

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

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

**SUBJECT: PROGRAMMATIC BASIS FOR  
DESIGN REQUIREMENTS**

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**MARCH 19-20, 1990**

# OVERVIEW

## MULTIPLE FACTORS DETERMINE DESIGN REQUIREMENTS

- **FEDERAL STATUTES, REGULATIONS, AND ORDERS**
- **WASTE INVENTORIES, UTILITY CONTRACTS, AND WASTE-ACCEPTANCE SCHEDULES**
- **EXTERNAL AND PROGRAMMATIC CONSIDERATIONS**

# **STATUTORY BASIS FOR THE REPOSITORY PROGRAM**

## **NWPA GOVERNS DEVELOPMENT OF REQUIREMENTS BY:**

- **DEFINING RESPONSIBILITIES FOR REPOSITORY DEVELOPMENT**
  - **DOE - SITING, CONSTRUCTION, OPERATIONS, AND CLOSURE**
  - **EPA - DEVELOPMENT OF STANDARDS**
  - **NRC - DEVELOPMENT OF REQUIREMENTS AND CRITERIA FOR LICENSING**
  - **STATE - GENERAL OVERSIGHT THROUGH CONSULTATION OR BROADER PARTICIPATION UNDER BENEFITS AGREEMENT**

# **STATUTORY BASIS FOR THE REPOSITORY PROGRAM**

## **NWPA GOVERNS DEVELOPMENT OF REQUIREMENTS BY (CONTINUED) :**

- **SPECIFYING A DEVELOPMENTAL PROCESS FOR  
REPOSITORY SITING AND LICENSING**
  - **PROCESS INCLUDES SITE SCREENING, PREPARATION OF  
EAs, NOMINATION AND RECOMMENDATION OF SITES FOR  
CHARACTERIZATION, AND RECOMMENDATION OF SITE FOR  
REPOSITORY**
  - **PROCESS AMENDED IN 1987 TO DESIGNATE YUCCA  
MOUNTAIN AS ONLY SITE TO BE CHARACTERIZED**
  
- **ESTABLISHING CONSTRAINTS ON REPOSITORY  
SITING AND OPERATIONS**
  - **SITING CRITERIA AND CONSTRAINTS**
  - **CAPACITY LIMITS**
  - **LINKAGE TO OTHER WASTE MANAGEMENT SYSTEM  
ELEMENTS**

