An Overview of the Spent Nuclear Fuel Storage and Disposal Project

Nuclear Safeguards Program
Stimson Center
Outline

- Project objectives
- How SNF is produced and stored, and the different types of SNF
- Introduction to DGR, MGR and borehole concepts
- Potential uses of the mapping tool
Objectives

- Assist the larger “Back-end to the Future” project on investigating the resiliency of nuclear safeguards systems
- Educate the general public of the back-end of the nuclear fuel cycle, how countries approach the issues of increasing SNF stockpile, and a solution for these issues
- Provide a good resource for the experts in the field as SNF information is often scattered all over places.
How is SNF produced and stored?

Use of the fuel in reactors (nuclear power, research, or naval propulsion)
- Spent UO\(_2\)
- Spent MOX (Mix Oxide)

Interim storage at reactor pools and/or dry cask storage system

Long-term storage at central storage facilities
Permanent disposal of SNF in deep geological repositories

• Deep geological repositories (DGRs)
  – Considered the safest option to keep SNF safe and secure
  – Finland, Sweden, France, Switzerland are moving towards permanent disposal at DGRs

• Models for DGRs
  – Multi-barrier repository concept
  – Deep horizontal drill hole repository concept
Permanent disposal of SNF in deep geological repositories

Multi-barrier repository concept

KBS-3 in Sweden and Finland

Multi-barrier safety system in Switzerland
Permanent disposal of SNF in deep geological repositories

Deep horizontal drill hole repository concept

Deep Isolation – a US-based company – is studying a novel idea to drill horizontal boreholes to permanently dispose of SNF.

The waste canisters are retrievable.
Permanent disposal of SNF in deep geological repositories

- Multinational Geological Repositories (MGRs)
  - MGRs are DGRs and jointly managed and developed by multiple countries
  - MGRs could be constructed using either multi-barrier safety concept or deep horizontal drill hole concept.
Potential uses of the mapping tool

• Educational channel for general audience
  – Provide general information on SNF (e.g. the location, quantities, growth trend)

• A reference for expert in the field
  – Provide data of inventories and changes of SNF and safeguards implementations

• A vision to the future of SNF management
  – Inform the need for countries to make decisions on SNF storage and final disposal