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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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

YEAR

MTU (THOUSANDS)

1990 2000 2010 2020 2030 2037
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