

Groundwater Flow and Transport Class:

Applications of Hydrogeology to Radioactive Waste Management

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Examples of Applied Hydrogeology

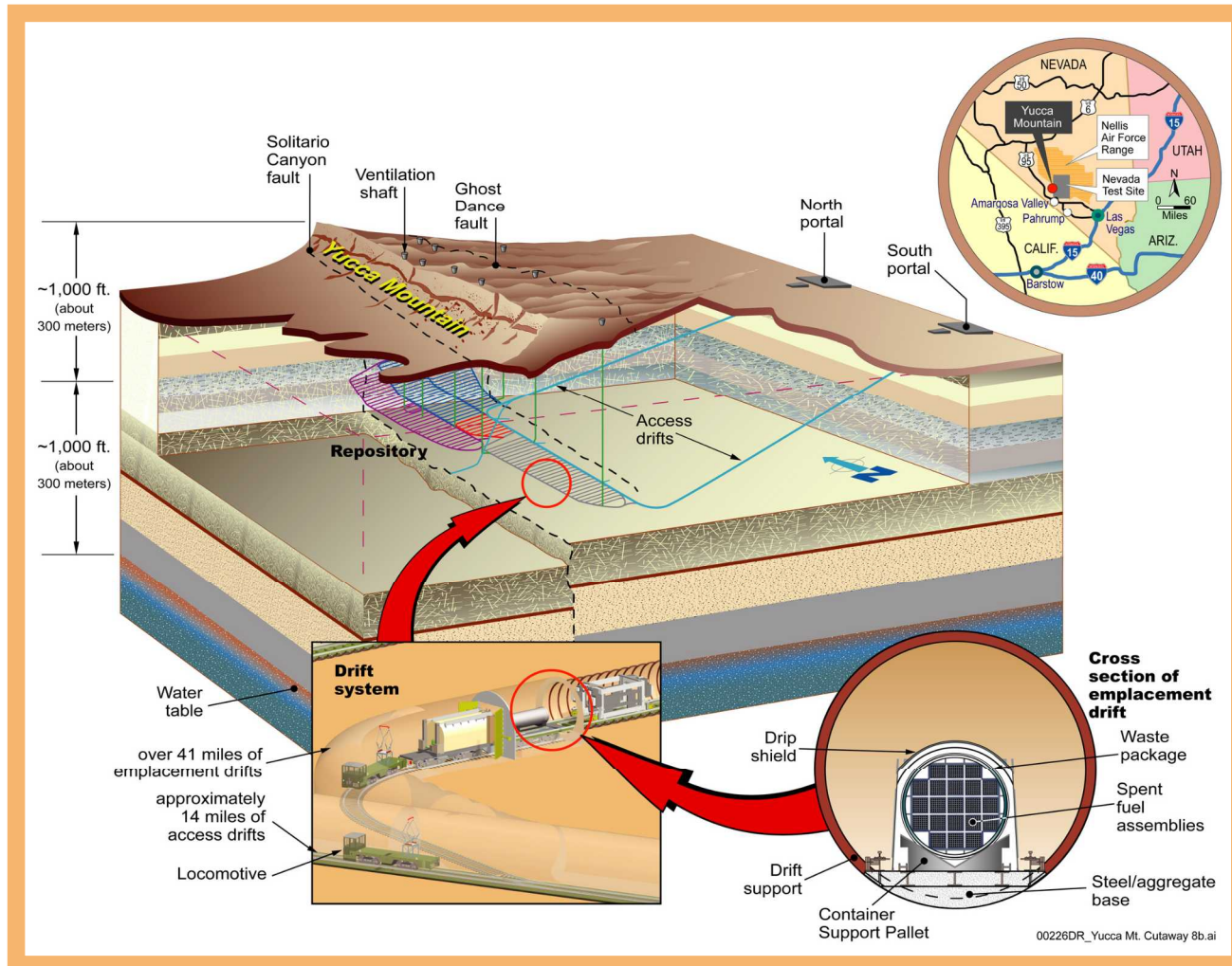
- Yucca Mountain Project – Geological repository for spent nuclear fuel and high-level radioactive waste
- Nevada Test Site – Near surface disposal of low-level radioactive waste
- Idaho National Laboratory – Decommissioning of reprocessing facilities and underground high-level liquid waste tanks
- Repository Programs in Japan and Taiwan – Geological repositories for spent nuclear fuel and high-level radioactive waste



