



U.S. Department of Energy
Office of Civilian Radioactive Waste Management



MC&A Planning for Yucca Mountain

Presented by

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Introduction

- **The Presentation will include**
 - **An overview of the proposed Yucca Mountain (YM) Geologic Repository**
 - **Highlights of the NRC MC&A requirements on YM**
 - **The fundamentals of YM MC&A**
 - **Elements of the YM MC&A accounting system**



The Geologic Repository

- DOE will construct and operate the proposed YM geologic repository for spent nuclear fuel (SNF) and high-level radioactive waste (HLW)
- The Nuclear Waste Policy Act of 1982 established OCRWM in DOE to implement the waste policy
- In July 2002, the President signed the joint congressional resolution designating Yucca Mountain for development as a repository



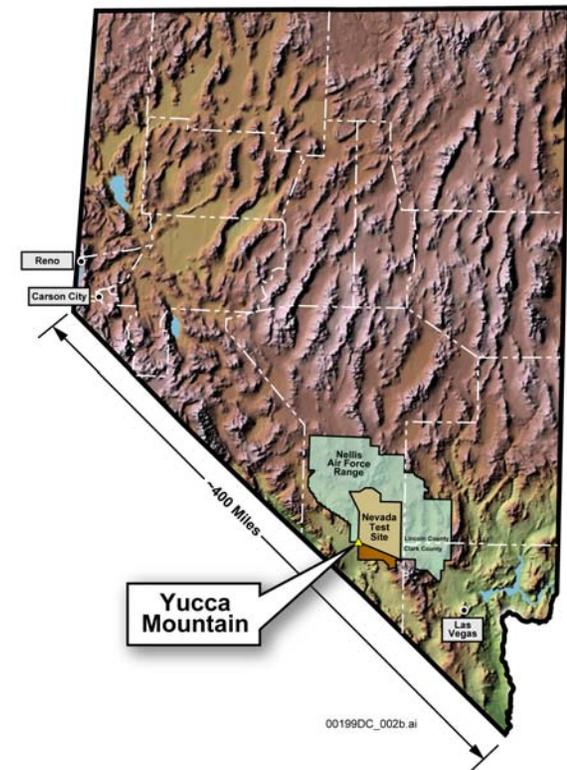
Geologic Repository Concept

- The repository will be located in a desert about 100 miles NW of Las Vegas
- YM is a ridge comprised of layers of rock from volcanoes that erupted 11-14 million years ago
- YM is a closed hydrologic basin
- Waste will be placed in metal containers some 1,000 feet under ground protected by robust engineered barriers to safely isolate highly radioactive nuclear waste for >10,000 years



Location of Yucca Mountain

Ground water in the hydrologic basin does not flow into any rivers or oceans, and is isolated from the aquifer systems of Las Vegas and Pahrump, the largest community in Nye County

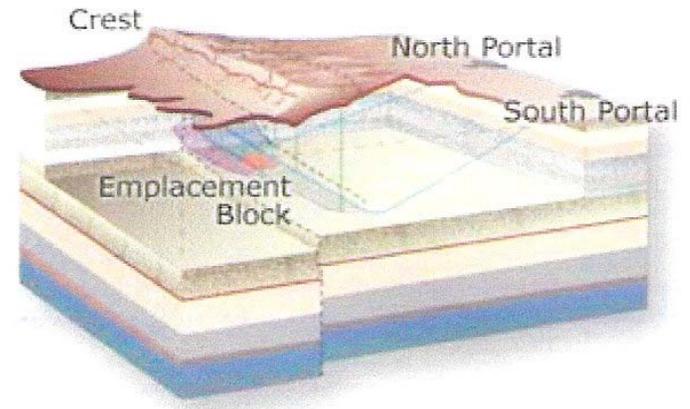


Waste Emplacement

The repository design includes more than 50 horizontal tunnels for storing the waste

These tunnels would be excavated in solid rock about 1,000 feet beneath the surface of the mountain and, on average, about 1,000 feet above the water table

The tunnels would be 16.5 feet in diameter and about 2,000 feet long and would be reinforced with steel sets, rock bolts, and wire mesh to prevent rock from falling on the engineered barriers

