

DEEP BOREHOLES

FACTSHEET



At a glance

- Relatively simple to construct and operate, compared to larger facilities.
- May be suitable for small volumes of intermediate-level waste. (ILW)
- Requires suitable geology.
- Makes use of natural barriers.
- Limited in size.

Deep borehole disposal is an emerging technology for waste that requires isolation for more than a few hundred years. It may be suitable for the disposal of small volumes of ILW. The method would require drilling a series of narrow boreholes to a depth of about 500 to 1000 metres into which waste packages would be lowered, creating a stack deep underground. The space around and above the packages would be backfilled and sealed with low permeability materials such as cement grout and clay. Natural barriers then provide the main means of impeding the release of radionuclides over the long term. If there is suitable rock near where the ILW is generated or stored, the boreholes could be constructed nearby, which would reduce the need to transport the waste.

There are potential limitations associated with this approach, which mean it may not be suitable for large amounts of waste. Current deep drilling technology is limited to relatively narrow boreholes only a few tens of centimetres wide. This means waste currently in storage would have to be repackaged into smaller containers at a new facility. For ILW, this would have to be done by remote handling in order to protect workers.

Compared to a near surface repository, it could be more difficult to seal a large number of individual boreholes and ensure the waste would be retrievable.

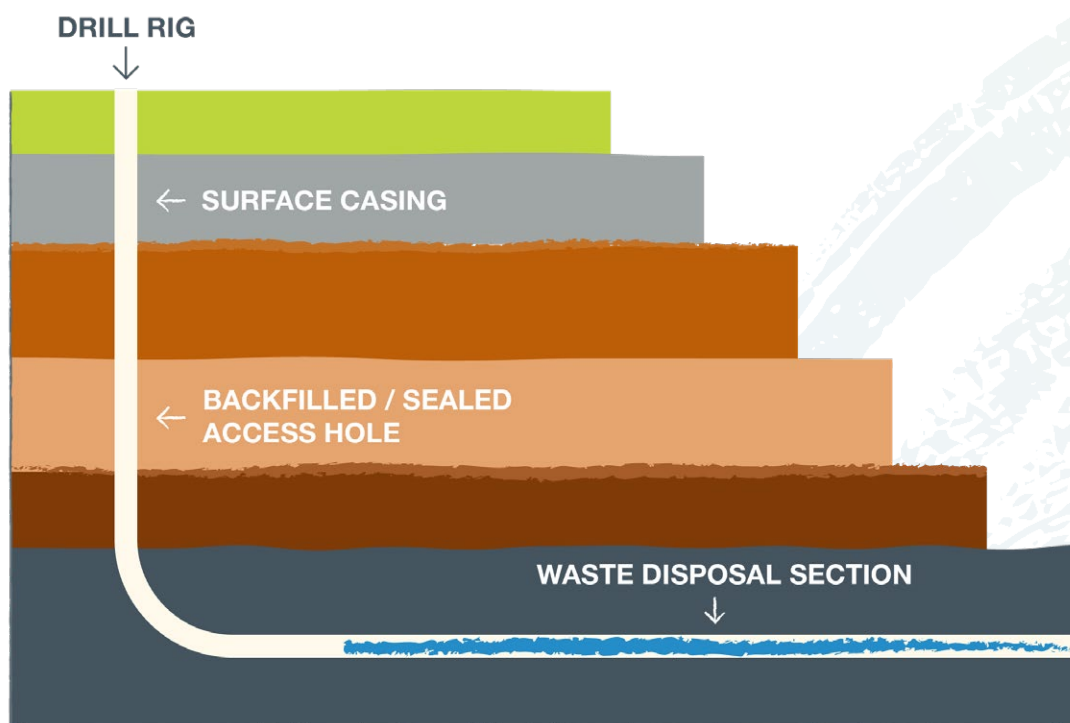


INTERNATIONAL EXPERIENCE

Internationally, there are no examples of large-scale use of deep boreholes for solid radioactive waste disposal. Several countries have investigated this disposal concept for used nuclear fuel and most have decided not to go forward with it, but rather to focus on a deep geological repository.

The United States is investigating the possible use of deep boreholes for disposal of certain forms of radioactive waste using standard oil field technology. The U.S. concept envisions disposal of radioactive waste in one or more boreholes about 40 centimeters wide and drilled to a depth of 5 kilometres in rock. The lower 2 kilometres of the boreholes would be used as the disposal zone where a series of waste packages would be emplaced. The upper 3 km would then be sealed with clay and concrete. A field demonstration was completed in 2019 in Texas, where a simulated waste package was successfully placed at about 600 meters underground and retrieved.

Estonia is considering the use of the same technology for the disposal of radioactive waste from a future nuclear program.



Artist's rendering of the U.S. deep borehole disposal concept