

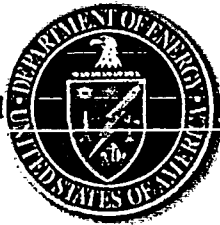


U.S. Department of Energy
Office of Civilian Radioactive Waste Management



DOE/NRC Quarterly Management Meeting

March 21, 2006
Rockville, Maryland



U.S. Department of Energy

OFFICE OF CIVILIAN RADIOACTIVE
WASTE MANAGEMENT

Licensing Update

Presented to:

DOE/NRC Quarterly Management Meeting

Presented by:

Mark Williams

Director, Office of License Application and Strategy

Office of Repository Development

U.S. Department of Energy

March 24, 2006

Rockville, Maryland

Main Topics

- **Licensing Support Network**
- **Aircraft Hazards Analysis**
- **Design Control**
- **Audit Observation Report OAR-05-05**
- **Level of Design Detail**
- **Peña Blanca Appendix 7 Meeting**
- **Future Interactions**



Licensing Support Network

- DOE continues to process new documents for LSN
 - 3.35M documents crawled by NRC, up from 2.1M in June 2004
 - Approximately 1M documents publicly available
 - Approximately 15,000 new documents added each month
- DOE will certify LSN not less than 6 months prior to License Application submittal



Aircraft Hazards Analysis

- **Issues**

- Flight restrictions
- Credit for pilot actions
- Frequency Analysis updates
- DOE request for NRC reports

- **Path forward**

- DOE intends to show that aircraft crash is not a credible hazard
- DOE continues to work with US Air Force on flight restrictions
- DOE plans to take no credit for pilot actions in analyses
- Updated frequency analysis will be provided to NRC after CD-1
- DOE will re-visit need for NRC reports



Design Control

- **Issue**
 - Timing of implementation of design control process for Critical Decision – 1 (CD-1)
- **Background**
 - DOE continues to implement design control and plans to conduct a validation review in April 2006
- **Path forward**
 - OCRWM managing development of CD-1 in accordance with DOE requirements
 - After the CD-1 decision
 - ♦ Potential changes to the repository design will be identified
 - ♦ Baseline will be updated to incorporate design changes and managed under design control procedures



Observation Audit Report OAR-05-05

- The NRC identified 5 technical Audit Observation Inquiries (AOIs) and 2 technical weaknesses in the January 9, 2006 Observation Audit Report
 - AOI-1: Drift Scale Thermal Hydrologic Chemical Seepage Analysis Model Report
 - AOI-2: Analysis of Dust Deliquescence for Features, Events, and Processes Screening
 - AOI-3: Inconsistencies for Overall Localized Corrosion Modeling
 - AOI-4: Referencing Cancelled Documents
 - AOI-5: Use of Viasala Humidity Probes at Temperatures Outside Their Calibrated Range
 - Weakness-1: Reduction in scope of audit and timely availability of audit checklists
 - Weakness-2: Lack of participation of technical specialists in the audit



Observation Audit Report OAR-05-05

(Continued)

• Path Forward

- DOE initiated condition reports to document issues raised by the NRC in their report
- Single management board (DOE/BSC) oversees and integrates issues raised from this event
- Independent review team commissioned by Acting Program Director
- Status briefings provided to NRC On-site Representatives
- DOE is preparing a response for the AOIs and technical weaknesses



Level of Design Detail History

- DOE reviewed previous feedback from NRC to capture issues on level of design detail
 - NRC Letters
 - ♦ 12/2003 - Comments on sample LA Heating Ventilation Air Conditioning section
 - ♦ 10/2004 - The Design of the Proposed Surface and Subsurface Facilities at Yucca Mountain
 - Technical Exchange Meeting Summaries
 - ♦ 11/2002 - Phased Repository/Alternative Design
 - ♦ 2/2004 - Pre-Licensing Activities and the Level of Detail in the LA
 - ♦ 5/2004 - Identification of Structures, Systems, and Components (SSCs) Important to Safety
 - ♦ 9/2004 - Design of the Proposed Surface and Subsurface Facilities
 - ♦ 7/2005 - Information to Support 10 CFR 63 Analyses