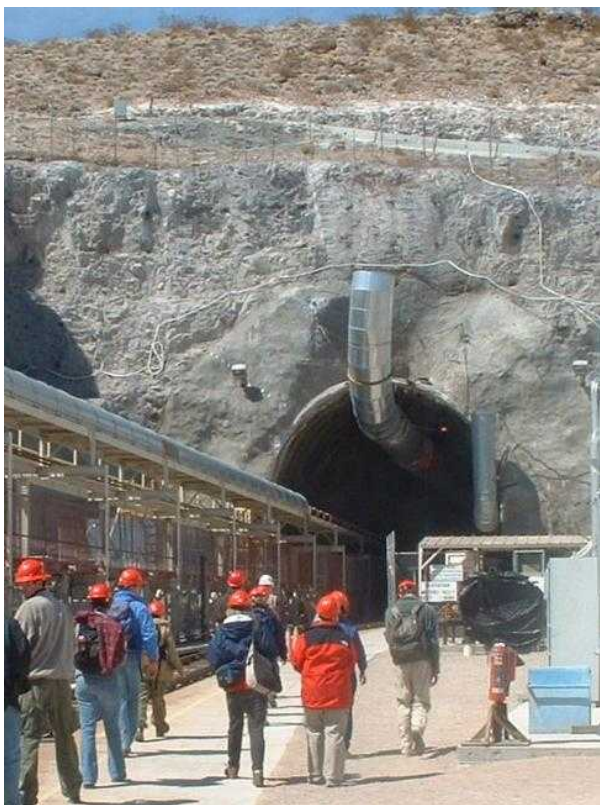
Yucca Mountain

- **Proposed repository for spent nuclear fuel and high-level radioactive waste**
- **Objective of research is to assess risks of disposal system into the future**
- **Arid climate – limited infiltration**
- **Thick unsaturated zone (as deep as 600 m)**
- **Repository located in fractured volcanic tuff**

