Revision of OCRWM FY 2001 Workplan

Presented to:
Nuclear Waste Technical Review Board

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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
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
• 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