U.S. Spent Nuclear Fuel and High-Level Waste Program Update

Presented to:
Nuclear Energy Research Advisory Committee

Presented by:
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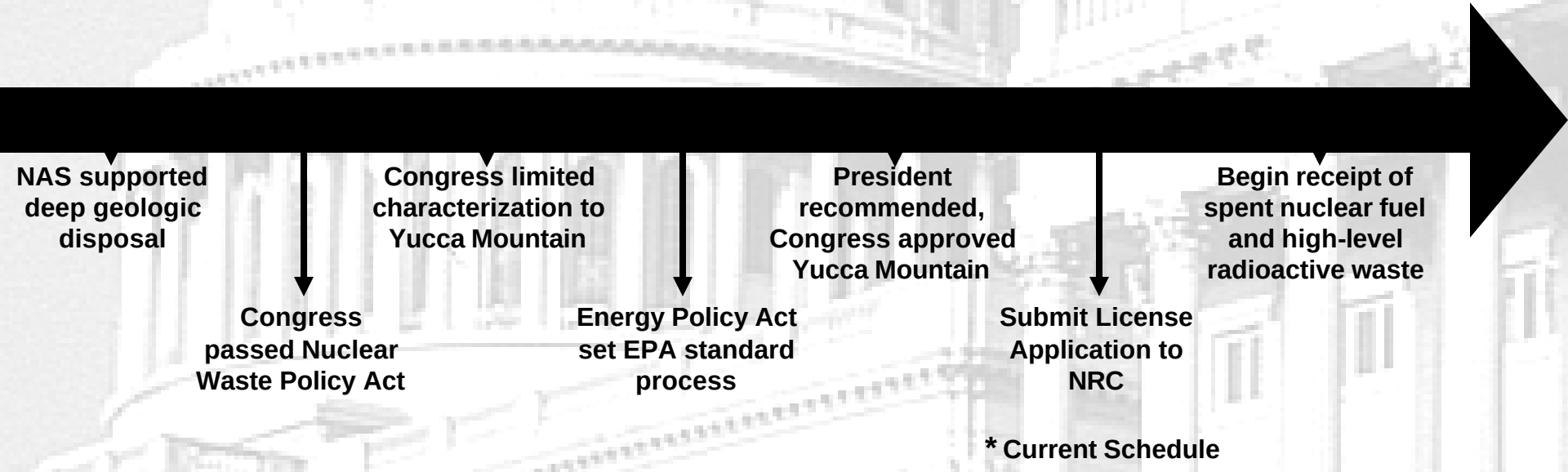
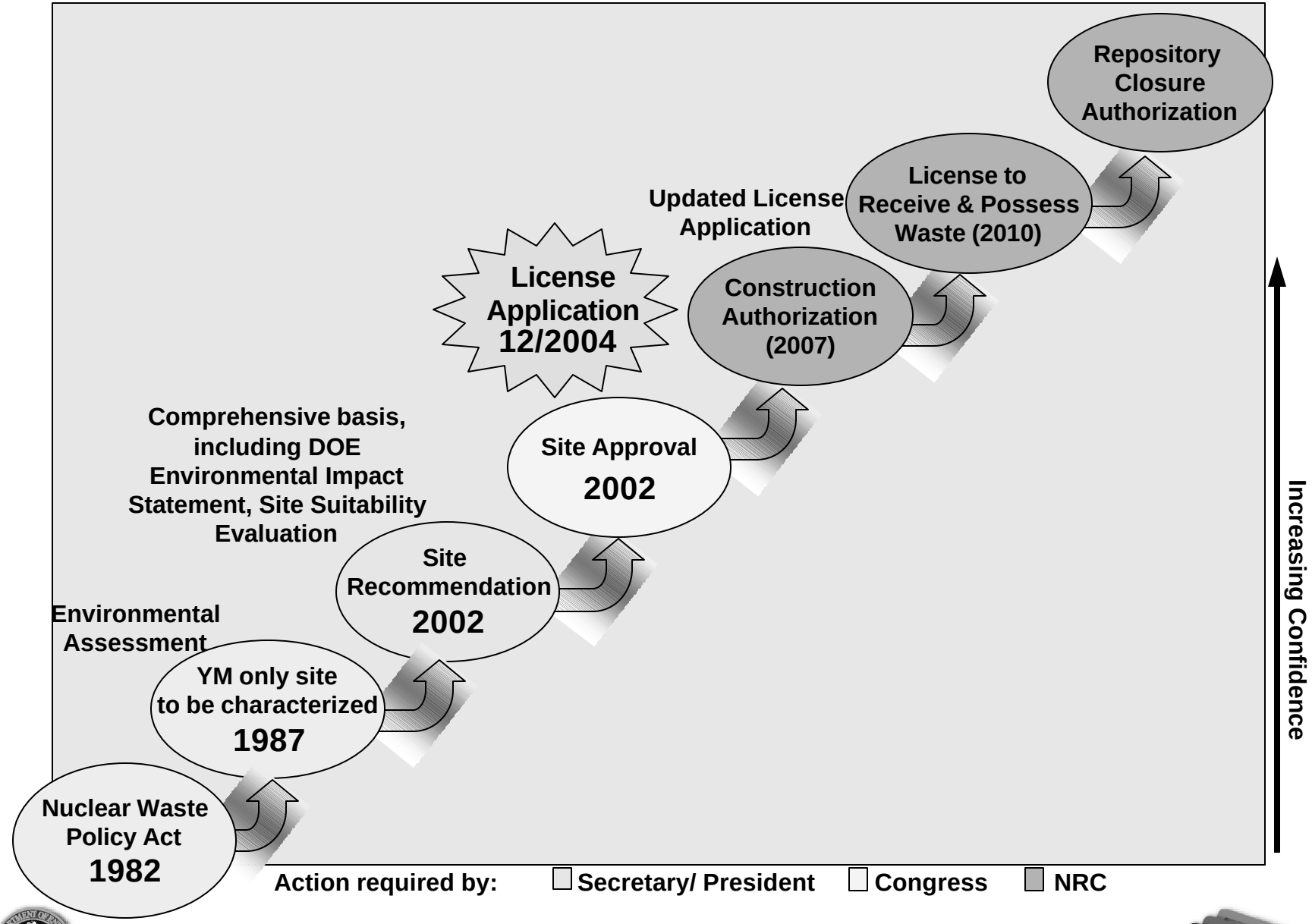
Washington, DC