Level of Design Detail History

(Continued)

- Much of the feedback has already been incorporated into the draft LA or will be as design and analysis are completed
- Issues for further discussion with NRC staff:
 - Demonstration of reliability of Passive Important to Safety (ITS) SSCs
 - Design information for Transport-Age-Dispose canisters (TADs), (previously site-specific casks)
 - Utilization of precedent for natural initiating events under 10CFR63.102(f)
 - Uncertainties and margins for Preclosure Safety Analysis (PCSA)
 - Consideration of human reliability
- Items being introduced today
 - Demonstration of achieving reliability requirements for Active ITS SSCs
 - Preclosure seismic safety strategy



Level of Design Detail to Demonstrate Active SSCs Reliability Requirements are Met

- **Design details for the ITS SSCs will be enhanced**
 - Ventilation and instrumentation diagrams, process and instrumentation diagrams, electrical one lines, logic diagrams, schematic/block diagrams
- **Analyses will be performed to demonstrate that reliability requirements for active ITS SSCs are met**
 - Collect industry data on similar systems (e.g., cranes); and/or
 - Perform fault tree modeling on the design
 - ♦ Collect component data
 - ♦ Assess common-cause failure
 - ♦ Assess uncertainties
- **Similar level of detail as previously developed for HVAC/HEPA system - Technical Exchange to be planned**



Preclosure Seismic Safety Strategy

- **January 24, 2006 NRC letter states:**
 - **Seismic design bases, and design codes and standards, consistent with regulatory requirements**
 - **Seismic Margins Analysis (SMA) approach is useful but “is not a substitute for demonstrating compliances with the performance objectives in §63.111(b)(2)”**
 - **Suggested “additional supporting analyses” to demonstrate compliance**
 - ♦ **Develop probability of seismic failure through convolution of hazard curves and fragility curves to demonstrate the probability of unacceptable performance for seismically initiated event sequences is less than 1 in 10,000 over the preclosure period”**
- **DOE understands the letter is limited to seismically initiated events and believes the combination of the SMA approach and probabilistic seismic analysis will demonstrate compliance with regulations**



Preclosure Seismic Safety Strategy

(Continued)

- In consideration of NRC's January 24, 2006, letter, DOE will augment seismic margins analysis with probabilistic seismic analyses
- Probabilistic seismic analysis consists of the following:
 - Development of the site- specific seismic hazard function
 - Development of seismic event trees
 - Performance of fragility analyses of SSCs
 - Performance of convolution analyses
- The objective of the probabilistic seismic analysis is to demonstrate that the annual probability of seismically initiated event sequences having potential doses that exceed Category 2 limits is less than 1 in 10,000 during the preclosure period
- Approach consistent with American Society of Civil Engineers Standard 43-05, Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities
- SSCs will be redesigned if convolution analysis does not confirm required seismic performance



Peña Blanca Appendix 7 Meeting

- Purpose of meeting (2/16/06) was to discuss data and models related to movement of groundwater through unsaturated tuff from uranium deposit
- Site has been studied for many years by DOE and NRC staff and contractors
- Studies provide valuable insights in support of TSPA models for radionuclide transport
- Meeting provided productive interchange of data and opportunity to coordinate additional planning for field work and sample collection in June 2006



Future Interactions

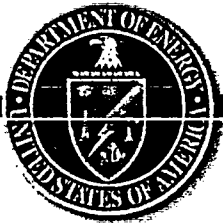
- **Programmatic Issues**

- Corrective Action Program
- Evaluation of issues raised by E-mails of former project participants
- Critical Decision 1 (CD-1) Process and Status

- **Technical Issues**

- Demonstration of achieving reliability requirements for Active ITS SSCs
- Preclosure Seismic Safety Strategy
- Demonstration of reliability of Passive ITS SSCs
- Utilization of precedent for natural initiating events under 10CFR63.102(f)
- Uncertainties and margins for PCSA
- Consideration of human reliability
- Aircraft Hazards Analysis
- Design information for TADs





