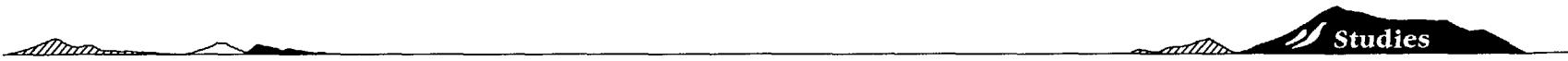


YUCCA
MOUNTAIN
PROJECT



Overview of DOE's Strategy for the Postclosure Safety Case

Presented to:
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Presented by:
Abraham Van Luik
Senior Technical Advisor for Performance Assessment
Office of Licensing and Regulatory Compliance
U.S. Department of Energy



U.S. Department of Energy
Office of Civilian Radioactive
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Focus of Postclosure Safety Case for the License Application

- **Focus is the postclosure performance objective of proposed rule**
- **The safety case will focus on principal factors affecting postclosure performance**
- **TSPA will integrate these factors to demonstrate compliance with the performance objective**
- **The safety case will provide additional information to support finding of reasonable assurance**
 - **Performance margin**
 - **Defense in depth (multiple, diverse barriers)**
 - **Barriers importance assessment**

Safety Case Addresses Four Key Attributes of the Repository System

- **Key Attributes**
 - **Limited water contacting the waste package**
 - **Long waste package lifetime**
 - **Limited mobilization and release of radionuclides from breached waste packages**
 - **Retardation and dilution of radionuclides moving away from breached waste packages**
- **The principal factors are those that are most important to these attributes**
- **TSPA is conducted to determine how well the system, expressed in terms of these factors, performs**

Principal Factors of the VA System Design

~~DOE~~

Key Attributes of Repository System	Principal Factors
Limited water contacting waste packages	Precipitation, infiltration into the mountain, percolation to depth, and seepage into drifts
	Effects of heat and excavation on flow
	Integrity of drip shield
Long waste package lifetime	Humidity and temperature at waste package
	Chemistry of water on waste package
	Integrity of outer waste package barrier
	Integrity of inner waste package barrier
	Seepage into the waste package
Limited mobilization and release of radionuclides from breached waste packages	Integrity of spent nuclear fuel cladding
	Dissolution of SNF and HLW glass waste forms
	Radionuclide solubility
	Formation of radionuclide-bearing colloids
	Integrity of drift invert
Retardation and dilution of radionuclides moving away from breached waste packages	Transport through the unsaturated zone
	Flow and transport in the saturated zone
	Dilution from pumping
	Biosphere transport and uptake

Updating the Safety Case

- **TSPA-VA, considering these factors, showed waste isolation with moderate confidence**
- **We are increasing confidence in the safety case**
 - Enhancements to the system design
 - Improved process models and TSPA components
- **We are also prioritizing the safety case to get at its essential elements--the Principal Factors**
- **The result of this effort will be a focused safety case--this will have important implications for the TSPA**

Preliminary Analyses of the System Design Recommended for LA

- **The information shows most of the radionuclides would be isolated by the site alone**
- **Important factors**
 - **Seepage into the emplacement drifts**
 - **Dissolved radionuclide concentration limits**
 - **Retardation of radionuclide transport in UZ and SZ**
 - **Dilution**
- **These factors alone are effective in reducing the peak annual dose of the less-mobile radionuclides well below the proposed standard**

Preliminary Analyses of Recommended Design (continued)

- Engineered barriers provide additional confidence, particularly with respect to small fraction of relatively mobile radionuclides
- Important factors
 - Environments affecting engineered barriers and waste package *Big challenge for new design build basis for models*
 - Juvenile failures and degradation of EBS and Waste Package barriers
 - SNF cladding initial condition and degradation
- Thus the system provides multiple barriers that enhance postclosure performance

Strategy is Now to Complete the Postclosure Safety Case

- Identification of remaining issues and possible further focusing**
- Specification of additional information needed regarding principal factors to satisfy IRSR acceptance criteria and KTIs**
- Integration of all information supporting the safety case through Process Model Reports (e.g., SZ Flow and Transport Process Model Report)**
- Completion of TSPA and other analyses to satisfy the applicable requirements of 10 CFR Part 63**