Introduction to Total System Performance Assessment for the Viability Assessment (TSPA-VA)

Presented to:
Nuclear Waste Technical Review Board
Panel on Performance Assessment

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Presentation Purpose

- To review recent Nuclear Waste Technical Review Board comments regarding the need for transparency in TSPAs

- To request the Nuclear Waste Technical Review Board's feedback at the end of this panel meeting
  - How well, in the presentations that follow, are these comments being addressed?
  - Are there specific suggestions for improving the TSPA process and its presentation?

Questions to be Asked of the TSPA-VA (and TSPA-LA)*

- **QUESTION 1: Does the TSPA demonstrate the safety of the repository?**
  - regulatory agencies emphasize demonstrating compliance with a standard using specific criteria
  - technical community will look at the validity of scientific and engineering assumptions
  - non-technical decision makers may be concerned about the political implications of a safety analysis
  - the public could judge the analysis on the sponsoring agency's reputation for honesty and openness
  - *Report to the U.S. Congress and the Secretary of Energy-1996, Findings and Recommendations, NWTRB, Mar.1997, p.21

Questions to be Asked of the TSPA-VA (and TSPA-LA)

(Continued)

- **QUESTION 2: Does the TSPA generate confidence?**

    - **the ability of the TSPA to withstand challenges brought about by new knowledge and changing assumptions will be a prime factor in generating confidence in the conclusions**

    - **enhanced by the extent to which the analysis can be understood**

Enhancing the Likelihood of Obtaining Positive Answers to the Two Questions

- **Transparency - "the ease of understanding the process by which a study was carried out, which assumptions are driving the results, how they were arrived at, and the rigor of the analyses leading to the results"**
  - if abstractions are fully understood, observers can develop a sense of confidence that the models are reasonable approximations of reality
  - specialist may require detailed knowledge of a model and its assumptions
  - non-technical decision maker or the public will want a conceptual explanation conveying what a model does, why that's important and how the results are interpreted
  - can be increased by well chosen sensitivity studies showing the effects of different assumptions

Enhancing the Likelihood of Obtaining Positive Answers to the Two Questions

(Continued)

- **Proper Treatment of Uncertainty**

  - **different types of:**
    - model uncertainty
    - parameter uncertainty
    - statistical uncertainty (randomness) inherent in natural processes
  - **sensitivity studies can help show the significance of uncertainties**
  - **conservative assumptions**
  - **defensible uncertainty distributions**

Enhancing the Likelihood of Obtaining Positive Answers to the Two Questions

(Continued)

- **Establishing validity using analogues and simplified calculations**

  - "a model is considered 'valid' if it provides a reasonably accurate representation of reality"
    - reasonable and accurate are potentially contentious words
    - "appropriate to the problem being addressed" is an important qualifier on these words
  - perform simple calculations capturing some of the main elements of the complete natural and engineering system to allow easier scrutiny of assumptions used in analysis

Enhancing the Likelihood of Obtaining Positive Answers to the Two Questions

(Continued)

- **Using outside expertise**
  - provides views not necessarily found within the DOE program for consideration
  - increases the program's technical credibility
  - should not substitute for scientific information reasonably available

- **Public acceptance**
  - likelihood of acceptance enhanced by transparency
  - increased public involvement urged
  - there are no simple or guaranteed ways of increasing public acceptance of an analysis for a project as technically complex and controversial as building a high-level waste repository

Summary

- In its Report to the U.S. Congress and the Secretary of Energy-1996, the NWTRB made suggestions regarding the need to increase the transparency of TSPAs

- The Department agrees with the intent of the Board's suggestions

- The Department invites your feedback on the presentations made at this Panel meeting, many of which reflect our continuing effort to address the Board's 'transparency' suggestions