight panel sections, each with seven disposal rooms. There is space to construct additional panels, if necessary.



Layout of the Waste Isolation Pilot Plant (WIPP)

Because salt is a soft rock, salt formations naturally 'creep' over time to fill up and heal any fractures or gaps over time. The disposal rooms at WIPP are excavated 'just-in-time' and are only left open for a few years. After the rooms have been filled with L&ILW packages, they are closed off. Over time, the natural 'creep' of the salt will fill up the leftover spaces and surround the waste.

HUNGARY

Hungary opened a DGR for short-lived L&ILW at the Bátaapáti site in the south of the country in 2012. As shown in the figure below, the DGR includes emplacement rooms made of granite rock (the main barrier) at a depth of 250 meters below the surface. The waste is mostly in steel drums which are filled in with grout, creating concrete packages. The concrete packages are then stacked in the disposal rooms, typically four packages wide by four high, with another top layer, which is two or three packages wide to fit the arched ceilings of the disposal rooms. When these disposal rooms are filled, they will be backfilled with grout. Two disposal rooms have already been built, with a plan to make 17 in total. The total capacity will fit 25,000 cubic meters of waste, prior to packaging, for disposal.

Disposal vault at the Bátaapáti Repository, Hungary