Congress Created a Legal Obligation to Dispose of Nuclear Waste

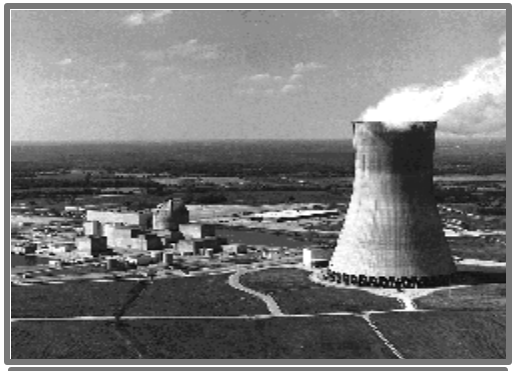
- **1982 - Nuclear Waste Policy Act (NWPA) established national policy for the disposition of high-level radioactive waste and commercial spent nuclear fuel**
- **1987 - Congress directed DOE to characterize only the Yucca Mountain site**
- **2002 - Congress passed a joint resolution approving the Yucca Mountain site for development as a repository**



Step-Wise Decision Process

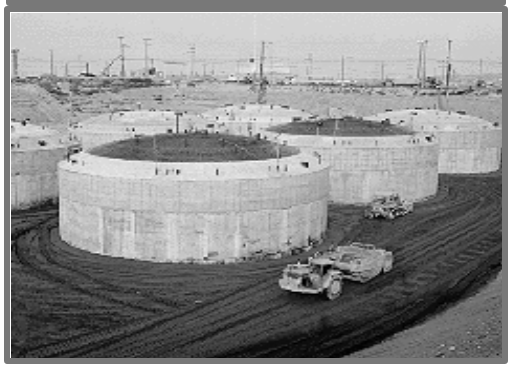


Waste for Yucca Mountain

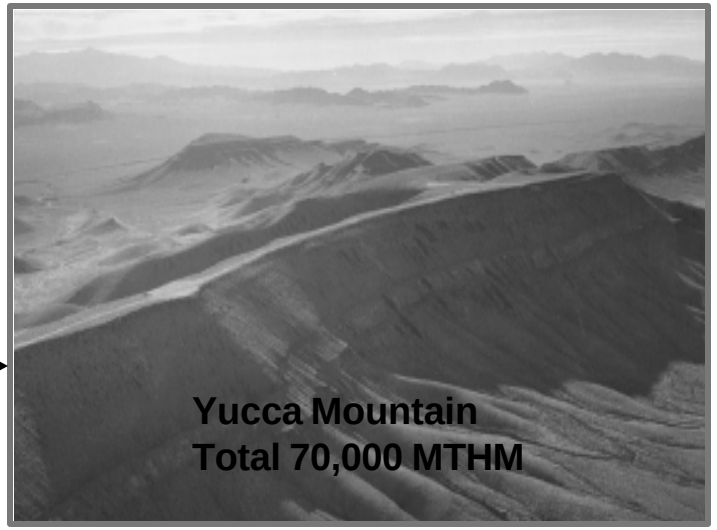


Commercial Spent Nuclear Fuel:
63,000 MTHM

DOE & Naval Spent Nuclear Fuel:
2,333 MTHM

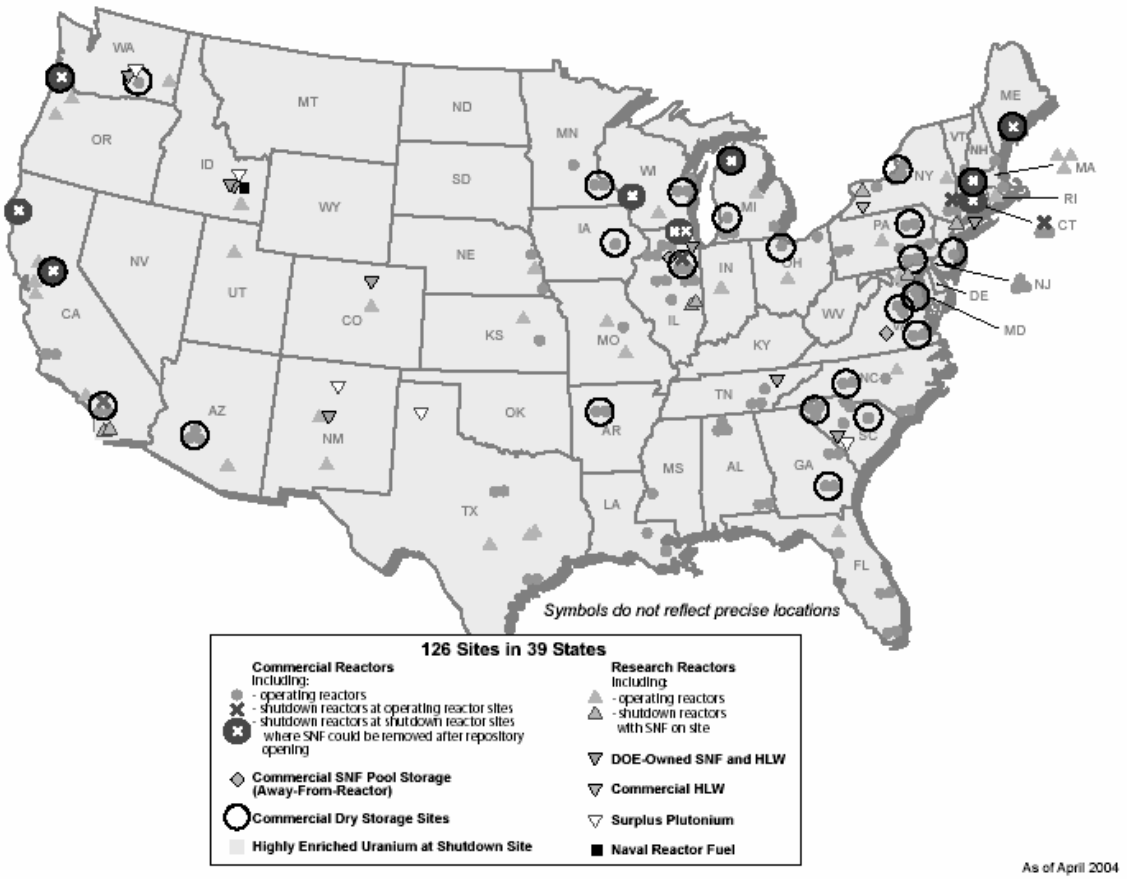


DOE & Commercial High-Level Waste:
4,667 MTHM



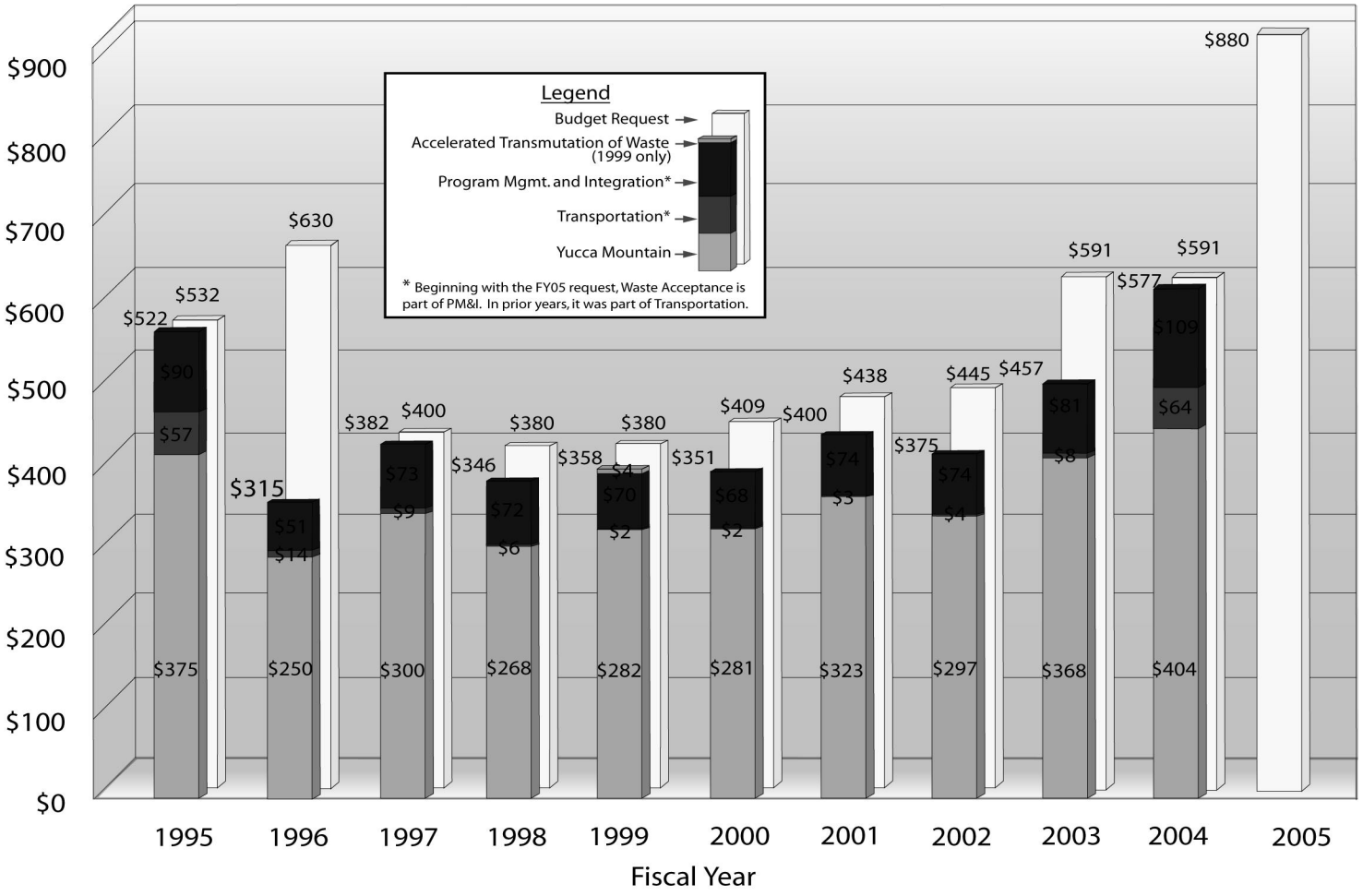
Program Mission

Our Mission is to manage and dispose of high-level radioactive waste and spent nuclear fuel in a manner that protects health, safety, and the environment; enhances national and energy security; and merits public confidence.



Current locations of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) destined for geologic disposal: <u>126 sites in 39 states</u>

Annual Appropriations and Administration's Budget Request



Annual Shortfall:	($10M)	($315M)	($18M)	($34M)	($22M)	($58M)	($38M)	($70M)	($134M)	($14M)

Cumulative Shortfall FY 1995-FY 2004: $713M

Nuclear Waste Fund Balance

Status of the Nuclear Waste Fund

(in millions of dollars, as of December 31, 2003)

Cumulative Fees Collected to Date:	
One-Mil Fees	**$11,312**
One-Time Fees	**1,485**
Total Cumulative Fees	**12,810**
Investment Return	**8,022**
Total Income	**20,832**
Less Disbursements to the Program	**6,036**
Balance Now in the Nuclear Waste Fund	**14,796***

As determined by the most recent assessment, fees continue to be adequate to meet the projected costs of disposal.

* The calculation of the NWF balance uses a cash basis methodology which does not include the accrued principal and estimated interest for one-time fees owed by some civilian waste generators and principal and estimated interest for disposal of some defense wastes owed by the government. Including these items, the balance would be approximately $18 billion.

