



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

Framework for a Site Recommendation Decision

Presented to:

Nuclear Waste Technical Review Board (NWTRB)

Presented by:

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YUCCA
MOUNTAIN
PROJECT

Presentation Outline

- **Principles, process, and perspectives for Site Recommendation (SR) decision**
- **Remaining site characterization work**
- **Overall approach to enhancing the technical basis for evaluating site suitability and products available for a SR decision**
- **NWTRB questions and context for responses**
- **Other topics for discussion**
- **Summary**

Fundamental Principles

- **There are three fundamental principles that underlie the repository development process and influence DOE's planning of scientific and design work**
 - **continuous learning**
 - ◆ **understanding of site conditions and the behavior of the engineered system will continue to improve**
 - **informed decision making**
 - ◆ **decisions will be based on all relevant information**
 - ◆ **decisions can be revisited based on new information**
 - **responsible stewardship**
 - ◆ **DOE is responsible for all phases of the repository program, including monitoring and oversight after permanent closure**

Fundamental Principles

(Continued)

- **Siting (which includes site characterization and SR decision), licensing, constructing, operating, and closing a geologic repository will**
 - require continuous information gathering and analyses
 - necessitate changes in approach and plans through time
 - take decades to complete
 - result in safe geologic disposal
- **A critical point in the SR process is an evaluation of the suitability of Yucca Mountain for consideration as a possible geologic repository**