Yucca Mountain



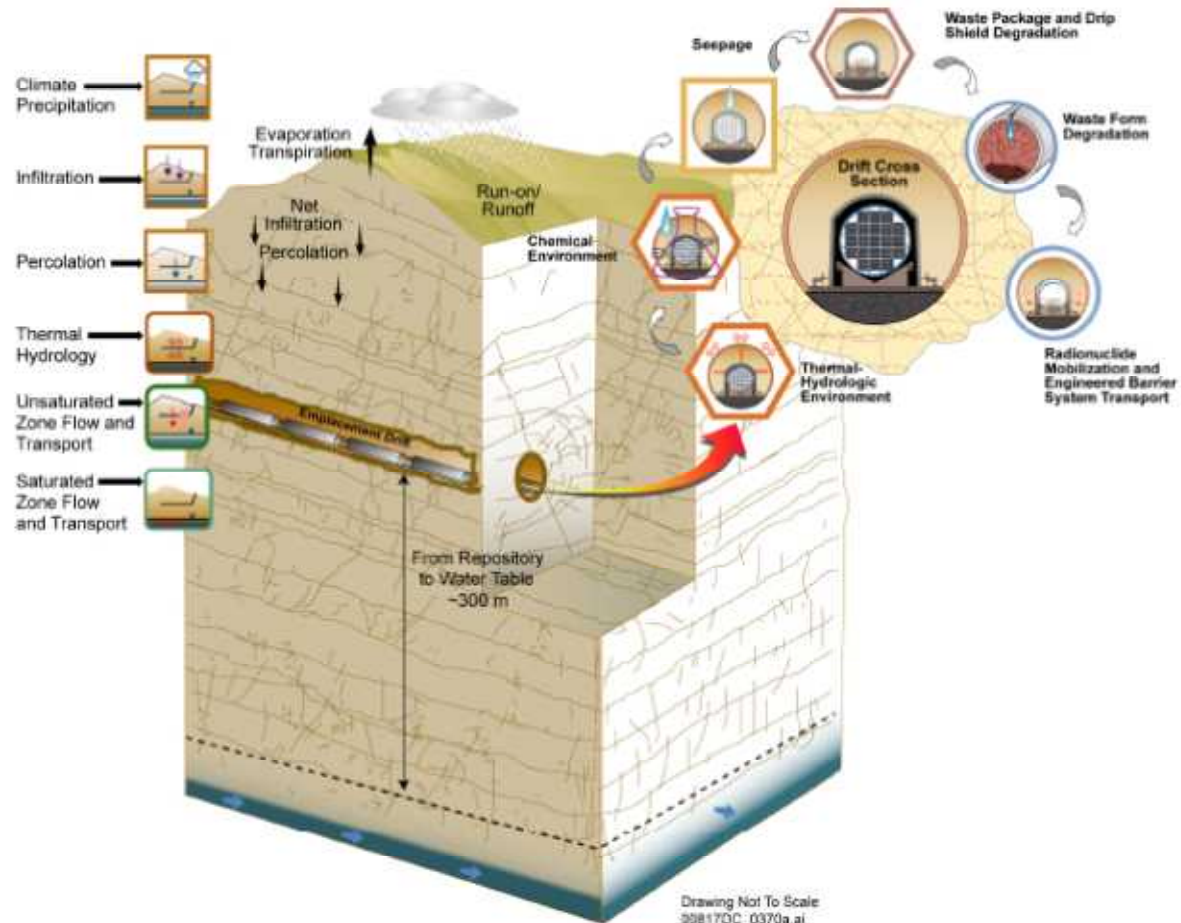
Yucca Mountain



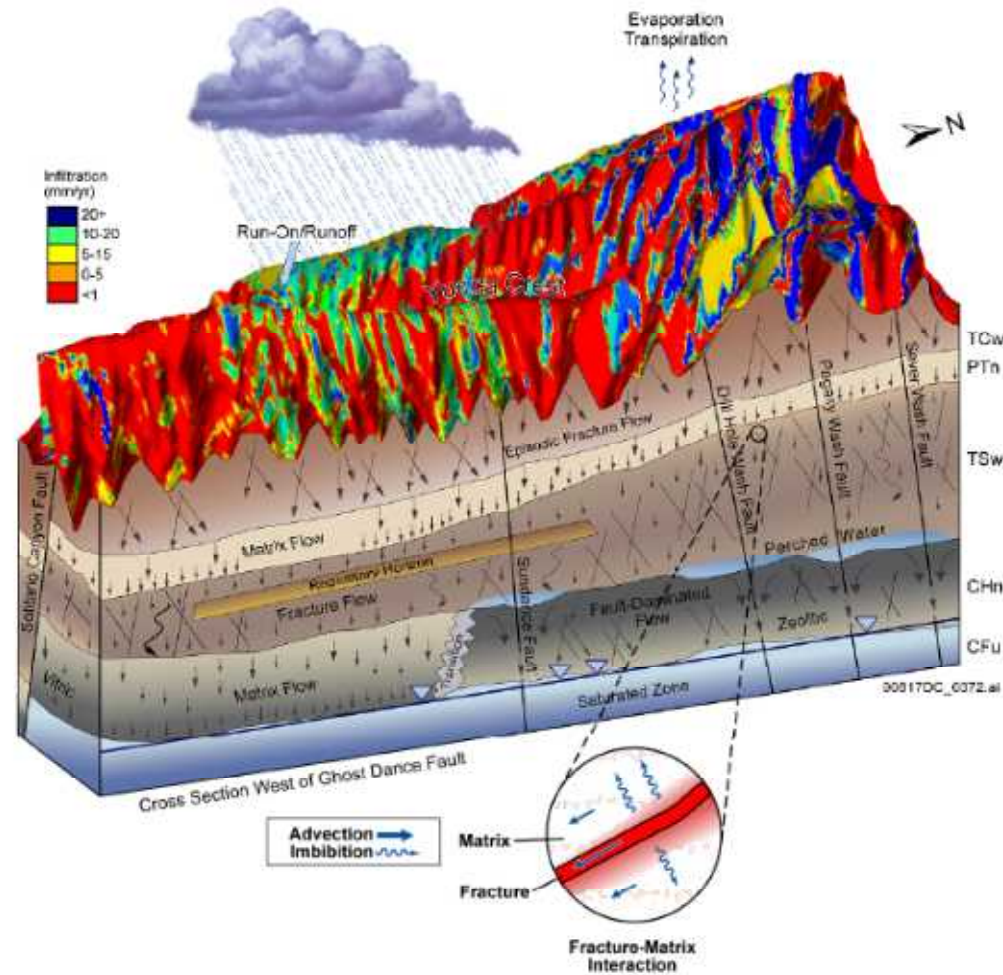
Yucca Mountain



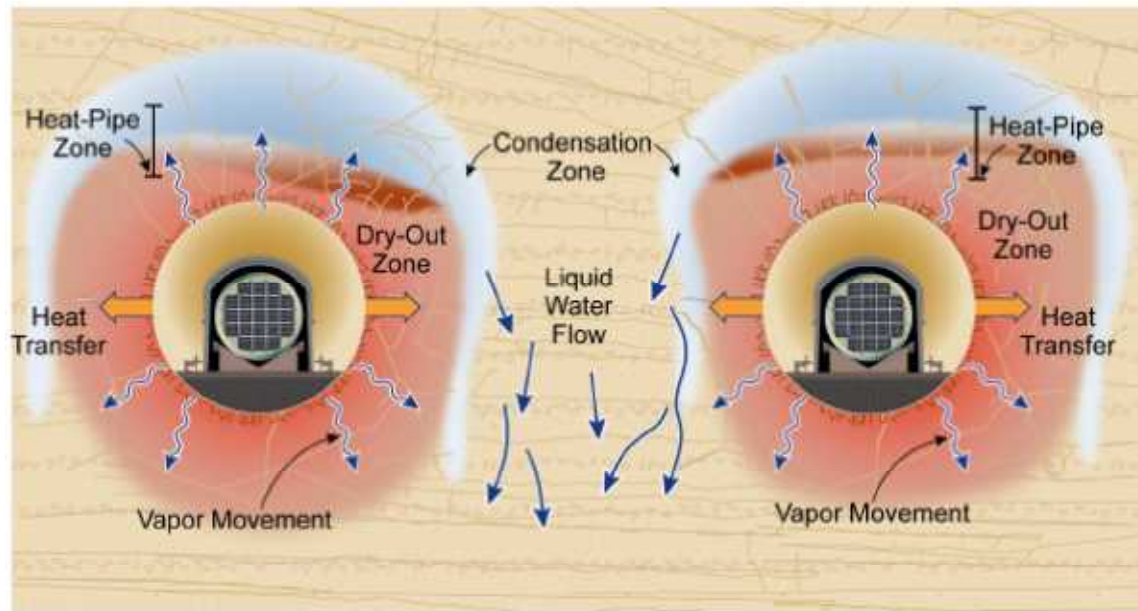
Yucca Mountain



