

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

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: LINKAGE FROM WASTE ISOLATION
AND CONTAINMENT STRATEGY TO
KEY EXPLORATORY STUDIES
FACILITY DECISIONS AND TESTING
PROGRAMS**

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**BEATTY, NEVADA
JANUARY 11, 1995**

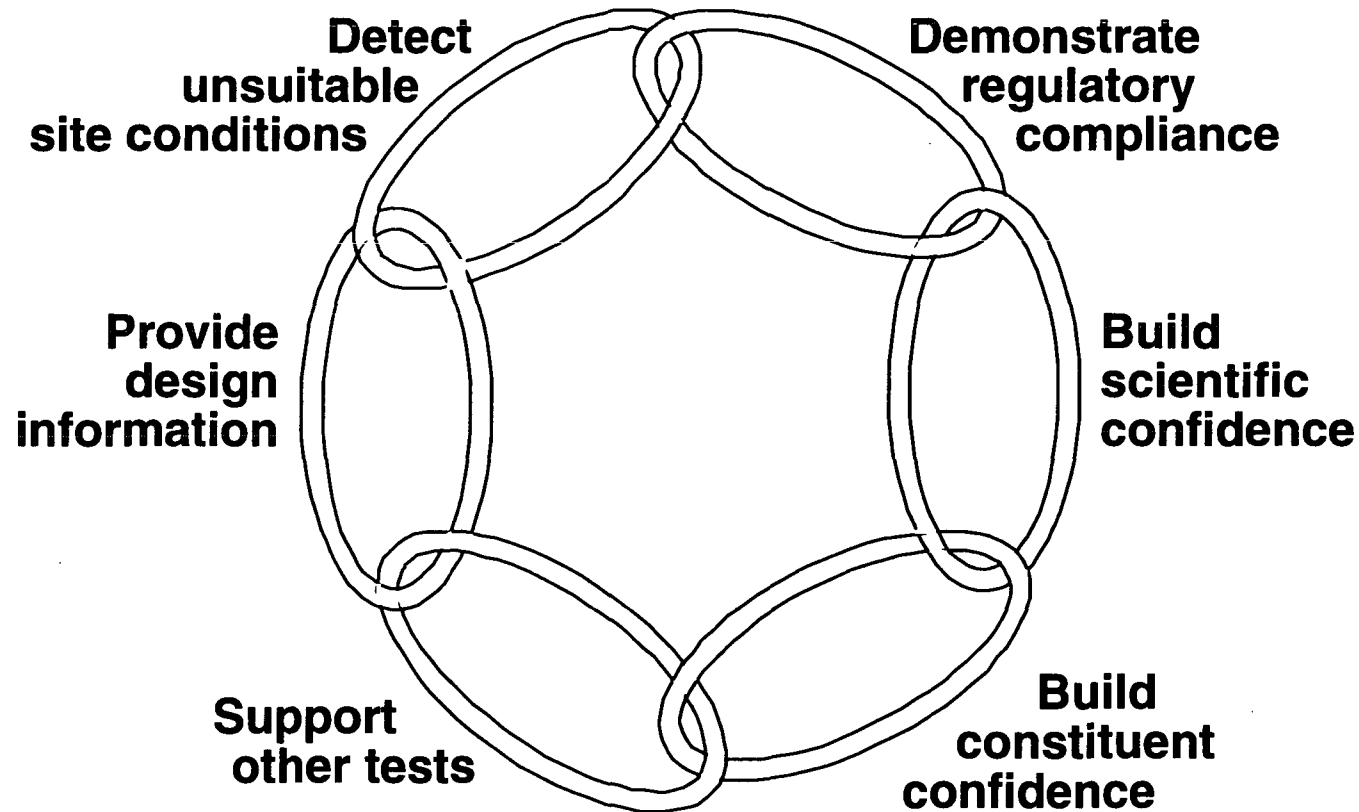
Overview of NWTRB Comments and Concerns

- **Is the DOE continuing to focus on developing a clear definition of the waste isolation and containment strategy for the repository?**
- **Are major decisions about the Exploratory Studies Facility excavation sequence linked to the waste isolation and containment strategy?**
- **Is the testing program focused on the right work?**

Goal of Presentations

- **Review basis for key decisions related to sequencing of Exploratory Studies Facility construction**
- **Review waste isolation and containment strategy**
- **Show linkages from surface and underground testing activities to key uncertainties derived from the waste isolation and containment strategy**
- **Provide a status of surface-based and Exploratory Studies Facility activities**

Background: Multiple Reasons for Test Programs



Goal: Balanced Program that Addresses Multiple Reasons for Testing

- **Surface-based program important for improving 3-D geologic/hydrologic framework and process models**
 - **Enhances representativeness of Exploratory Studies Facility results**
- **Surface and underground testing provide information needed for design**
 - **Seismic hazard**
 - **Rock stability**
 - **Environmental conditions for waste package**
- **Exploratory Studies Facility provides access to key features (e.g., Ghost Dance Fault, key lithologic contacts)**
- **Laboratory testing is an important source of materials, geochemical, and rock properties data**

