GREENPEACE

Nuclear waste disposal plans in Finland

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. 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 at least five years of more research is needed before the company is even ready to apply for a permit. There are several concerns and open questions that have not been addressed.

The status of the project[1]

- The government has made a decision in principle that construction of a waste dump in Olkiluoto would be in the overall interest of the society if the environmental requirements can be met. The decision allows the construction of an underground rock characterization facility which is now underway.
- Little site specific research was undertaken before the decision, which explains why the decision is "in principle". The only stance that government authorities have officially taken so far is that they cannot without further research exclude the possibility that the requirements can be met.

What can go wrong?

- 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 (see figure 3). Olkiluoto was chosen for waste storage because of political reasons – the population living near the reactors is much less critical because of decades of intense "education" by the nuclear operator.
- 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 published in the Science magazine shows that the canisters could be corroded in a century.
- The understanding of the long term dynamics of the bedrock has advanced hugely after the waste disposal concept applied in Olkiluoto was put together. The bedrock is much more dynamic than previously believed, for example there can be strong earthquakes associated with ice ages, which undermines the whole idea of stable bedrock.

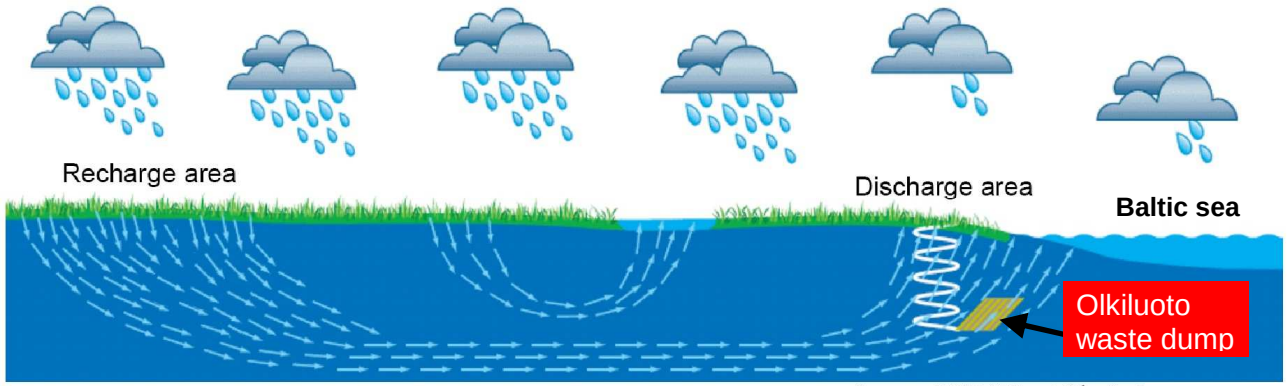
The process

The waste disposal project has proceeded faster than anywhere else in the world and that has lead to overlooking some expert recommendations and too much haste in initial phases of site characterization. There is no real need for the hurry, since the waste will have to cool down in intermediate storage sites for decades after the reactors are closed down. The nuclear industry, however, desperately needs to be able to say that they have a "solution" to the problem of nuclear waste – in order to get to build more reactors and accumulate even more waste.

- Basically all research at the site is conducted by the waste disposal company itself. The Finnish authorities have commissioned independent experts to give a second opinion and they have raised exactly the same concerns as environmental organizations – too much haste and too few observations, problems being overlooked. The recommendations of these experts have not been followed in most cases though.
- If the storage site is built be closed, it will be fully under the responsibility of the society. There are no plans or money set aside for monitoring the site or retrieving the waste and cleaning up the mess in the case of leakage.

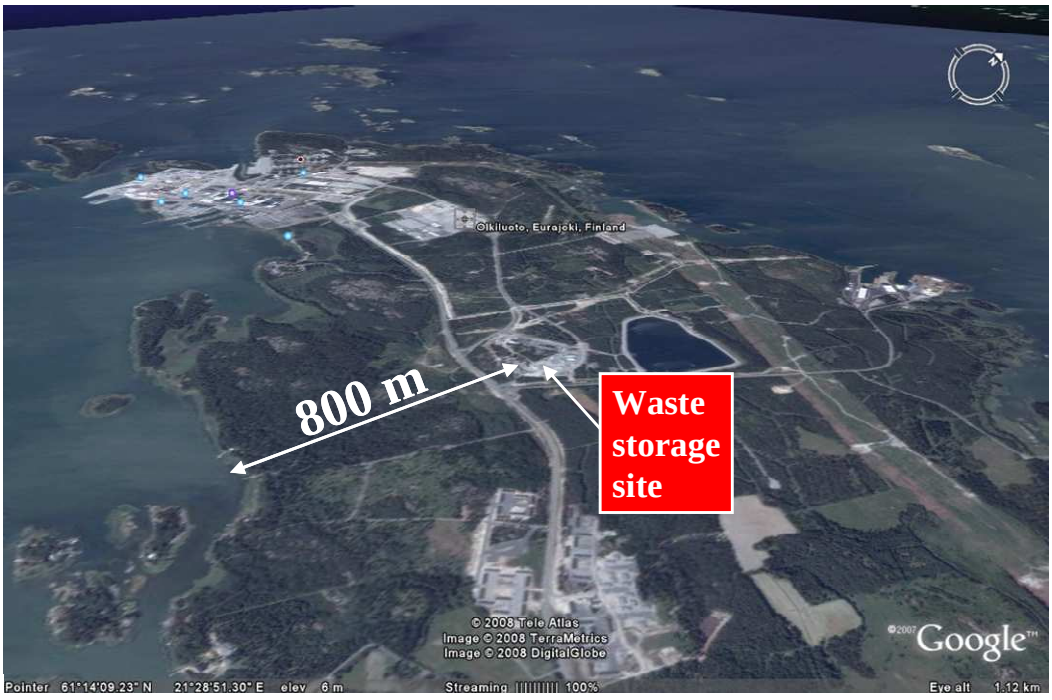
Geology heavyweight confirms NGO concerns