Yucca Mountain

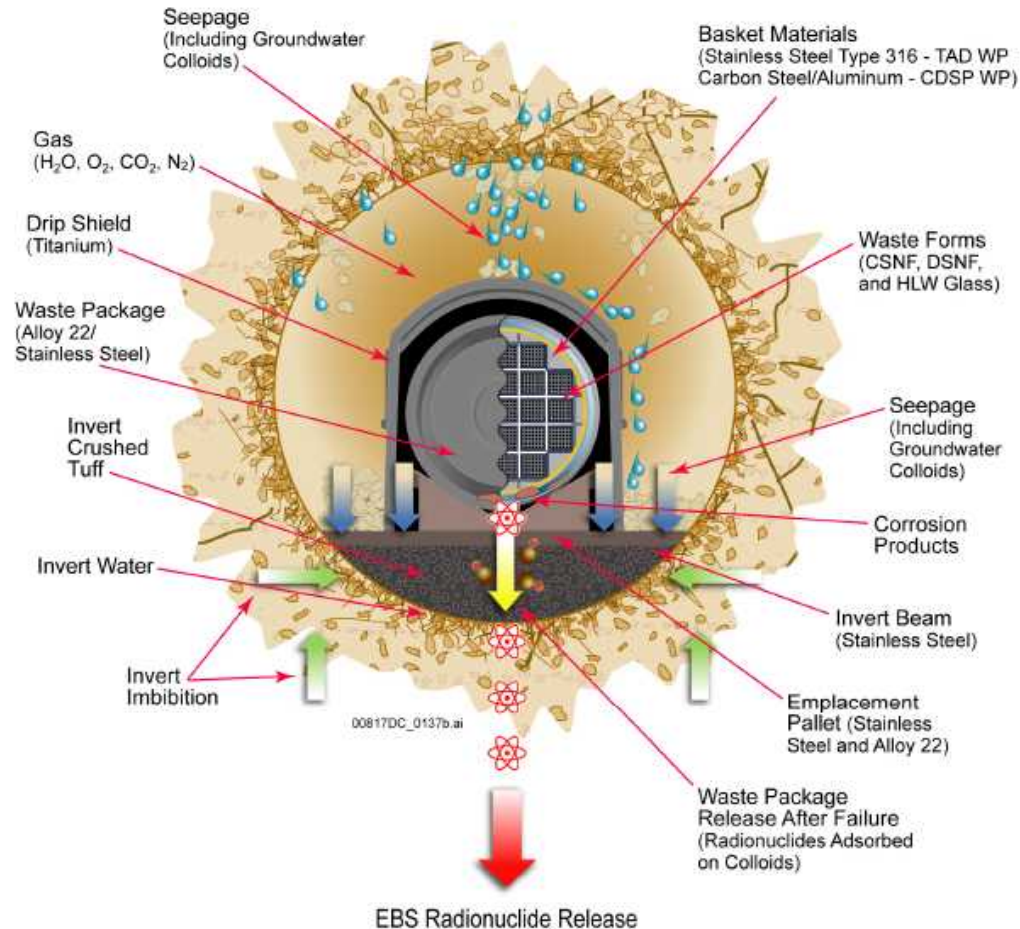


Yucca Mountain

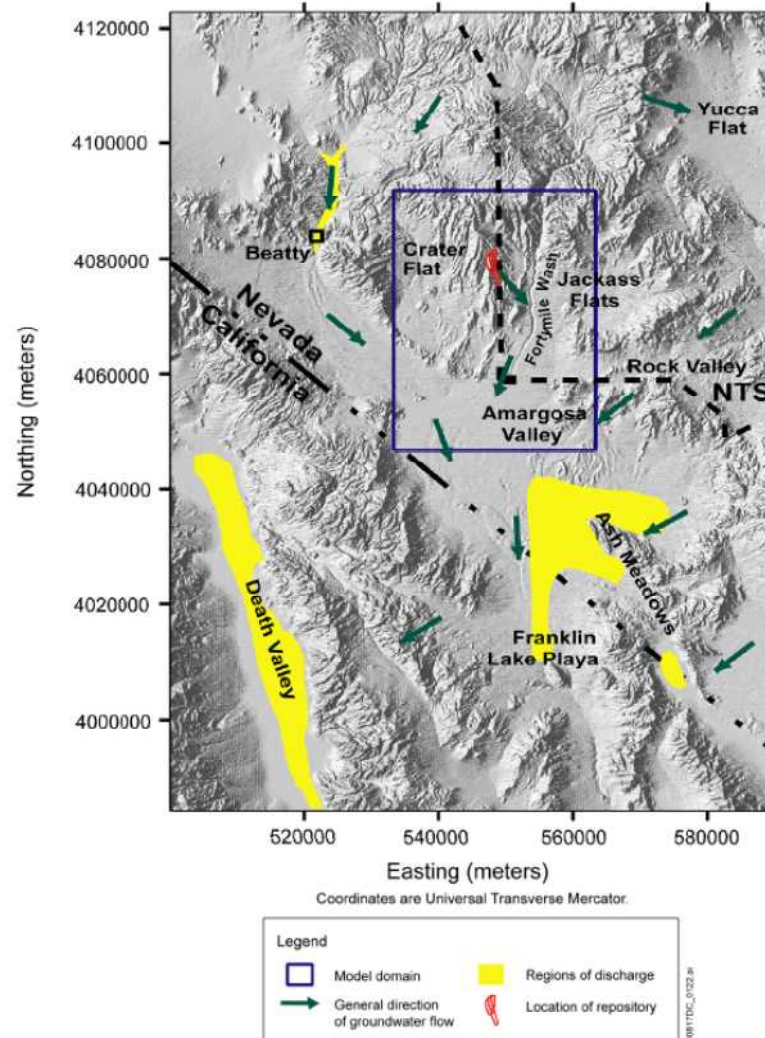


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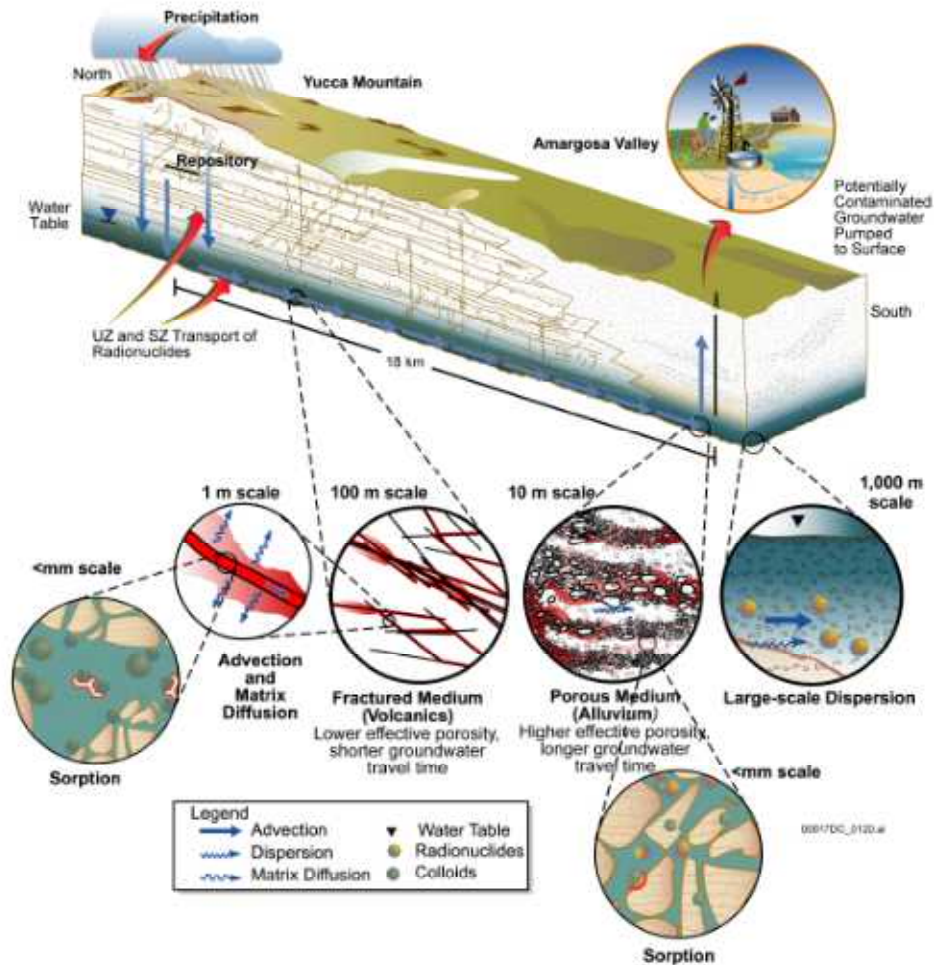
Yucca Mountain



Yucca Mountain



Yucca Mountain





Nevada Test Site

- **Former nuclear weapons testing facility**
- **Near surface disposal cells for low-level radioactive waste at several locations**
- **Arid climate – limited or no net infiltration**
- **Thick unsaturated zone**
- **Disposal cells located in thick alluvium (porous medium)**