# **PRIMARY SOURCES OF DESIGN REQUIREMENTS**

- **NWPA, AS AMENDED**
- **10 CFR PART 60, AND  
REFERENCED REGULATIONS**

# **OTHER SOURCES OF DESIGN REQUIREMENTS**

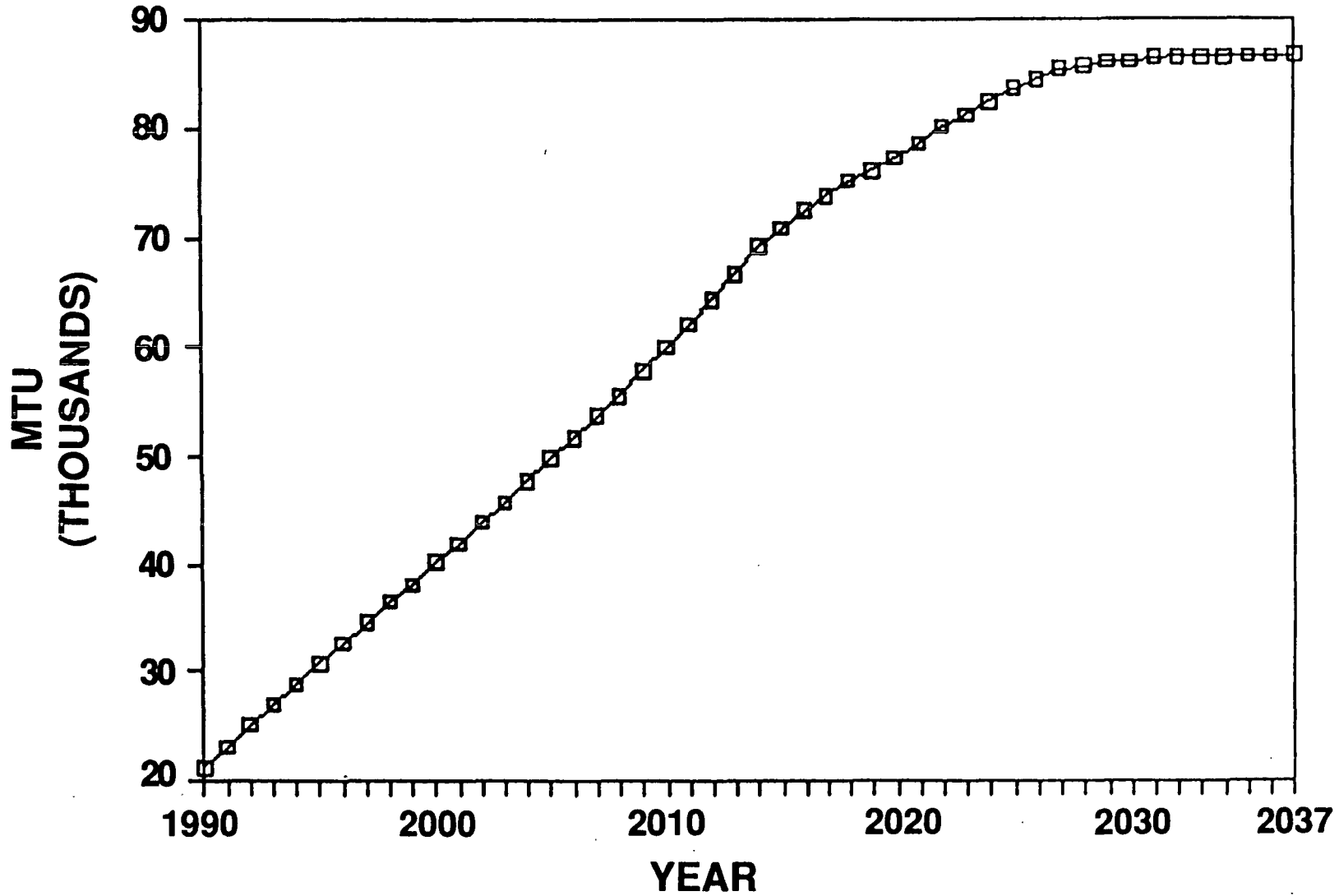
- **NEPA**
- **ENVIRONMENTAL STATUTES AND  
IMPLEMENTING REGULATIONS**
- **MSHA/OSHA REGULATIONS**
- **RCRA AND IMPLEMENTING EPA  
REGULATIONS**
- **DOE ORDERS**

# **INVENTORY PROJECTIONS: WASTE QUANTITIES**

## **SPENT FUEL FROM COMMERCIAL REACTORS (DOMINANT WASTE FORM)**

- **ASSUMING NO NEW ORDERS AND CUMULATIVE INVENTORY TO END-OF-REACTOR-LIFE: APPROXIMATELY 87,000 MTHM DISCHARGED THROUGH THE YEAR 2037**

# SPENT FUEL GENERATION





# **INVENTORY PROJECTIONS: WASTE QUANTITIES**

## **HIGH-LEVEL WASTE**

- **CIVILIAN: APPROXIMATELY 300 CANISTERS  
(BOROSILICATE GLASS)**
  - WEST VALLEY
  
- **DEFENSE: APPROXIMATELY 18,000 CANISTERS**
  - 6,000 SAVANNAH RIVER (BOROSILICATE GLASS)
  - 1,000 HANFORD (BOROSILICATE GLASS)
  - 11,000 INEL (WASTE FORM TBD)

# UTILITY CONTRACTS

## STANDARD CONTRACT SPECIFIED IN 10 CFR PART 961

- **ACCEPTANCE OF SPENT FUEL AND COMMERCIAL HLW TO BEGIN AFTER COMMENCEMENT OF FACILITY OPERATIONS AFTER JANUARY 1998**
- **OLDEST FUEL OR HLW WILL HAVE HIGHEST PRIORITY FOR ACCEPTANCE RIGHTS**
- **UTILITIES NEED NOT SHIP OLDEST FUEL FIRST (SUBJECT TO DOE APPROVAL)**
- **UTILITIES MAY TRADE RIGHTS TO SHIP FUEL (SUBJECT TO DOE APPROVAL)**
- **MINIMUM COOLING TIME FOR "STANDARD FUEL" IS 5 YEARS (ACCEPTANCE OF OTHER FUEL SUBJECT TO DOE APPROVAL)**