U.S. Department of Energy

OFFICE OF CIVILIAN RADIOACTIVE
WASTE MANAGEMENT

Design and Engineering Update

Presented to:
DOE/NRC Quarterly Management Meeting

Presented by:
Paul Harrington
Acting Director, Office of Project Management and Engineering
Office of Civilian Radioactive Waste Management
U.S. Department of Energy

March 21, 2006
Rockville, Maryland

Main Topics

- **Critical Decision-1 Revision Process**
- **Potential Features of Revised Design Approach**
- **Preclosure Safety Analysis Impacts**
- **Independent Engineering Study**



Critical Decision-1 Revision Process

- **October 25, 2005, DOE directed contractor to develop revised Critical Decision-1 (CD-1) package, including Conceptual Design Report, for selection of preferred alternative and range cost estimates for canister-based waste handling**
- **Implementation of canister-based approach**
 - **Commercial spent nuclear fuel (CSNF) generally would be sent to the repository in a Transportation, Aging and Disposal canister (TAD)**
 - **CSNF would not require repetitive handling prior to disposal**
 - **Canister handling would result in cleaner facilities**



Critical Decision-1 Revision Process

(Continued)

- On February 14, 2006, DOE selected a recommended configuration to be developed in the Critical Decision-1 revision package
 - Modular, flexible configuration
 - 90% of CSNF received in TADs; 10% of CSNF waste stream as uncanistered SNF assemblies
 - Adds dedicated facilities for receipt and waste package (WP) closure
- Critical Decision-1 package being developed, including:
 - Conceptual Design Report
 - Preliminary Hazard Analysis
 - Risk Assessment
 - Project Execution Plan
 - Cost and schedule information



Critical Decision-1 Revision Process

(Continued)

- Until Energy Systems Acquisition Advisory Board (ESAAB) review and approval, anticipated in May 2006, this information is preliminary
- Following ESAAB approval, design development and updates to preclosure and postclosure safety analyses to support License Application (LA) will be performed



Potential Features of Critical Decision-1 Revision

- **Revised sets of surface facilities**
 - Receipt Facility accepts TADs and Dual Purpose Canisters (DPCs) and sends to aging
 - Canister Receipt and Closure Facility (CRCF) accepts TADs and other disposable canisters and inserts into WPs
 - Wet Handling Facility accepts uncanistered CSNF or DPCs, transfers to TADs, and sends TADs to CRCF or aging
- **Subsurface layout unchanged**
- **CSNF WPs similar to naval long WPs**
 - TADs similar in size to naval long canisters



Potential Features of Critical Decision-1 Revision

(Continued)

- **Uncanistered CSNF assembly handling performed in pools**
- **Canister handling generally performed with local shielding**
- **Waste packages to include shield plugs to support local access during WP closure operations**
 - **Shield plugs included in full-diameter canisters (TADs, naval) and in WPs for small-diameter canisters (DOE SNF and high-level waste)**
- **Deletion of separate site rail system and associated transportation cask transfers**



Potential Effects on Preclosure Safety Analysis

- Category 1 event sequences reduced or eliminated due to reduction of number of uncanistered CSNF assembly lifts
- Consequence of uncanistered CSNF drops reduced due to confinement provided by pool
- Category 2 event sequences likely little changed
- Important To Safety classification still expected for structures, lifting/handling equipment, electrical power, ventilation systems



Independent Engineering Study

- **Independent systems engineering study performed**
- **Similarities to BSC recommendation**
 - **Wet handling of uncanistered CSNF assemblies**
 - **Canister handling uses local shielding**
- **Differences from BSC recommendation**
 - **Equipment for handling canisters**
 - **Potential for underground aging**
- **Evaluate further through Value Engineering studies during preliminary design development**



Summary

- **Canister-based design will simplify waste handling**
- **Until ESAAB review and approval, anticipated in May 2006, this information is preliminary**
- **Following ESAAB approval, baseline will be updated and LA products developed**
- **Greatest changes in surface facilities, less in subsurface and waste packages**
- **Event sequences will be minimized and consequences likely reduced**

