

ADVISORY COMMITTEE ON NUCLEAR WASTE

Vertical Slice Review of Total System Performance Assessment for the Site Recommendation

Dr. B. John Garrick

Presentation to NWTRB
Pahrump, NV
January 29, 2002

Advisory Committee on Nuclear Waste

1

ACNW VERTICAL SLICE REVIEWS

- ◆ ACNW Employed a Vertical-Slice Strategy for Evaluating
 - NRC Staff's Issue Resolution Process
 - DOE Technical Bases for the Yucca Mountain Site
- ◆ Issued Letters on:
 - High-Level Waste Chemistry Issues
 - Total System Performance Assessment - Site Recommendation (TSPA-SR)
 - NRC Staff Issue Resolution Process
- ◆ Overall Conclusions Consistent with NRC Staff Sufficiency Comments

Advisory Committee on Nuclear Waste

2

ACNW VERTICAL SLICE REVIEW OF TSPA-SR

- ◆ Focused on Ways to Improve TSPA before Possible License Application
 - Principal Drivers of Repository Performance
 - Extent to Which the Results are Risk-Informed and Evidence Based
 - Transparency, Traceability, and Defensibility of the Results

Advisory Committee on Nuclear Waste

3

ACNW VERTICAL SLICE REVIEW OF TSPA-SR

- ◆ ACNW Strongly Supports the TSPA Thought Process when:
 - Performance Measures are Well Defined
 - Analysis Models are Realistic and Reasonable within Limits of Evidence
 - Results, Including Uncertainties, are Quantified
 - Quantification Takes the Form of Evidence-Based Probability Distributions

Advisory Committee on Nuclear Waste

4

ACNW FINDINGS

- ◆ Results Not Realistically Risk-informed
- ◆ Modeling Guided by Inconsistent Assumptions and a Complex Mix of Conservative and Non-Conservative Elements
 - Waste Package Failure and Coupled Processes
 - In-package Chemistry and Source Term
- ◆ Assumption-Based Rather than Evidence-Based
- ◆ Margins of Safety Not Revealed
- ◆ Absence of Simplified Model

Advisory Committee on Nuclear Waste

5

ACNW CONCLUSIONS

- ◆ TSPA-SR Does Not Answer the Question, What Is the Risk?
- ◆ Model Complexity Inhibits Confidence in the Results
- ◆ Linkage Between Assumption Set and Supporting Evidence Lacks Transparency

Advisory Committee on Nuclear Waste

6

ACNW RECOMMENDATIONS

- ◆ Implement Basic Tenet of Risk Assessment
 - Realistic and Reasonable Results
 - Scientific Basis for Quantifying Margins of Safety
- ◆ Improve Traceability Between Supporting Evidence and Risk-informed Results
- ◆ Abstract a Simplified Basic Physics Model
 - Communication of Results
 - Conduct Tradeoff Studies

Advisory Committee on Nuclear Waste

7

ACNW FOLLOW-UP

- ◆ DOE'S Supplemental Science and Performance Analyses Indicate Movement Towards More Realistic Performance Assessment
- ◆ Updated Documents by DOE Appear to Address Many Concerns Growing out of the ACNW's Vertical Slice Review

Advisory Committee on Nuclear Waste

8