# **WASTE ACCEPTANCE SCHEDULE**

## **CONSTRAINTS ON WASTE ACCEPTANCE AND DESIGN**

- **MRS SCHEDULE AND CAPACITY LINKED TO REPOSITORY MILESTONES**
- **LINKAGES COULD CHANGE PER NEGOTIATED AGREEMENT FOR MRS SITE**
- **CAPACITY OF FIRST REPOSITORY LIMITED TO 70,000 MTHM; LINKED TO DECISION ON SECOND REPOSITORY**
  - **REPORT TO CONGRESS ON NEED FOR SECOND REPOSITORY ON OR AFTER JANUARY 2007**
- **FACILITY INTERFACE WITH TRANSPORTATION SYSTEM**

# **EXTERNAL CONSIDERATIONS FOR DESIGN: NRC REGULATIONS**

- **WASTES CLASSIFIED AS GREATER-THAN-CLASS-C MUST BE DISPOSED OF IN A GEOLOGIC REPOSITORY UNLESS OTHERWISE APPROVED BY NRC**
- **GREATER-THAN-CLASS-C WASTE HAS NOT BEEN CONSIDERED IN THE CURRENT CONCEPTUAL DESIGNS**

# **EXTERNAL CONSIDERATIONS FOR DESIGN: NRC REGULATIONS**

(CONTINUED)

- **WASTE PACKAGE MUST PROVIDE "SUBSTANTIALLY COMPLETE CONTAINMENT" FOR 300-1000 YEARS FOLLOWING CLOSURE**
- **UNCERTAINTY EXISTS REGARDING HOW "SUBSTANTIALLY COMPLETE CONTAINMENT" WILL BE DEFINED OR INTERPRETED**
- **WASTE PACKAGE AND ENGINEERED BARRIER SYSTEM MUST BE DESIGNED TO MEET PERFORMANCE OBJECTIVES ASSUMING "ANTICIPATED PROCESSES AND EVENTS"**
- **UNCERTAINTY EXISTS REGARDING HOW "ANTICIPATED AND UNANTICIPATED EVENTS" WILL BE DEFINED OR INTERPRETED**

# **PROGRAMMATIC CONSIDERATIONS FOR DESIGN**

- **WILL SPENT FUEL BE CONSOLIDATED PRIOR TO PACKAGING FOR DISPOSAL?**
- **WILL POSSIBLE FUTURE NEED FOR REPOSITORY CAPACITY IN EXCESS OF 70,000 MTHM NEED TO BE CONSIDERED?**
- **SHOULD SPENT FUEL BE AGED PRIOR TO DISPOSAL?**
- **HOW WILL LINKAGE BETWEEN THE MRS AND THE REPOSITORY BE CHANGED?**
- **THERE WILL BE AN ITERATIVE FEEDBACK OF SITE CHARACTERIZATION INFORMATION INTO THE DESIGN PROCESS**
- **WHAT ARE THE IMPLICATIONS OF THE INTERFACE BETWEEN ESF AND REPOSITORY?**

# **PROGRAMMATIC DECISIONS ABOUT SITE CHARACTERIZATION AFFECTING REPOSITORY DESIGN**

- **DECISION THAT THERE WOULD BE NO CHARACTERIZATION TESTING WITH LIVE WASTE**
- **ESF SIZE (i.e., AREA AND DRIFT SIZE) SHOULD BE CONSTRAINED SO AS TO NOT APPEAR AS IF REPOSITORY CONSTRUCTION HAD STARTED**
- **EXPLORATORY FACILITIES AT ALL 3 SITES WERE TO BE SIMILAR TO FACILITATE SITE COMPARISONS**
- **TWO EXPLORATORY SHAFTS TO BE UTILIZED IN FACILITY FOR SAFETY**
- **ESF WILL BE INCORPORATED INTO THE REPOSITORY DESIGN IF THE YUCCA MOUNTAIN SITE IS FOUND SUITABLE**

# SUMMARY OF BASIS FOR DESIGN REQUIREMENTS

- DESIGN REQUIREMENTS EVOLVE THROUGH TIME
- THEY WILL CHANGE AS SITE CHARACTERIZATION YIELDS DATA
- THEY MAY CHANGE IF THERE ARE CHANGES IN:
  - LEGISLATION
  - REGULATIONS
  - WASTE INVENTORIES, UTILITY CONTRACTS, OR SHIPPING SCHEDULES
  - PROGRAMMATIC DECISIONS