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

Revision of OCRWM FY 2001 Workplan

Presented to:
Nuclear Waste Technical Review Board

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YUCCA MOUNTAIN PROJECT

Presentation Outline

- FY 2001 Plan Overview
- Revised Site Recommendation (SR) Approach
- SR Documentation
- FY 2001 Workscope
  - Quantification of Uncertainties
  - Corrosion
  - Lower-Temperature Operating Modes
  - Multiple Lines of Evidence
- Summary of Revised SR Approach

FY 2001 Plan Overview

- **Bechtel SAIC submitted the updated FY 2001 plan to DOE on April 30, 2001 for review and approval**
- **The plan focuses on the remaining analyses and documentation needed to support a Secretarial decision on site recommendation by early FY 2002**
- **The plan reflects a revised SR approach**
- **It also includes high level planning for the work needed to complete a License Application (LA), if the site is recommended and designated**

Revised SR Approach

- **Based on a flexible repository design that can be operated over a range of thermal operating modes**
- **Builds on TSPA-SR Rev 00 ICN 1, which assumed a higher-temperature operating mode**
- **Evaluates repository performance across a range of temperatures and in-drift environmental conditions, and develops design details as needed to support performance evaluations and to verify design feasibility and constructibility**
- **Other design details will be developed as the design evolves towards LA, if the site is recommended and designated**

Revised SR Approach
(Continued)

- **Addresses key NWTRB issues:**
  - **Meaningful quantification of conservatism and uncertainties in TSPA**
  - **Progress in understanding fundamental processes in predicting rate of corrosion**
  - **Evaluation and comparison of the base-case design with a low-temperature design**
    - **Addressed by evaluating performance of a single flexible design over a range of thermal operating modes**
  - **Multiple lines of evidence for the safety case that are derived independently of TSPA**

SR Documentation

- **Yucca Mountain Science & Engineering Report**
  - **Issued on May 4, 2001**
  - **Updates site and design information since the 1998 Viability Assessment**
  - **Initiated state and public review of SR decision materials**
- **Supplement to Draft Environmental Impact Statement (SDEIS)**
  - **Also issued on May 4, 2001**
  - **Incorporates range of repository thermal operating modes**
  - **Kicked off a 45-day SDEIS public comment period**

SR Documentation
(Continued)

- **Supplemental Science and Performance Analyses**
  - **Summer 2001**
  - **Volume I – Scientific Bases and Analyses**
    - **New science**
    - **Alternative (usually, less conservative) process models with revised ranges of uncertainties**
    - **Descriptions of how process models were modified to reflect the potential effects of a cooler operating mode**
  - **Volume II – Performance Analyses**
    - **TSPA sensitivity studies that investigate the effects on predicted performance of alternative process models, revised ranges of uncertainty, and cooler operating modes**

SR Documentation
(Continued)

- **Preliminary Site Suitability Evaluation**
  - **Summer 2001**
  - **Preliminary evaluation against DOE's site-suitability guidelines in proposed 10 CFR 963**
  - **Will evaluate repository performance over a range of thermal operating models**
  - **Key references are the Science and Engineering Report and associated Analysis and Model Reports, and the Supplemental Science and Performance Analyses**
  - **Will be updated based on public comments and any changes to 10 CFR 963**

FY2001 Workscope
Quantification of Uncertainties

- **Unquantified uncertainties in TSPA are associated with conservative parameter bounds, conservative and optimistic models and assumptions, and conservatively biased parameter distributions**
- **Review the treatment of conservatisms and uncertainties in TSPA-SR Rev. 00 ICN 1**
- **Assess unquantified uncertainties**
- **Conduct component-level analyses of these uncertainties and identify their significance**

FY2001 Workscope

Quantification of Uncertainties

(Continued)

- **Incorporate significant uncertainties in supplemental TSPA, using TSPA-SR Rev. 00 ICN 1 model**
- **Continue TSPA analyses on less significant uncertainties**
- **Develop guidance for treatment of uncertainties in future analyses and modeling efforts**

FY2001 Workscope
Corrosion

- **Develop conceptual model for passive film stability**
- **Identify thermal and chemical dependencies of long-term corrosion rates**
- **Identify appropriate natural analogs that provide other lines of evidence related to corrosion mechanisms**
- **Conduct short-duration tests to address specific corrosion modes**
- **Conduct waste package corrosion peer review**
- **Continue additional testing and analyses to evaluate corrosion degradation rates**

FY2001 Workscope
Lower-Temperature Operating Modes

- **Change requirements in existing requirements documents that conflict with a lower-temperature operating mode**
- **Support screening of design-related FEPs for lower-temperature operating environments**
- **Conduct engineering analysis of one representative lower-temperature operating mode**
- **Conduct parametric studies to explore ways in which lower temperatures could be achieved through variable design and operating parameters**

FY2001 Workscope

Lower-Temperature Operating Modes

(Continued)

- **Identify thermally dependent physical processes with most potential impact on system performance, considering both model uncertainty and a range of thermal operating environments**
- **Review how thermal dependencies were incorporated in TSPA-SR Rev. 00 ICN 1 models**
- **Develop alternative models that more fully encompass the range of possible thermal effects**
- **Establish whether existing abstractions for process models are adequate and defensible over a range of operating environments**

FY2001 Workscope

Lower-Temperature Operating Modes

(Continued)

- **Develop numerical simulations of thermal-hydrologic-chemical environments for higher and lower thermal operating modes**
- **Conduct "one-off" calculations using TSPA-SR Rev 00 ICN 1 model with updated inputs, including unquantified uncertainties inputs and new science**
- **Update TSPA model (GoldSim) to build new TSPA model to include new science (e.g., long-term climate model) and important findings from unquantified uncertainties**
- **Run new full-system TSPA using updated model for both higher- and lower-temperature environments**

FY2001 Workscope

Lower-Temperature Operating Modes

(Continued)

- **Initiate in situ and laboratory testing to determine thermal rock characteristics**
- **Continue laboratory ventilation testing to support in-drift models**
- **Continue model comparisons to observations from in situ coupled processes testing**
- **Define, develop, and prepare to implement systematic decision process to select design parameters and ranges of operating modes for inclusion in the LA, if the site is recommended and designated**

FY2001 Workscope
Multiple Lines of Evidence

- **Document other lines of evidence that support component models**
- **Document technical arguments based on multiple lines of evidence to support understanding of the natural and engineered systems, and the applicability of process models over extended ranges of temperature**
- **Develop appropriate natural analogs that provide other lines of evidence related to corrosion mechanisms**
- **Continue site-specific natural analog studies**
  - **Peña Blanca**
  - **Yellowstone**

Summary of Revised SR Approach

- **A single flexible design that preserves the ability to operate the potential repository over a range of thermal operating modes**
- **Analysis of previously unquantified uncertainties**
- **Analysis of lower-temperature operating environments**
- **Focus on waste-package corrosion**
- **Incorporation of multiple lines of evidence**