



U.S. Department of Energy  
Office of Civilian Radioactive Waste Management

# **Total System Performance Assessment and Integration Issue Resolution Status Report, Revision 2**

Presented to:  
**NRC/DOE Technical Exchange on Total System  
Performance Assessment (TSPA) for Yucca Mountain  
San Antonio, Texas**

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**YUCCA  
MOUNTAIN  
PROJECT**

# Presentation Overview

- **DOE General Approach to Issue Resolution**
- **Status of Issues Related to the Total System Performance Assessment and Integration (TSPAI) Issue Resolution Status Report (IRSR)**
- **Discussion of Approach to Addressing TSPAI IRSR Subissues**
- **IRSR Tracking Database**
- **Summary**

# DOE General Approach to Issue Resolution

- **DOE is committed to an approach to resolution in the risk-informed, performance-based approach to issue resolution**
- **Issues will continue to be addressed through formal interactions and correspondence**
- **Issues will be tracked using a database to ensure that all issues are ultimately addressed**
- **TSPAI IRSR Rev. 2 Acceptance Criteria are addressed in PMRs**

# Subissues Supporting the TSPA I KTI Objective

KTI SUB-ISSUES	IMPORTANCE TO WASTE ISOLATION
<b>1 System Description and Demonstration of Multiple Barriers</b>	<b>Demonstrates the effectiveness and diversity of the barriers as a measure of the resiliency of the repository</b>
<b>2 Scenario Analysis</b>	<b>Describes what can reasonably happen to the repository and the processes and events that can affect the system</b>
<b>3 Model Abstraction</b>	<b>Provides for a systematic examination, in the context of the total system performance, whether models, assumptions, and input data have been appropriately identified, incorporated and analyzed in the TSPA-SR</b>
<b>4 Demonstration of the Overall Performance Objective</b>	<b>Provides for a transparent demonstration of compliance with the overall performance objective</b>

# Status of Issues Related to the TSPAI KTI

- **TSPAI Subissues Status**
  - System Description and Multiple Barriers (Open)
  - Scenario Analysis (Open)
  - Model Abstraction (Open)
  - Overall Performance Objective (Open)
- **32 Site Characterization Analysis (SCA) issues are identified in the TSPAI Issue Resolution Status Report, Revision 2:**
  - 27 are resolved
  - 5 remain open
- **Attached table addresses open issues related to the TSPAI KTI**

# SUBISSUE 1 - System Description and Demonstration of Multiple Barriers

- **Transparency**
  - The TSPA Methods and Assumptions document provides a roadmap for development of the TSPA-SR
  - Explicit discussions of the TSPA methodology and treatment of uncertainty are also part of the TSPA-SR

# SUBISSUE 1 - System Description and Demonstration of Multiple Barriers

- **Traceability**
  - **Assumptions and details of the analyses will be in the TSPA-SR document, PMRs and supporting AMRs**
  - **The TSPA analysis tools allows direct tracking of information along its entire path through the analysis**
  - **Unique data tracking numbers are assigned for traceability and control of Q-status**
  - **The TSPA-SR document is tied directly through text, table, and graphics to the supporting Analysis and Model Reports (AMRs) and Process Model Reports (PMRs)**

# SUBISSUE 1 - System Description and Demonstration of Multiple Barriers

- **Multiple Barriers**
  - **The entire TSPA analysis is built on a succession of process-level and abstracted models that represent the various parts of the natural and engineered system**
  - **TSPA-SR will show performance analysis results for the various components of the system**
  - **TSPA-SR sensitivity studies and barrier importance analyses will evaluate the contribution and the relative importance to system safety of major system components and barriers**



# SUBISSUE 2 - Scenario Analysis

- **Methodology and TSPA-SR implementation will be documented in the TSPA-SR Technical Report**
- **Description of the individual FEPs for each process, including the screening analysis results, is included in the associated PMR and supporting AMR**
- **The FEPs database has been revised to enhance the understanding of its structure**

# SUBISSUE 3 - Model Abstraction

- **This subissue addresses the adequacy with which the various components of the engineered system, geosphere, and biosphere are treated in the TSPA-SR (Chapter 3) and supporting analyses PMRs and AMRs**
- **Subsequent Technical Exchanges will cover the details of the various component models**

# **SUBISSUE 4 - Demonstration of the Overall Performance Objective**

- **Acceptance criteria and review methods to be issued in succeeding versions of the IRSR**
- **TSPA-SR will be conducted to comply with proposed 10 CFR Part 963, and 40 CFR Part 197 in terms of addressing the prescribed requirements for the total system**
- **Chapter 4 of the TSPA-SR will consist of the nominal, disturbed, and combined performance results**
- **Chapter 5 shows the results of uncertainty analyses, sensitivity analyses, and barrier importance analyses**

# IRSR TRACKING DATABASE

- **IRSR Tracking Database currently being developed**
- **IRSR Tracking Database is designed to track how NRC subissues within the KTIs have been addressed by TSPA**
- **Database includes four key tables**
  - **IRSR Acceptance Criteria and ISI Tables**
  - **RSS4 Table**
  - **Mapping Table**
  - **Summary Table**
- **The database is designed to link with the FEP database**

# IRSR TRACKING DATABASE

**Microsoft Access - [IRSR Tracking Database]**

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## IRSR Tracking Database (Draft)

**Key Technical Issue** Container Lifetime and Source Term (CLST)

**Subissue** Acceptance criteria applicable to all six subissues

Acceptance Criterion 1: The collection and documentation of data, as well as development and documentation of analyses, methods, models, and codes, were accomplished under approved quality assurance and control procedures and standards.

PMR	PMR Approach and Section Reference
Disruptive Events	Each disruptive events AMR describes the quality assurance procedures under which it was developed (Section 2) and the qualification status of software, models and data used for the analysis (Sections 3 and 4 for analyses and Section 4 for calculation). The Data Input Reference System entries for each AMR captures information used in tracking the completion of qualification and verification activities. For the DE PMR the quality assurance framework under which it was developed is discussed in Section 1.3.
Waste Form	Activities associated with the development of WF PMR and its related AMRs were determined to be subject to the QA program as described in the Quality Assurance Requirements and Description (DOE 2000). As such, collection of related data, development of analyses and models, and use and validation of software are subject to the requirements of procedures developed to implement QA program requirements.

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# SUMMARY

- **TSPAI IRSR Rev. 2 Acceptance Criteria are addressed in PMRs (see attached table)**
- **Open issues identified in the TSPAI IRSR Rev. 2 and in previous interactions are being addressed (see attached table)**
- **Significant progress has been made in addressing issues related to Transparency, Traceability and FEPs**
- **Issues related to Model Abstraction will be discussed at subsequent Technical Exchanges**