Concepts developed for disposal of HLW and/or SNF

Juhani Vira

Posiva Oy

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Basis for concept development

Objective:

- *"The objective of radioactive waste management is to deal with radioactive waste in a manner that protects human health and the environment now and in the future without imposing undue burdens on future generations."*

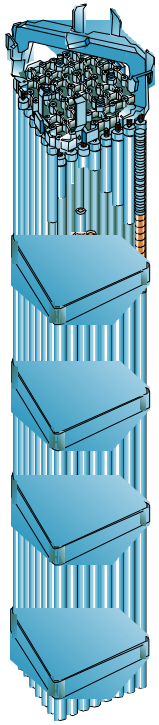
Technical approach:

- To isolate the waste from the biosphere and to substantially reduce the likelihood of inadvertent human intrusion into the waste;
- To contain the waste until most of the radioactivity has decayed;
- To delay any significant migration of radionuclides to the biosphere.

Main premises for HLW/SNF repository design: waste form

Vitrified waste package

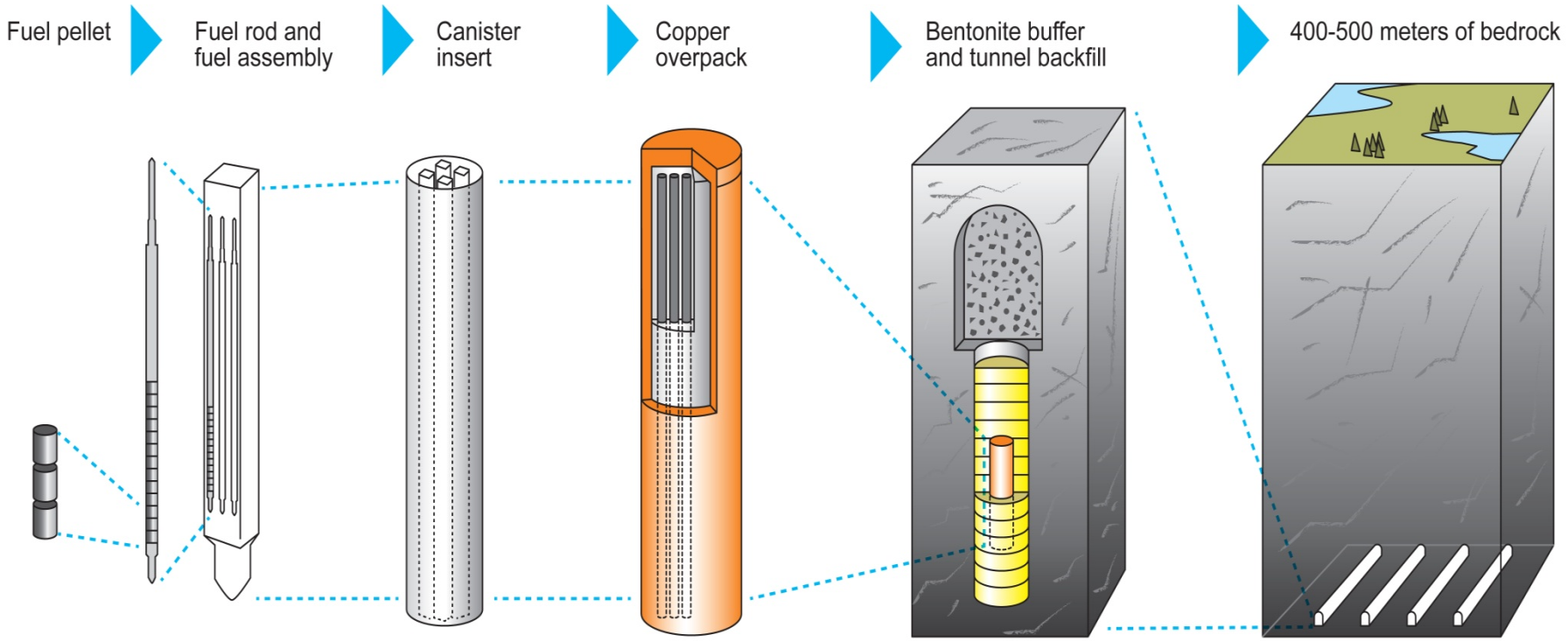
Spent fuel assembly



Main premises for repository design: available geological media

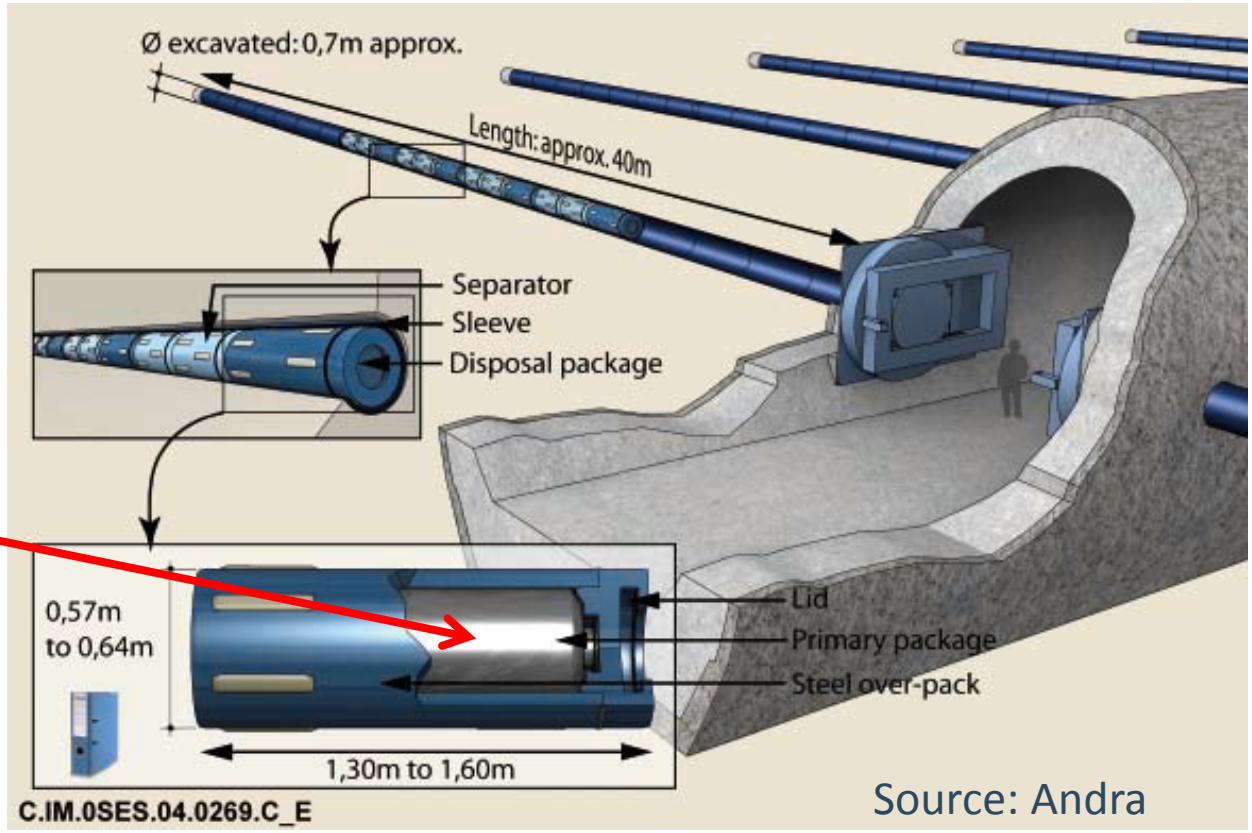
- Crystalline rock stands against long-term erosion, but probably needs to be accompanied by a long-term engineered barrier system.
- Sedimentary rocks make a good barrier against radionuclide releases, but may suffer from erosion risks.
- Salt formations offer a stable containment of radionuclides as long as the absence of water can be ensured.