Nevada Test Site

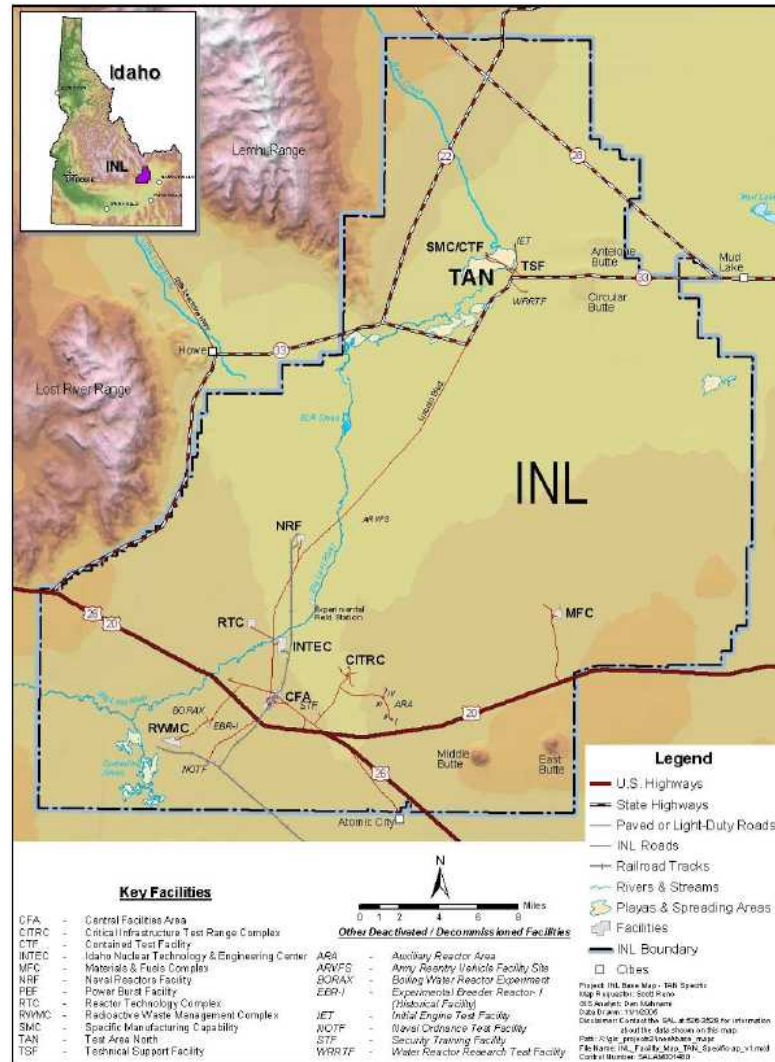




Idaho National Laboratory

- **Nuclear engineering test facilities and fuel reprocessing facilities**
- **Contaminated surface facilities**
- **Underground liquid waste tanks and piping**
- **Contaminated soils from spills in the vadose zone**
- **Semi-arid climate**
- **Thick unsaturated zone**
- **Highly transmissive fractured basalt aquifer in the saturated zone**

Idaho National Laboratory



Idaho National Laboratory

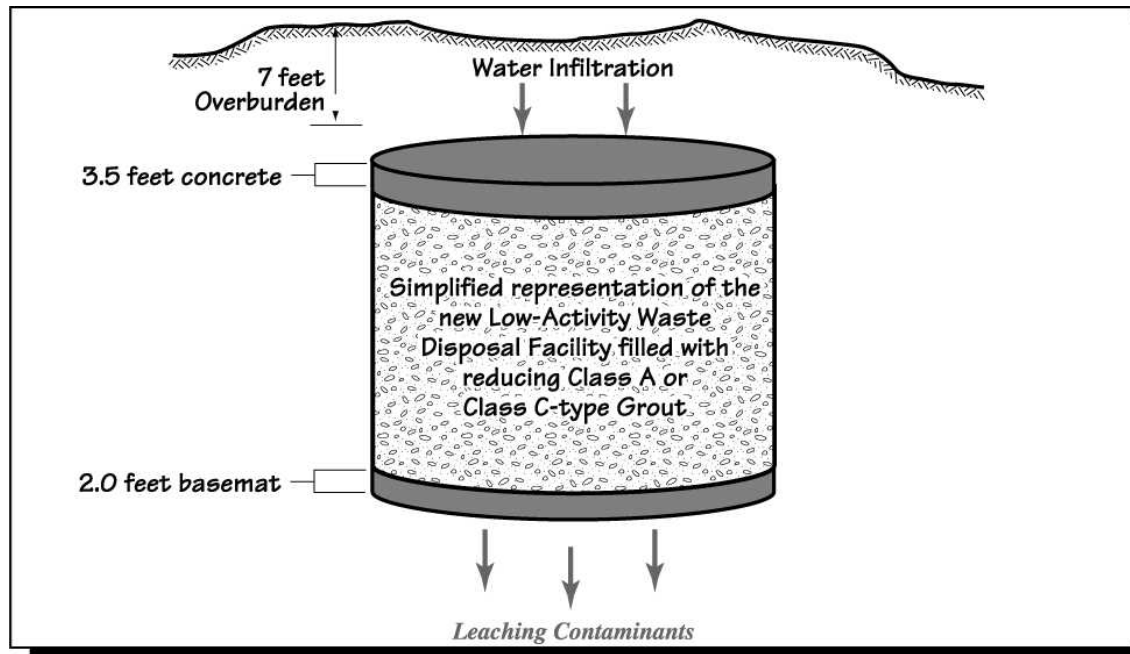


FIGURE C.9-10.

Conceptual diagram of Class A grout disposal in new Low-Activity Waste Disposal Facility.



Repository Programs in Japan and Taiwan

- **Spent nuclear fuel and high-level radioactive waste repository programs are in the research stages**
- **Both Japan and Taiwan are seeking host communities for potential waste disposal sites**
- **Humid climate**
- **Seismically, tectonically, and/or volcanically active countries**
- **Japan has two underground research laboratories with ongoing groundwater hydrology programs**