Repository Licensing Overview

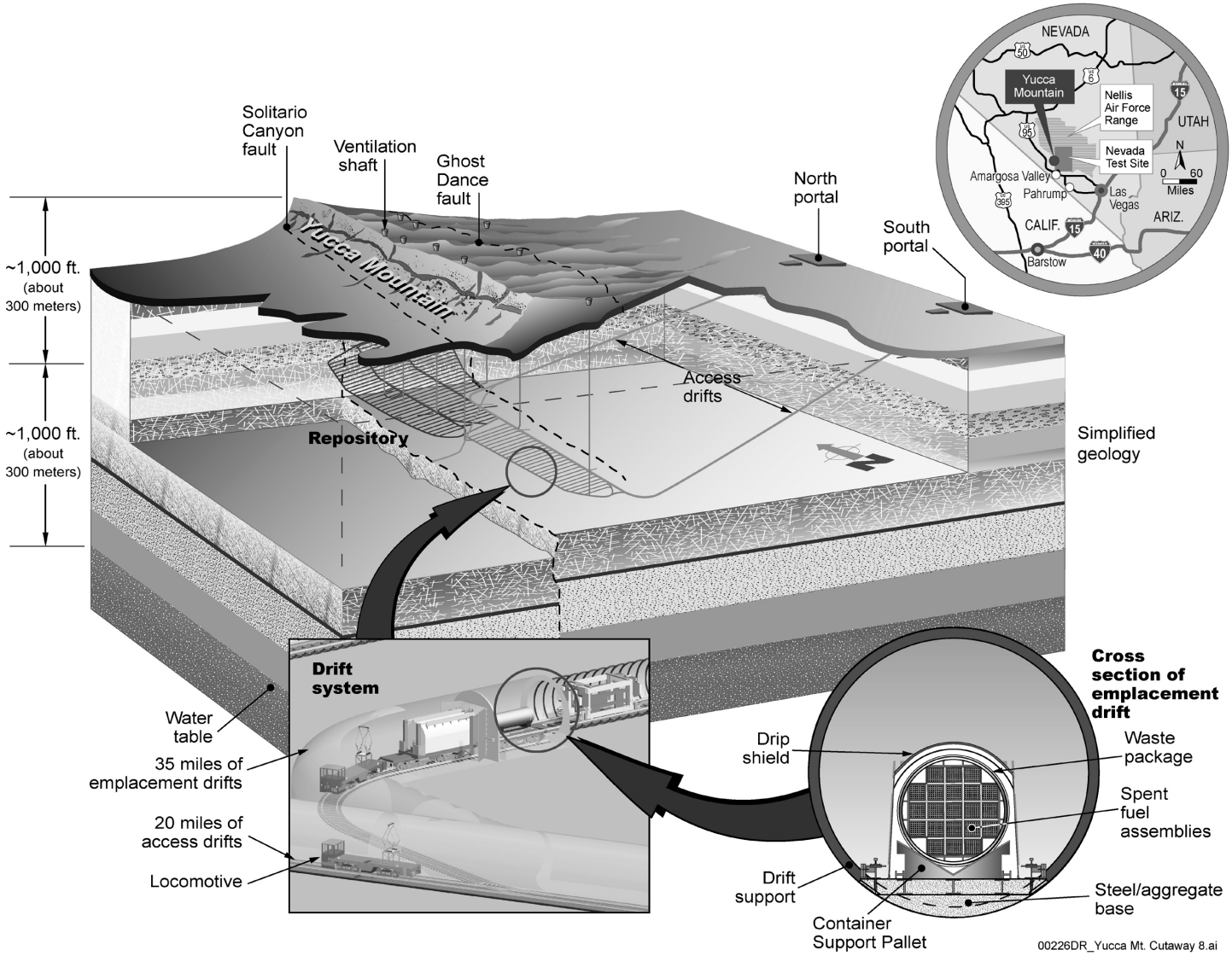
License Application

- General Information
- Safety Analysis Report
  - Repository Safety Prior to Closure
    - Site description
    - Design of surface and subsurface facilities and systems
    - Waste package design
    - Preclosure safety analysis
  - Repository Safety after Permanent Closure
    - Discussion of barriers
    - Scenario analysis and event probability
    - Model abstraction
    - Compliance with postclosure standards
  - Research and Development Program to Resolve Safety Questions
  - Performance Confirmation Program
  - Administrative and Programmatic requirements
    - Quality assurance program description
    - Training program and organizational description
    - Emergency planning
    - Conduct of operations

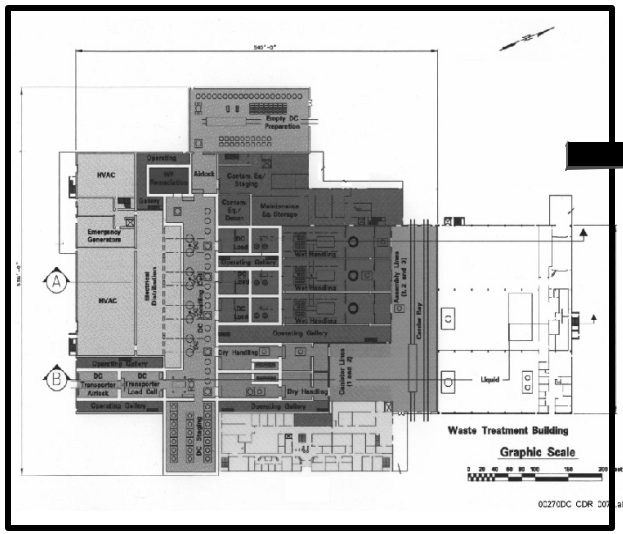
Repository Licensing - NRC Actions

- **After determining whether the application is suitable for docketing, the NRC will hold extensive technical reviews and legal hearings**
  - NRC staff will conduct a technical review
  - The Atomic Safety and Licensing Board, appointed by the NRC, will conduct the hearings
  - Administrative hearings will be open to the public
  - Electronic discovery will facilitate the licensing proceedings
- **A construction authorization will be granted only if the NRC concludes that the repository would meet reasonable expectations for protecting the safety and health of the public and workers and for preserving the environment**