KBS-3 concept for spent fuel disposal in crystalline rock



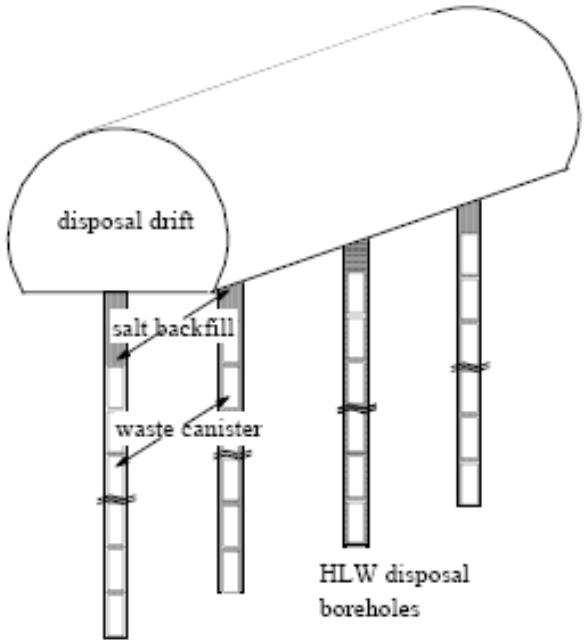
Source: SKB

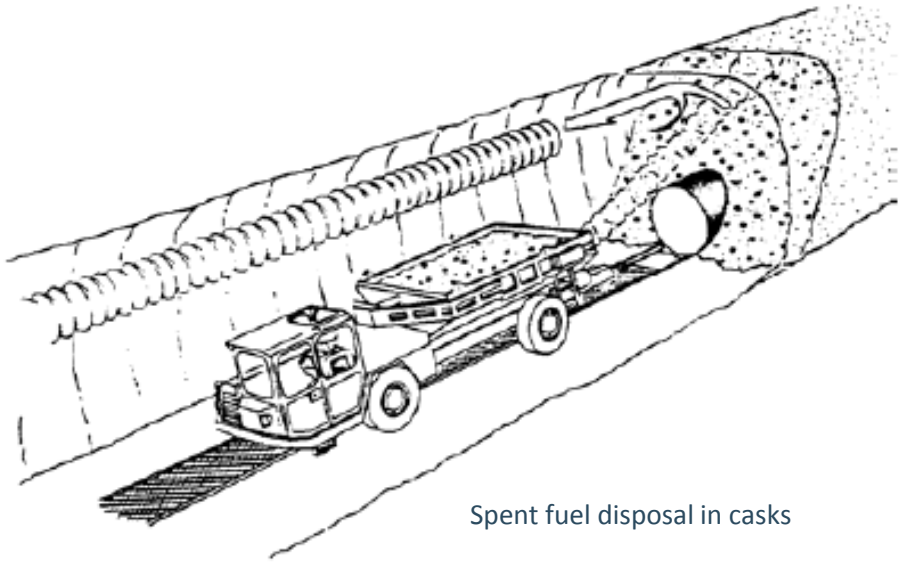
”Cigeo” concept for disposal of high-level reprocessing waste in sedimentary rock



