

Evolution of Repository and Waste Package Design at a Proposed Repository in Volcanic Tuff in the US

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Abstract

Over 30 years, scientists and engineers designed features to complement attributes of the natural barrier such that a proposed repository in volcanic tuff would safely isolate radioactive waste over 10^6 years. Initially, a generic repository layout and engineered barrier design was considered that was applicable to several geologic media. In the 1990s, the engineered design gradually adapted to unsaturated tuff. The repository layout was changed to accommodate a tunnel boring machine. Also, the repository switched from floor emplacement of waste in small, single-walled stainless steel canisters to in-drift emplacement in large, double-walled containers. By 2000, the outer layer was high-nickel material to resist corrosion and the inner layer was stainless steel for strength. To avoid localized corrosion through dripping during the thermal period, titanium drip shields were also added above the package. Finally, a handling canister, sealed at the reactor, was adopted in 2006 to eliminate further handling of fuel.

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