

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

ADVISORY COMMITTEE ON NUCLEAR WASTE

**SUBJECT: TOTAL SYSTEM PERFORMANCE
ASSESSMENT '95 TECHNICAL
EXCHANGE - DOE RESPONSE TO
NRC'S REVIEW**

PRESENTER: ABRAHAM VAN LUIK

**PRESENTER'S TITLE
AND ORGANIZATION: PERFORMANCE ASSESSMENT TEAM LEAD
YUCCA MOUNTAIN SITE CHARACTERIZATION OFFICE**

TELEPHONE NUMBER: (702) 794-1424

**ROCKVILLE, MARYLAND
JUNE 25 - 26, 1996**

2/27-70

A Technical Exchange (TE) is Only as Good as its Follow-Up

- **Things were learned on ‘both sides of the aisle’ in this TE**
- **Several items were identified that need to be addressed in follow-up work by either the DOE, the NRC, or both**
- **This presentation addresses items listed by the NRC staff in the preceding presentation as needing DOE follow-up**

General Observations on the TSPA '95 Technical Exchange

- **NRC performance assessors reading TSPA '95, and reproducing selected analyses, was enlightening for DOE**
 - **Some assumptions were not stated or, at least, not clearly stated**
 - **Some analyses were not reproducible based solely on what was in the document**
 - **Lessons-learned (re: fuller documentation) are to be reflected in future DOE TSPAs**

More Completely Addressing Spatial Correlation of Properties

- **DOE is aware of the need to include spatial correlations in hydrologic modeling, at least at the process level**
- **DOE will address and evaluate spatial correlations in TSPA-VA**
- **In response to the TE, a new TSPA '95 calculation was performed with and without correlating percent fracture flow and velocities: little impact on peak dose**

Re-evaluating Relative Humidity and Temperature Calculations

- The TSPA '95 “relative humidity” was actually the vapor-pressure (Pv) ratio:
 - Pv at the dry-out front divided by the saturated Pv at the waste package
 - This Pv ratio is the quantity needed for corrosion rate calculations
- Re: temperatures -- physical dimension and properties differences explain differing NRC and DOE model results
- Re-evaluation continues

Preliminary Results from Re-Evaluating Temperature Calculations

- **Temperatures calculated with 3-D models are higher than those calculated with 2-D models (TSPA '95 was 2-D; NRC used both)**
- **The method of handling heat transfer in open drifts (i.e., before backfill) should be radiation-dominated - - perhaps with a convective component**
- **TSPA '95: radiative-transfer with lower thermal conductivity for drift -- making early container temperatures higher and lowering the temperature spike after backfilling**

Waste Package Degradation Modeling Discussion

- **In response to NRC discussion of issues, several DOE attendees described ongoing and planned work and the general approach**
- **DOE was interested in the basis for the NRC's approach to pit growth modeling**
 - **One reference provided at the TE**
 - **Other references recently sent to DOE**

Infiltration and Deep Percolation Discussions

- **It was observed that calculated TSPA '95 fracture velocities did not explicitly include saturation**
 - **A follow-on sensitivity study showed minor differences if saturation was included**
- **In discussions, it was noted that process-level UZ flow modeling is in progress and is addressing**
 - **Consistency with observations**
 - **Climate change effects**

Saturated Zone Flow and Transport Discussion

- **NRC interpretations of field data for mixing depths and flux values were of great interest to DOE**
- **DOE (TSPA '93 and '95) modeling of the SZ used field data**
- **It was again noted that process-level flow and transport models (both UZ and SZ) development is in progress**

Differences Between IPA-2 and TSPA '95 Results

- Discussion focused on differences in arrival and value of Np-237 peak doses
- Differences in waste package failure, hydrologic, and stratigraphic modeling play an important role
- DOE is evaluating assumed Np-237 solubility and sorption differences
- Early results suggest differing Np solubilities do not explain dose differences

Continuing DOE Work

- **NRC criticisms on TSPA '95 were received and are being evaluated: early results continue to support DOE's belief that TSPA '95 is a robust product**
- **An outline of the TSPA-VA Chapter of the PISA will be created to address "completeness," "transparency," and "traceability" issues more systematically**
- **Part of preparation for TSPA-VA will be more fully addressing the issues raised in this TE and in the NRC Audit Review Report due later this calendar year**