Rationale for Major Decisions and Assumptions

- **DOE's Program Plan was developed on the basis of key decisions and assumptions**
- **The following viewgraphs review key decisions related to Exploratory Studies Facility sequencing and explain the rationale and basis**

Major Decisions Regarding Exploratory Studies Facility (ESF) Excavation Sequencing

- **Calico Hills exploration**
- **Distributed testing alcoves**
- ***In situ* thermal testing**
- **East-west/north ramp extensions**
- **Completion of 5-mile loop**

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Calico Hills Exploration

- **Current position**
 - **4000 m excavated in FY 1999 with additional 1500 m in FY 2000**
- **Basis for position**
 - **Surface-based and P-Tunnel studies will provide adequate basis to support bounded flow and transport predictions for 1998 Technical Site Suitability Evaluation**
 - **DOE's Program Approach places highest priority on developing high confidence about waste package performance and near-field environment for 2001 License Application**

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Calico Hills Exploration

- **Basis for position** (continued)
 - High confidence about performance of Calico Hills unit as natural barrier to radionuclide transport will be critical for 2008 update to License Application
 - North ramp extension has been given higher priority before 2001 to allow earlier initiation of long-duration heater tests
- **Ongoing evaluations**
 - Systems Study currently reviewing this sequencing to ensure that it is consistent with suitability and licensing data needs
 - DOE will evaluate Systems Study results and update excavation plan, if appropriate

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Core Testing Area vs. Distributed Testing Alcoves

- **Current Position: distributed testing alcoves will be used rather than a core testing area; 7 alcoves will be completed by 1997, with additional 20+ by 2001**
- **Basis for position**
 - **Distributed testing alcoves became practical with decision to develop ramp accesses**
 - **Locations of first seven alcoves tied to data needs for Technical Site Suitability Evaluation**
 - **Ease of access and operability improved by use of distributed alcoves**

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Core Testing Area vs. Distributed Testing Alcoves

- **Basis for position** (continued)
 - Testing in range of rock units provides better basis for correlating with surface-based program
 - Testing at lithologic and fault contacts may be important to understanding fluid flow processes
- **Ongoing evaluations**
 - Unexpected rock conditions or structures encountered along north ramp or north-south main drift could result in decision to develop additional alcoves

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

In Situ Thermal Testing

- **Current position**
 - Thermal-mechanical measurements on samples from Exploratory Studies Facility and surface-based boreholes will be adequate to support Technical Site Suitability Evaluation
 - Accelerated short-duration *in situ* heater tests will provide adequate basis for 2001 License Application
 - Post-2001 testing will provide basis for evaluating whether higher thermal loads are acceptable
- **Basis for position**
 - 1998 Technical Site Suitability Evaluation will rely on performance assessments that bound the range of thermal loadings under consideration, with the reference case being on the low end of the thermal range

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

In Situ Thermal Testing

- **Basis for position** (continued)
 - Licensing conditions for 2001 License Application will be on the low end of thermal range
 - Updates to License Application could result in movement to higher thermal loadings
- **Ongoing evaluations**
 - System-wide trade studies will provide insight into adjustable parameters (e.g., receipt rates, age of fuel, surface storage, partial loading) relevant to thermal loading
 - Streamlined *in situ* test designs may allow earlier heater test initiation

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

East-West Drift/North Ramp Extension

- **Current position**
 - 1600 m north ramp extension completed in FY 1998
- **Basis for position**
 - Geophysics will provide indications as to whether major structures exist prior to 1998 Technical Site Suitability Evaluation
 - Surface-based drilling program will provide additional controls on structure and stratigraphy
 - North ramp extension provides east-west section and access to Solitario Canyon Fault prior to 2001 License Application
 - Long-duration heater test can be initiated prior to 2001 License Application
- **Ongoing evaluations**
 - Contingency plans will be developed to investigate expansion areas, if needed

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Completion of 5-Mile Loop

- **Current position**
 - **Complete five testing alcoves in north ramp and main drift and two Ghost Dance fault accesses in FY 1996/97 to support 1998 Technical Site Suitability Evaluation**
 - **Complete 5-mile loop in FY 1997 with no additional test alcoves constructed after the second Ghost Dance Fault access**

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Completion of 5-Mile Loop

- **Basis for position**
 - **Accesses to Ghost Dance Fault will provide key information regarding the potential for fast flow paths to support the 1998 Technical Site Suitability Evaluation**
 - **Continued exploration through completion of main drift and south ramp increases spatial coverage**
 - **Additional testing alcoves are planned after 1998 to support the licensing process**

Major Decisions Regarding ESF Excavation Sequencing

(Continued)

Completion of 5-Mile Loop

- **Ongoing evaluation**
 - **Evaluations will continue to determine whether completion of 5-mile loop is the best use of resources. Considerations include:**
 - » **Value of additional East-West drifts**
 - » **Value of earlier Calico Hills access**
 - » **Cost of maintaining tunnel boring machine, if stopped after second Ghost Dance Fault access**