The Finnish nuclear watchdog STUK has commissioned an evaluation of Posiva's research on long term safety of the waste depository from professor Matti Saarnisto, Secretary General of the Finnish Academy of sciences and former head of the Finnish Geological Survey. According to Saarnisto, "the huge downward and upward movements [of the bedrock] are one of the main risks of the nuclear waste depository together with glacial loading and permafrost, but they are not addressed in adequate detail in the report. […] All predictions of depository safety beyond the next glaciation […] are speculation and not based on scientific facts. […] During the next 120 000 years the depository will be covered by a continental glacier or the Baltic basin waters for some 40 000 years without any possibility to control it." Saarnisto also remarks: the "sections which I have evaluated have been written by a person/persons with inadequate knowledge and in some sections are based on elementary books or poor-quality reports." [2]



Source: MKG/Mikael Kårelind

Figures 1 and 2: The proposed waste depository in Olkiluoto is located less than a kilometer from the Baltic sea, in a place where the groundwater flows from the bedrock directly into the sea.



Olkiluoto 3 sinks the leaky plans for a waste depository

The Olkiluoto 3 reactor model is world's first iteration of the European Pressurized Reactor (EPR), a design touted as a new generation nuclear reactor by the French Areva. The reactor is designed, with cost savings in mind, to burn uranium more intensely than any existing reactor. This causes the amount of readily released radioactive substances in spent fuel to increase disproportionately. EU-funded research shows that the health risk posed by high-level nuclear waste from the EPR is up to seven times higher that that caused by waste from existing reactors.

If the fuel is disposed of by burying it into an underground nuclear waste dump, the largest heath hazard comes from iodine-129. The amount of iodine-129 instantly released, when the nuclear waste dump leaks, is seven times as large in the case of the "super nuclear waste" produced by the EPR reactor, compared to typical currently operating reactors.[3]

One of the cornerstones of all geological disposal concepts is the presumption that the spent nuclear fuel does not readily dissolve into the water and, consequently, waste is released very slowly after the engineered barriers have been breached. This presumption is totally false in the case of EPR waste, which makes current waste management plans obsolete.

This exposes the public to unforeseen short and especially long term health hazards as well as enormous uncovered liabilities as current nuclear waste disposal plans prove totally inadequate to deal with super nuclear waste.

The company responsible for managing the waste from world's first Areva EPR reactor, Posiva, also admit the increase in risks by a factor of seven in their recent environmental impact assessment report. Even the permitted releases of radioactivity from the waste dump are capable of causing thousands of cancer deaths in the long term and the presence of "super nuclear waste" would dramatically increase the potential death toll.

Hugh Richards from the UK based Nuclear Consultation Working Group warns that fuel produced by the EPR reactor "is more demanding at every stage of the nuclear cycle from the reactor itself, subsequent cooling in ponds, through drying and storage in dry casks to eventual burial. It will increase potential worker and public exposure to radiation." Furthermore, the uncertainties about management and long-term storage of high burn-up spent fuel are so large, that allowing its generation "would expose the future taxpayer to the risk of huge uncovered liabilities."[4]

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[1] The decision in principle by the Government concerning Posiva Oy's application for the construction of a final disposal facility for spent nuclear fuel produced in Finland. 2001.
http://www.stuk.fi/ydinturvallisuus/ydinjatteet/loppusijoitus_suomessa/en_GB/luvat/_files/73810747422542880/default/decision_in_principle.pdf

[2] Matti Saarnisto 2008: Evaluation report on the Posiva report 2006-5. STUK, available on demand.

[3] Posiva (2008): Expansion of the Repository for Spent Nuclear Fuel. Environmental Impact Assessment Report.
http://www.posiva.fi/publications/Posiva_YVA_selostusraportti_en_lukittu.pdf.

Nagra (2004): Estimates of the Instant Release Fraction for UO2 and MOX Fuel at t=0.
http://www.nagra.ch/documents/database/dokumente/%24default/Default%20Folder/Publikationen/e_ntb04-08.pdf.

[4] Hugh Richards (2008): Too Hot to Handle. The truth about high burnup spent fuel.
http://www.nuclearconsult.com/Too_Hot_to_Handle.pdf