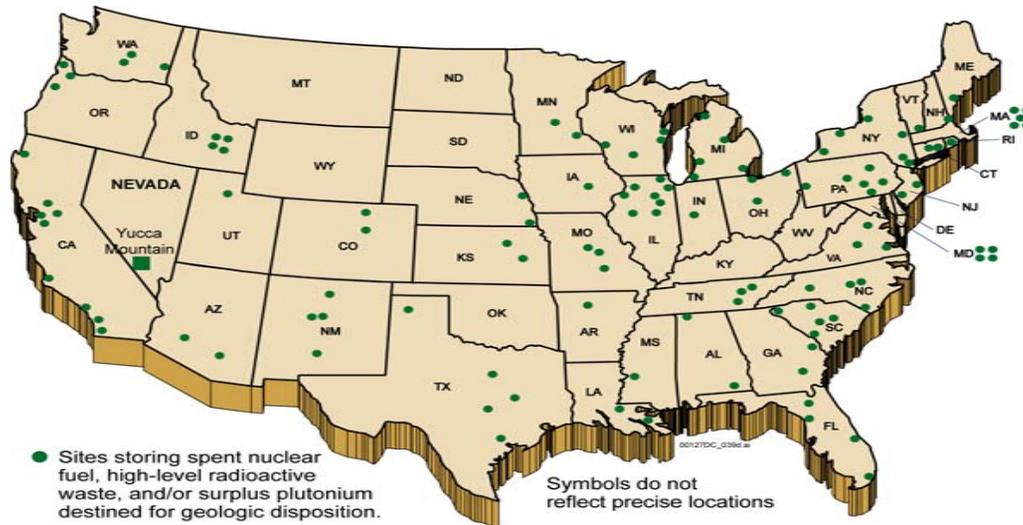


Nuclear Waste Profile

Nuclear waste is now located at 121 sites in 39 states

YM is expected to accept 70,000 metric tons (MT) of SNF and HLW for disposal

- 63,000 MT commercial SNF from power plants
- 7,000 MT SNF from DOE test or research reactors and HLW from DOE defense production sites



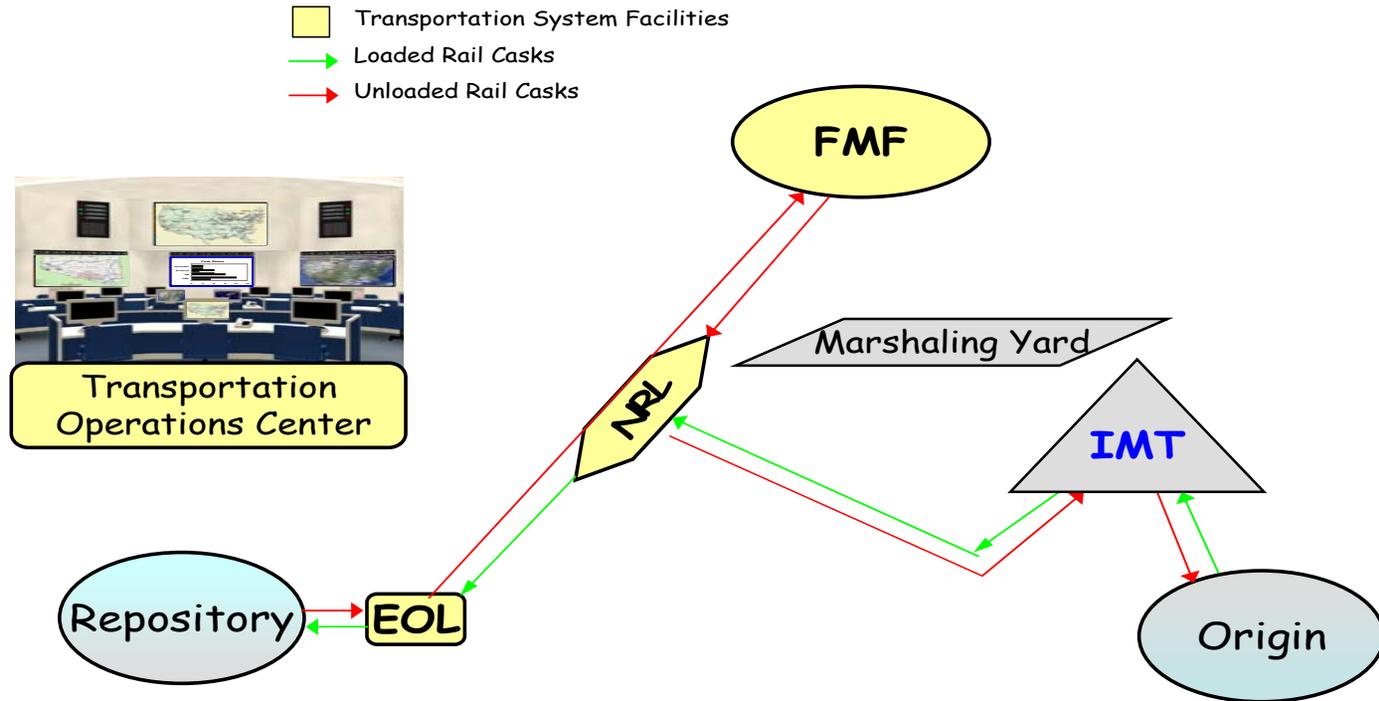
Shipment Modes to YM

- DOE will take title to commercial SNF prior to departure of a loaded cask from storage site
- DOE agrees to accept SNF for disposal when verified consistent with Appendix E and F of Standard Contract, 10 CFR 961
- Shipments by rail
 - Use existing Regional and Class 1 rail network
 - Considering Nevada rail interchange alternatives
 - Caliente is at a Union Pacific (UP) connector
 - Nevada Rail Line construction is planned to transport rail shipments from the UP mainline to YM
- Some shipments by conventional highway truck