Repository Reference Design Concept

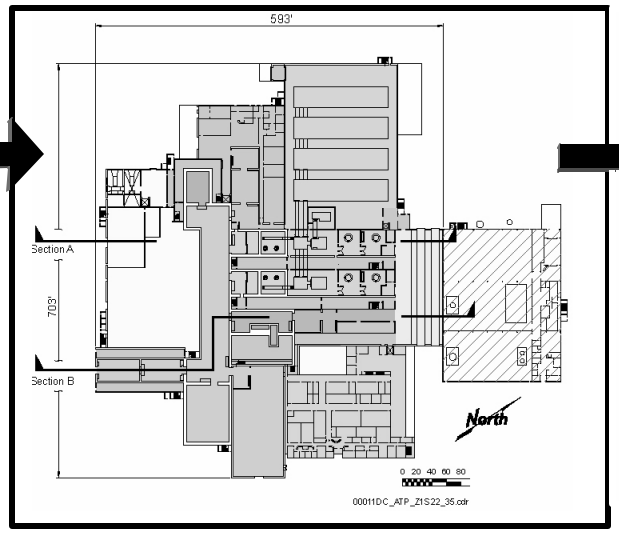


Surface Facility Evolution



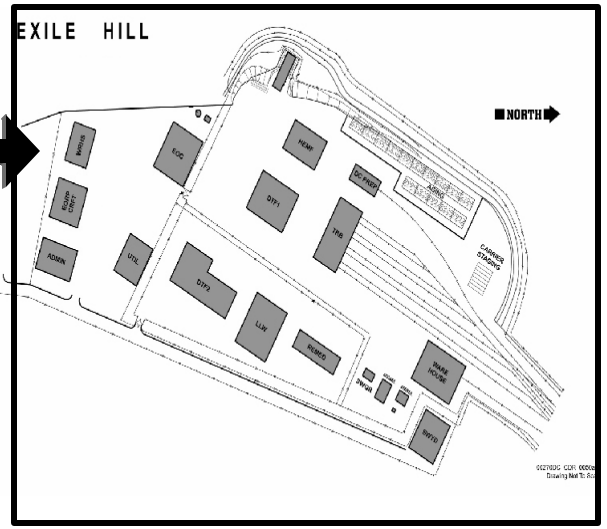
Viability Assessment Design (VA)

- Wet handling for commercial spent nuclear fuel (CSNF)
- Single large building
- 5 transfer lines



Site Recommendation Design (SR)

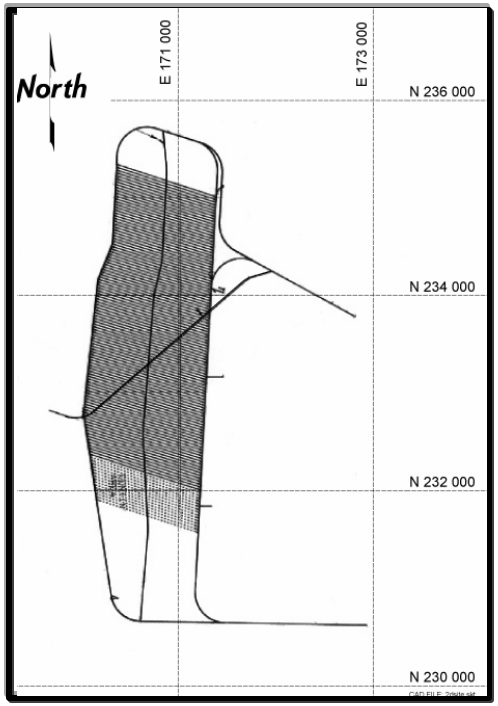
- Wet handling for CSNF
- Single large building
- 3 transfer lines
- 5,000 MTHM blending pools (to accommodate thermal blending)



License Application Design (LA)

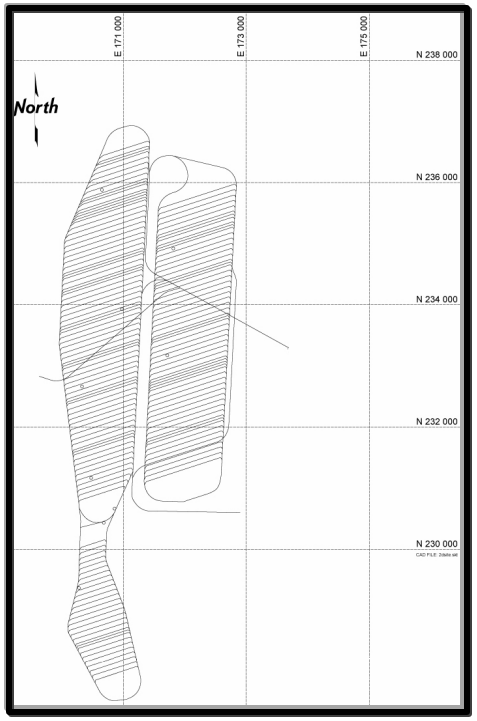
- Dry handling
- Multiple buildings
- Phased construction
- Dry cask aging

