U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING

SUBJECT: PURPOSE AND SCOPE OF TOTAL SYSTEM PERFORMANCE ASSESSMENT

PRESENTER: DR. JEREMY BOAK

PRESENTER'S TITLE AND ORGANIZATION: ACTING CHIEF OF THE TECHNICAL ANALYSIS BRANCH
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
LAS VEGAS, NEVADA

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DALLAS, TX
APRIL 7-8, 1992
Outline

- Purpose
- Scope of the Total System Performance Assessment (TSPA)
- Participants
- Selected steps in TSPA analyses
- Caveats
- Schedule
Purpose

• Help develop an "abstraction" process necessary for future total-system performance assessments
  - Essential features distilled from computationally complex models
  - Not necessarily "simple"

• Compare results from two alternative approaches
  - Common information set established

• Demonstrate production of a meaningful estimate of system performance
  - Release of nuclides at the AE shown via Complementary Cumulative Distribution Functions (CCDF)
The PA Pyramid: A Hierarchy of System Assessment Tools

System Models
Comprehensive scope, stochastic input, most abstracted process simulation, evaluate system sensitivities

Subsystem Models
Broader scope, partial abstraction and some coupling of processes, evaluate critical processes

Process Models
Limited scope, comprehensive treatment of modeled process, for comprehension of phenomena
Scope of the TSPA

Aqueous Flow → Conditional CCDF

Gaseous Flow → Conditional CCDF

Human Intrusion → Conditional CCDF

Basaltic Igneous Activity → Conditional CCDF

Tectonism → Conditional CCDF

"Total System" CCDF
Participants

- **Sandia National Laboratories**
  - Coordinated initial stages of the (TSPA)
  - Performed calculations using abstracted models

- **Pacific Northwest Laboratory**
  - Performed calculations using detailed models
  - Performed dose calculations

- **Los Alamos National Laboratory**
  - Provided information used in volcanic analysis
  - Defined parameter distributions for retardation

- **Lawrence Livermore National Laboratory**
  - Specified SNL source term
Caveats

This exercise reflects our current understanding of the site and is expected ultimately to contribute estimates of the ability of a potential repository system at Yucca Mountain to comply with regulations; however,

- it is not comprehensive in terms of modeled components
- the data and models used are not validated
- the ranges of values are very broad
Construct Data Set
Begin Calculations
Begin Dose Calculations
Preliminary Presentation
Draft to YMP
YMP Policy Review

4/91 7/91 10/91 1/92 4/92
Process for Interim Exercises

1. Screen Scenarios
2. Estimate probabilities
3. Choose conceptual models
4. Estimate parameter uncertainties
5. Calculate releases
6. Interpret results
Steps in Iterative Performance Assessment

1. Review Scenarios
2. Assign Probabilities
3. Develop Alternate Conceptual Models
4. Determine Parameter Uncertainty
5. Perform Calculations
6. Determine Model Uncertainty

Obtain Data

Interpretation of Results

Determine Impact of Uncertainty

Input to Subsequent Analyses
Time Scale

6/91  Initial request for study from YMPO
11/91 Informal results presented in Las Vegas
3/92  Draft report submitted to YMP for review