

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

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: HISTORICAL PERSPECTIVE
OF U.S. PROGRAM**

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Criteria For Nuclear Waste Disposal Have Been Developed in a Logical Process

- Top level criteria established in 1978 by National Academy of Science
- Thermal limit criteria proposed in the 1980 DOE statement for the Waste Confidence Rulemaking
- Thermal loading margins were proposed in 1980 Final Environmental Impact Statement for Management of Commercially Generated Radioactive Waste
- General and specific thermal constraints have been established

included thermal

National Academy of Science Was Involved in Development of Early Criteria

- **1955: Asked to help establish a scientific base for the waste management program**
- **1957: Stated mined geologic disposal feasible and salt appeared promising (assumption waste would be low concentrate in liquid)**
- **1978: Established geologic criteria for repositories for high-level waste**
 - **Long term stability criteria**
 - **Heat should not reach levels high enough to compromise geologic containment**

National Waste Terminal Storage (NWTS) Program Developed

- *out terminal storage*
1975 NWTS program studies initiated
 - **Multi-site survey of underground disposal in 36 states, designed to lead to the development of 6 pilot scale repositories by 2000**
 - **Focus on rock types other than salt reflected both medium and environment**
- **1978 NAS involved in decision to consider siting a repository in tuff**

Thermal Issues Were Addressed in Early Program Rulemakings:

- **1980: Waste Confidence Rulemaking: DOE position provided guidelines for thermal design criteria**
- **1983: 10 CFR Part 60 technical criteria concerned with thermal loads**
- **1985: 10 CFR Part 960 siting guidelines concerned with thermal effects on site**

Final Environmental Impact Statement on Management of Commercially Generated Radioactive Waste Issued in 1980

- Discussed generic factors relevant to geologic disposal
- Repository concept - 3 sq. mi. disposal area (approx. 65 kW/acre)
- Waste emplacement concepts controlled by thermal criteria (salt-50 kW/acre; shale-80 kW/acre; granite and basalt-130 kW/acre)

*no text at the time
in the EIS*

NWTS Program Siting Documents Provided Specific Guidance

- **1981 (NWTS-25) Repository Performance Constraints in the Far-Field Domain:**
 - **Developed performance constraints for design and performance evaluation**
- **1982 (NWTS-33(3)) Repository Performance and Development Criteria:**
 - **Functional requirement that repository contribute to the containment and isolation capability of the system**

Nuclear Waste Policy Act (NWPA) Defined DOE's Mission

1982 Nuclear Waste Policy Act

- **Established the Federal responsibility and a definite Federal policy for the timely disposal of HLW and SF**
- **Established an ambitious schedule for the development of repositories**
- **Directed DOE to develop guidelines for the recommendation of sites that would specify detailed geologic considerations that would be the primary criteria for selection of sites**

Nuclear Waste Policy Act Amended

1987 Nuclear Waste Policy Amendments Act

- **Redirected nuclear waste program to study the suitability of the Yucca Mountain site**
- **Single site to be studied is in unsaturated zone**
- **Established the Nuclear Waste Technical Review Board**

NWTRB Reports to Congress

First Report: March, 1990

- **Concerns about thermal loading of a repository and reduction of uncertainty in geologic disposal by reducing the thermal loading**

Second Report: November, 1990

- **Concerns about uncertainties in factors influencing the thermal loading of the repository host rock and the Calico Hills nonwelded unit**
- **Concerns about thermally-induced changes in conditions and effects on engineered barriers**

NWTRB Reports to Congress

(Continued)

Third Report: May, 1991

- **Concerns about repository conceptual design alternatives addressing thermal loading**
- **Concerns about thermal loading and waste aging relationships and their impact on design**

Concluding Remarks

- **DOE has a repository conceptual design that appears to meet criteria developed in the program**
- **Clearly, scientific data from characterization is needed to reduce uncertainties in design inputs**
- **DOE understands the concerns of the Board and will address them in this meeting**
- **We view this meeting as an opportunity to discuss constraints on thermal criteria so a range of thermal loading approaches can be examined in future design activities**



CHRONOLOGY OF HIGH LEVEL WASTE PROGRAM EVENTS RELEVANT TO THERMAL LOADING QUESTIONS