Source: Andra

Potential concepts for disposal of HLW and spent fuel in salt

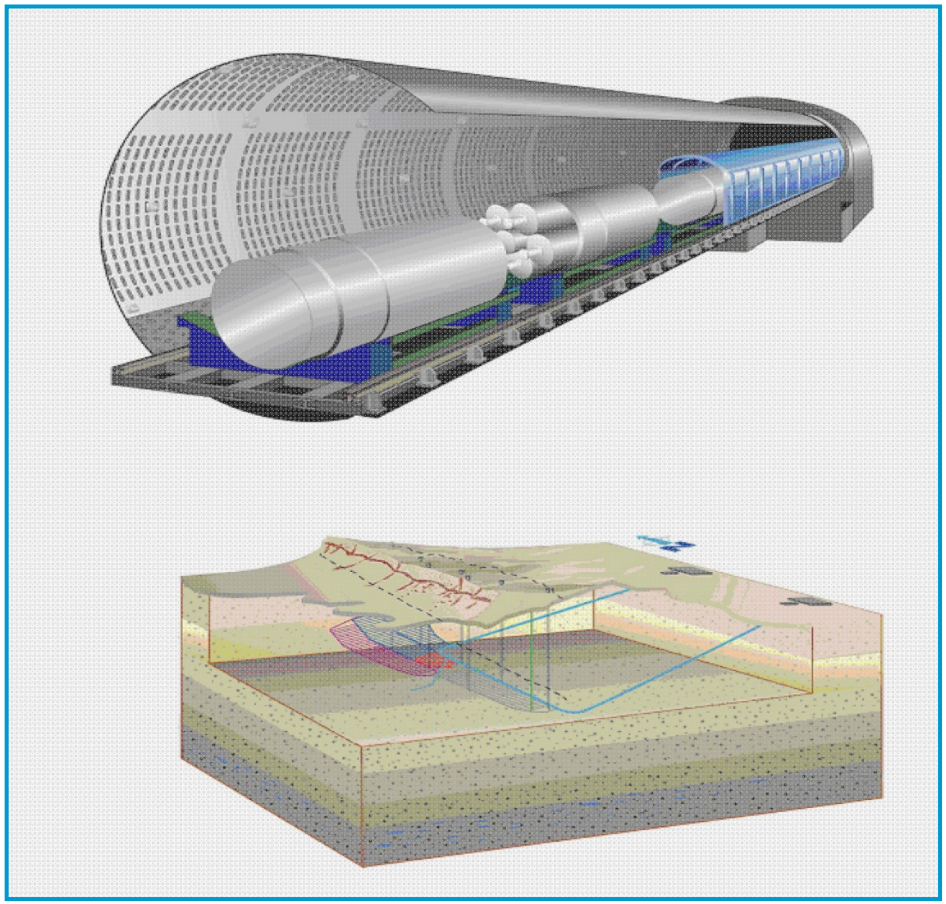




Spent fuel disposal in casks

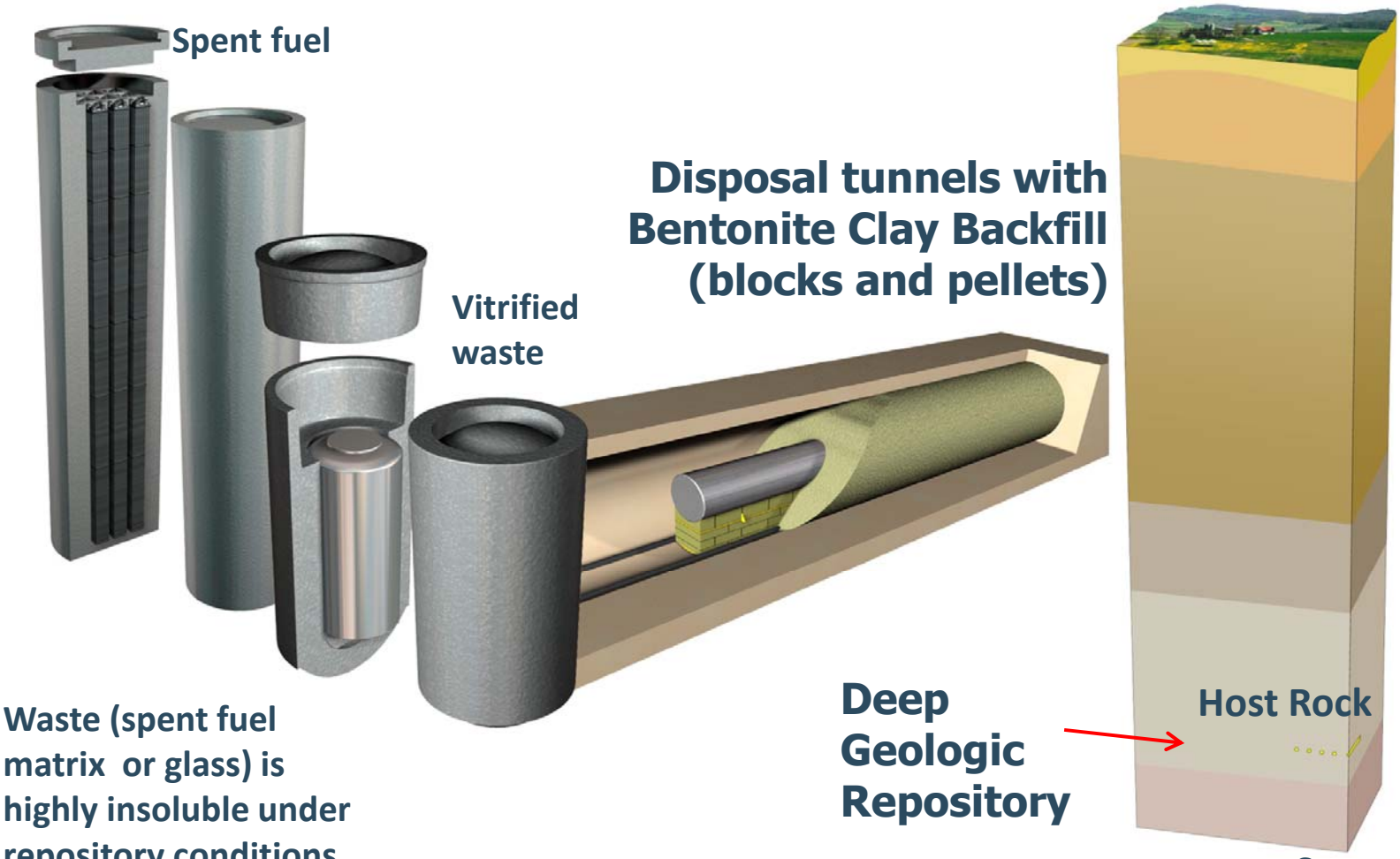
Source: Acta Montanistica Slovaca Ročník 12 (2007)

Yucca Mountain concept for geological disposal of spent fuel



Source: US DOE

Nagra‘s concept for spent fuel and high-level waste disposal



Source: Nagra

Current status

- Licensing process started for first HLW/SF repositories in Sweden and Finland.
  - and is planned to be started soon in France
- In several countries a substantial amount of conceptual design, RTD and testing has been carried out, but the progress towards implementation has been halted or slowed down by problems in siting.

Conclusions

- Several concepts have been developed for the geological disposal of spent fuel and high-level reprocessing waste.
- The licensing process has started for such repositories in a few countries and the first repositories are planned to start operating within ten years.
- More countries are likely to follow suite; in some countries the process of site selection has still to be defined.