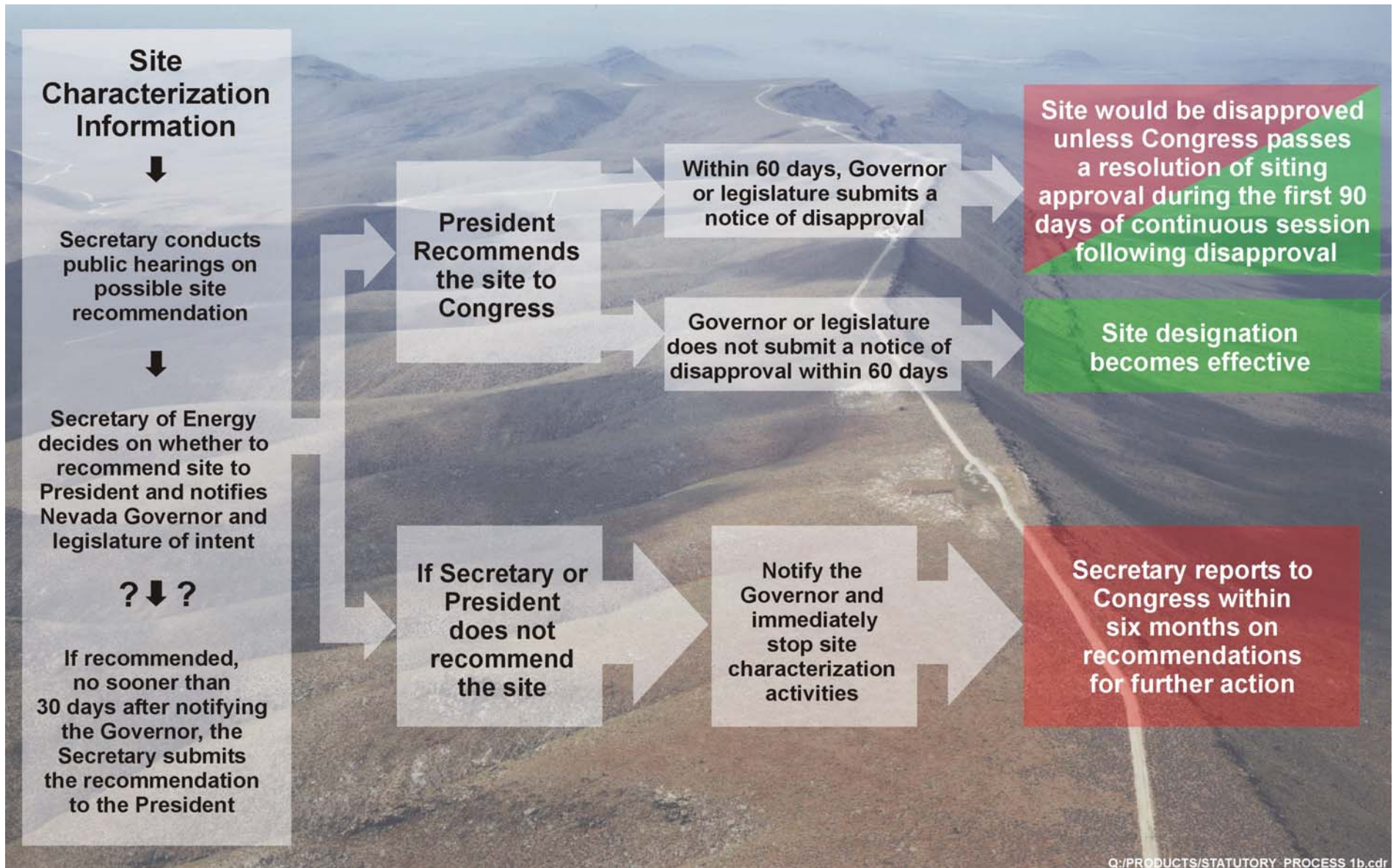
Site Recommendation Process

- **Under current planning evaluation of suitability will be based on the methods and criteria in DOE's proposed suitability guidelines that will consider**
 - **a comprehensive technical basis, including multiple lines of evidence and arguments**
 - ◆ **field and laboratory data and analyses**
 - ◆ **natural analogs**
 - ◆ **numerical analyses**
 - **performance assessment for the postclosure evaluation, consistent with NRC's licensing criteria**
 - **comparison to applicable radiation protection standards for preclosure and postclosure performance**

Site Recommendation Process

- **SR process schedule has been extended to accommodate additional information to enhance the technical basis for a possible SR decision**
- **This additional information for a possible SR decision is planned to be completed during 2001**
 - **design with low-temperature operating mode**
 - **updated analysis/modeling reports reflecting the design changes**
 - **TSPA representing a lower-temperature operating mode and containing new site characterization information**
 - **identification and quantification of selected key unquantified uncertainties**

Site Recommendation Process



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Perspectives for a SR Decision

- **DOE's proposed site suitability guidelines (10 CFR Part 963) are risk informed and performance based focusing on overall system performance and will**
 - **be consistent with NRC's proposed licensing criteria (10 CFR Part 63)**
 - **include evaluation of the capabilities of individual barriers to better understand the performance of the overall system that will**
 - ◆ **identify uncertainties and quantify key unquantified uncertainties**
 - ◆ **recognize that some uncertainties will remain**
- **Information gathering (site characterization and test and evaluation) will continue throughout the life of the Project**

Remaining Site Characterization Work

- **External reviews of the site characterization program have identified concerns related to the technical basis for a possible recommendation of the Yucca Mountain site as a potential repository**
- **Consistent with the program's fundamental principles, these concerns are being addressed through ongoing and new tests and analyses**

Remaining Site Characterization Work

(Continued)

- **The concerns identified are related to**
 - **quantification of uncertainties in TSPA, process models, and model abstractions**
 - **fundamental processes in understanding/predicting waste package corrosion**
 - **comparison and evaluation of base case design with lower-temperature operating mode**
 - **development of multiple lines of evidence and arguments for a safety case**
- **Addressing these concerns will improve the information available and our understanding of expected system performance to support an SR decision**

Approach to Enhancing Technical Basis

- **Ongoing work and new work being planned will address these concerns**
- **A revision of the multiyear plan is being prepared to address the new work**
 - **management and operating contractor is completing proposed change request for DOE review**
 - **plan will identify work to support SR decision as well as post SR, if site is recommended**

Approach to Enhancing Technical Basis

(Continued)