Subsurface Repository Evolution



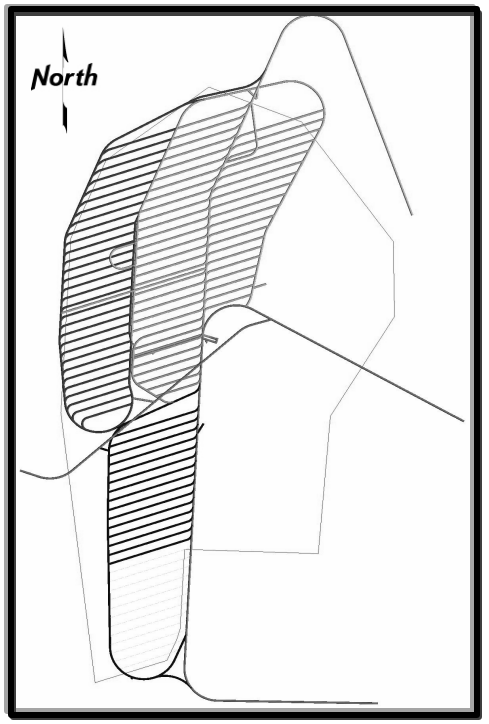
VA Design

- 92 ft drift spacing
- Above boiling temperature in rock pillar
- Single level
- Minimal ventilation



SR Design

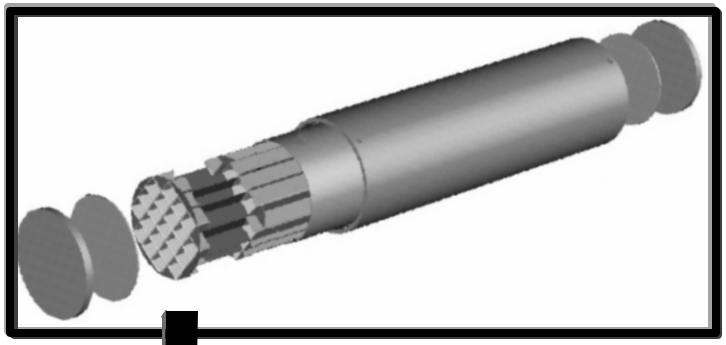
- 266 ft drift spacing
- Sub-boiling temperature in rock pillar
- Two levels
- Robust ventilation with allowance for natural ventilation



LA Design

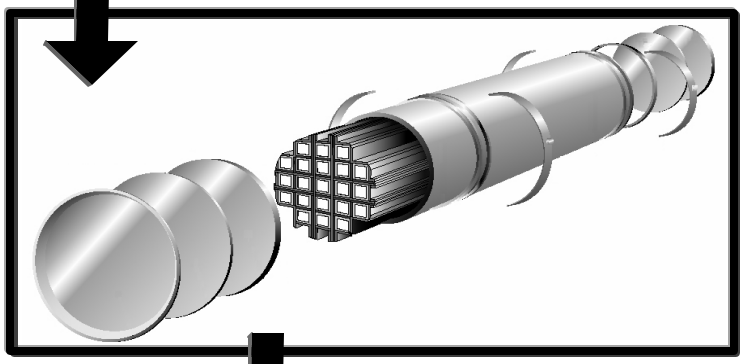
- 266 ft (81 meters)drift spacing
- Sub-boiling temperature in portion of rock pillars
- One level, 4 panels, phased
- Robust forced ventilation

Waste Package Evolution



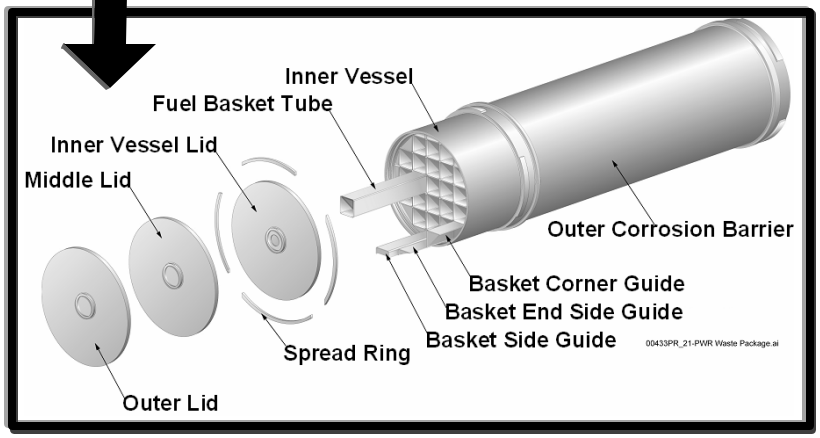
Viability Assessment Design

- Outer barrier carbon steel
- Inner barrier Alloy 22
- 18 kW power limit



Site Recommendation Design

- Outer barrier Alloy 22
- Inner barrier stainless steel
- 11.8 kW power limit
- Extended outer lid
- Split trunnion collar



