

Nuclear waste dump - what can go wrong?

Spent nuclear fuel is arguably the most dangerous material mankind has produced. A matchbox full of nuclear waste would suffice to render all the water in Finland's largest lake unsuitable for drinking.

Disposal plans in Olkiluoto

In Olkiluoto, nuclear waste company Posiva is conducting a research project on the possibility of burying this waste permanently underground. No permission to build a nuclear waste storage site has been granted and research will go on at least until 2012 before the company is even ready to apply for a permit. Nevertheless, the plans are being used as an excuse to buy new nuclear plants..

Power without responsibility

The Olkiluoto waste dump would be a cheap and convenient way for nuclear companies to dispose of their waste: they would have no responsibility to monitor or manage the site after closure, nor to prepare to retrieve the waste when the dump starts to leak. The price is paid by future generations.

Copper capsule

The plan is to pack the waste in copper canisters, because copper is the most corrosion resistant metal after gold and silver. It was assumed that the canisters would last thousands or tens of thousands of years, but new peer-reviewed research shows that the canisters could be corroded in a matter of centuries.

Permafrost

During ice ages, permafrost penetrates as deep as 700 meters below ground level. Posiva refuses to take this into account, assuming that the dump would not freeze. Ice can break the barriers that shield the waste.

Mistakes during burial

The waste disposal plan presumes that waste capsules are intact and tightly closed and the clay surrounding the capsules is homogeneous and wet. Mistakes in the automatic burying process can significantly speed up the release of the waste into groundwater.

Earthquakes

Ice ages can wreak havoc in the bedrock. The vertical movements of the bedrock amount to several hundred meters. Scandinavia experiences powerful earthquakes, up to 8 on Richter scale. Fragmentation zones caused by earlier earthquakes are found in bedrock also around Olkiluoto and there is a risk that a new major crack would simply cut through the waste dump site.

Super nuclear waste

Nuclear waste produced by new reactor models, especially the French EPR reactor under construction in Olkiluoto, exposes the public to up to seven times more radiation when buried into the bedrock. The waste contains more radioactive substances and, even more importantly, releases them much more readily when it comes to contact with water. The waste is hotter, which speeds up the failure of the barriers shielding the waste. These factors have not been taken into account in the planning of the waste dump, but Posiva wants to bury this "super nuclear waste" into Olkiluoto nevertheless.

Excavation damage

Explosives and machinery used in excavation of the tunnels and storage space cause new cracks and damage to the already cracked bedrock, which enables the waste to spread faster.

Groundwater

The bedrock in Olkiluoto is very old and full of cracks, and most importantly the groundwater there flows directly to the Baltic sea, which dramatically aggravates the possible impacts of any leaks in the repository. Vicinity of the sea also makes the groundwater more corrosive. Changes in the chemical characteristics of the groundwater can be drastic and hard to forecast. E.g. intrusion of oxygenous water or increase in sulphide content would speed up the corrosion of materials.

Radiating heritage

Many of the dangerous substances in nuclear waste are extremely long-lived. For example, the half-life of plutonium is 24,000 years. Nuclear waste must be isolated from the environment for hundreds of thousands of years - longer than the mankind has existed. Nuclear waste is the most long-lived heritage of our generation.