Shipping Nuclear Waste

Rail Shipment Via Inter-Modal Transfer



- **IMT = intermodal transfer facility**
- **FMF=fleet maintenance facility**
- **NRL=Nevada rail line**
- **EOL=end of line facility**



Shipments to YM

- Waste will be placed in canisters for transportation, aging and disposal (TADs), loaded into casks at the origin site, and prepared for shipment
- Reusable shipping casks will be placed on rail cars or trucks for transport to Nevada
- All shipments to YM will be reported to the NMMSS



Important FY 2007 Objectives

- Develop a license application based on a safer and simpler approach to handling SNF and HLW
 - Known as the clean-canistered approach
- The TAD canister minimizes handling of assemblies and limits need for multiple complex surface facilities at YM
- The TAD canister provides simplification in repository design, licensing, construction and operation



Simplified Fuel Handling

- SNF will be delivered to YM primarily in TADs which will eventually be placed in waste packages
- TADs, once sealed at the shipping utility, will remain sealed
- Coordination with utilities and NRC will be necessary in implementing this approach



NRC License Approval Needed

10 CFR 63.3, *License required.*

“(a) DOE may not receive nor possess source, special nuclear, or byproduct material at a geologic repository operations area at the Yucca Mountain site except as authorized by a license issued by the Commission under this part.”

“(b) DOE may not begin construction of a geologic repository operations area at the Yucca Mountain site unless it has filed an application with the Commission and has obtained construction authorization as provided in this part. Failure to comply with this requirement is grounds for denial of a license.”



NRC MC&A Requirements on YM

References: 10 CFR 961, Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste; OCRWM's Spent Nuclear Fuel Verification Plan; NUREG 1804, *Yucca Mountain Review Plan*

- An MC&A Plan and detailed procedures will be required (10 CFR 63)
- Records showing receipt, inventory (including location), disposal, acquisition, transfer of SNF and HLW, including provision to maintain inventory during any retrieval operations



NRC MC&A Requirements on YM

- The OCRWM Spent Fuel Verification Plan in 1977:
 - Established conceptual framework for the verification process at the shipper's site
 - Was distributed to all utilities contract holders
 - The information collected will be used for verification for MC&A purposes
- A copy of the verification plan may be obtained from
 - ◆ Dave Zabransky, dave.zabransky@hq.doe.gov
 - ◆ Tom Pollog, thomas.pollog@hq.doe.gov



Yucca Mountain MC&A

Reporting Requirements (10 CFR 63)

- A physical inventory of SNF and HLW in storage will be made at intervals not to exceed 12 months (unless directed otherwise by the NRC)
- Material status report as of March 31 and September 30 is to be filed within 30 days after the end of the period covered by the report
- Records of SNF or HLW in storage will be kept in duplicate at separate locations, so a single event will not destroy both sets



NRC MC&A Requirements on YM

- Checks and balances ensure that falsification of data and reports that could conceal a diversion of HLW by employees acting individually, or in collusion, will be readily detected
- Notification to the NRC Operations Center is required within one hour of discovery of accidental criticality or loss of SNM using the Emergency Notification System
- The anomaly reporting system will respond promptly to alarms indicating a potential loss of SNM and allows determination of whether the condition is caused by an actual loss or error



Fundamentals of YM MC&A

- Shipper's accountability values will be calculated or estimated by the utility
- Because the NRC requires confirmation of licensee calculations and records, requiring the information to be submitted to OCRWM under an NRC QA program will eliminate the need for OCRWM to perform any additional confirmation exercises
- YM will accept shipper's values as provided and not require additional receiver measurement



Fundamentals of YM MC&A

- Item level accountability; combination of items into a new item identity will be practiced
- Daily administrative checks in above ground areas
- NRC licensee reporting identification symbol (RIS) will be established



The YM Accounting System

- Accounting system must accommodate information that is classified, unclassified and unclassified safeguards information (SGI)
- Intent to use the DOE standard system, Local Area Nuclear Material Accountability Software (LANMAS)
- Electronic classified and unclassified data transmission with NMMSS and facilities in accordance with NMSS Report D-24, “Personal Computer Data Input for U.S. NRC Licensees.”



The YM Accounting System

- Use of encrypted email to send/receive unclassified data
- Use of safeguards management software (SAMS) for data editing
- Weekly full system backup copies: one for offsite storage and one kept on site