- **Revised plan may include additional testing and analyses**
 - **thermal/hydrologic/chemical (THC) testing and analyses**
 - **effort to quantify key uncertainties and develop more representative models**
 - **corrosion testing and analysis**
 - **radionuclide transport studies**
 - **engineered barrier and near-field environment studies**
 - **work to address agreements to close NRC's Key Technical Issues**
 - **completing an updated TSPA that includes a lower-temperature operating mode**

Proposed Additional Information Available for SR Decision

- **The following are examples of the supporting information planned to be available for SR decision**
 - **evaluation of uncertainties, including summary report on the quantification of key unquantified uncertainties**
 - **improved descriptions of coupled process (THC) models, and integration with unsaturated zone, near-field environment, engineered barrier system, and coupled process Analysis/Model Reports**
 - **Monte Carlo simulations for TSPA-SR based on revised seepage and THC models**
 - **incorporation of geothermal natural analogs in THC models**
 - **repository layout and ventilation analyses for lower-temperature operating mode**

Proposed Additional Information Available for SR Decision

(Continued)

- **Information for SR (continued)**
 - **waste package corrosion Analysis/Model Reports for lower-temperature operating mode**
 - **update selected System Description Documents for lower-temperature operating mode**
 - **peer review of current TSPA-SR**
 - **peer review of waste package materials performance**

NWTRB Questions

- **The NWTRB posed five questions to be discussed in this meeting that are related to**
 - **understanding and technical bases for the expected performance of particular natural and engineered barriers, and the significance of associated uncertainties (Questions 1,2, & 3)**
 - **role of the waste package in the safety case and the potential impacts of early waste package failure on repository performance (Question 4)**
 - **design objectives and the relative importance of those objectives in selecting a repository design (Questions 5)**

NWTRB Questions

(Continued)

- **Each question will be specifically addressed in subsequent presentations that will focus on the scientific and technical basis**
 - **performance of the waste package will be discussed by Gerry Gordon (question 1)**
 - **performance of the unsaturated and saturated zones will be addressed by Bo Bodvarsson and Al Eddebarh (questions 2 and 3)**
 - **contribution of the natural and engineered barriers to system performance, including significance of early waste package failure will be discussed by Bob Andrews (question 4)**
 - **objectives for repository design will be discussed by Paul Harrington (question 5)**

Context for Responses to NWTRB Questions

- **DOE looks forward to the NWTRB comments on our responses**
- **Answers to these questions are based on data and analyses from site characterization activities**
 - **these data and analyses are the bases of our understanding of subsystem and system performance**
 - **assessments of subsystem or elements of subsystem performance represent the performance of that subsystem or element, but may not be representative of overall system performance**

Context of NWTRB Questions

(Continued)

- **Additional information will be obtained to enhance the technical basis by addressing uncertainties and providing the basis for a more representative TSPA**
- **Based on DOE's proposed suitability guideline an evaluation of suitability will include**
 - **assessment of overall system performance**
 - **a description of the expected performance of the individual barriers of the multi-barrier system**
 - **appropriate sensitivity studies, to better understand overall system performance**

Other Topics for Discussion

- **In addition to the NWTRB questions we will present information on the following**
 - **update on YMSCO's scientific programs - Mark Peters**
 - **update on repository design - Paul Harrington**
 - **YMSCO's approach to decision making in a learning environment - Russ Dyer**
 - **YMSCO's approach to evaluation of uncertainties and status of that work - Bill Boyle**
 - **Repository Safety Strategy - Bill Boyle**

Summary

- **Development of a geologic repository is a lengthy process**
- **Testing, design, and analyses will continue throughout repository development**
- **Decision process is information-based and can be revisited based on new information**
- **SR process has been extended to address certain internal issues and to address external concerns to enhance the technical basis for an SR decision**

Summary

(Continued)

- **Ongoing and future testing and design will enhance our technical basis for an evaluation of site suitability and SR decision**
- **Answers to the five NWTRB questions are based on data and analyses from site characterization activities**
 - **these data and analyses are the bases of our understanding of subsystem and system performance**
 - **results from the assessment of subsystem or their elements represent the performance of that subsystem or element, but may not be representative of overall system performance**