License Application Design

- Outer barrier Alloy 22
- Inner vessel stainless steel
- 11.8 kW power limit
- Flat outer lid
- One-piece twist-on trunnion collar
- Spread ring design for inner lid closure

Yucca Mountain Lawsuits

- State of Nevada cases
  - Basis:
    - Siting guidelines
    - Environmental impact statement
    - Site recommendation
  - Status: Appellate Court hearing held January 14, 2004
- Water rights
  - Basis: DOE request for permitted water use at Yucca Mountain
  - Status: DOE may appeal state denial of permanent water rights

Transportation Under the NWPA

- DOE must use private industry to the fullest extent possible
- Transportation casks must be certified by the NRC
- DOE must notify each State Governor or designee prior to transportation through their jurisdiction
- DOE must provide technical assistance and funds for training in emergency response and safe routine transportation procedures (Section 180(c) of NWPA)

Transportation Overview

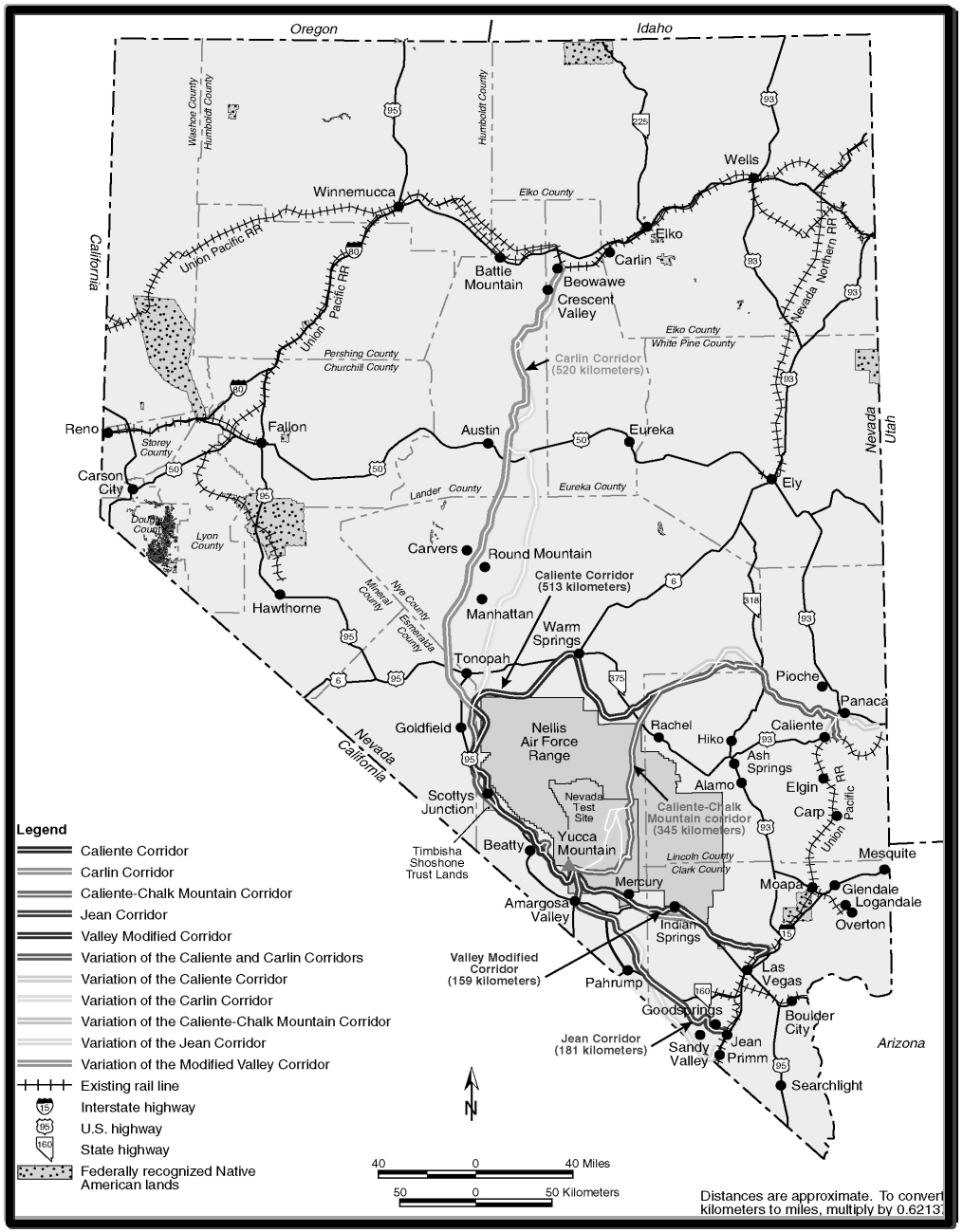
- **After many years of deferral due to budget shortfalls, we are accelerating our planning**
- **We will build on the experience and proven safety record in the U.S. and Europe**
- **Over the next 6 years, we will develop a transportation system ready to ship SNF and HLW to the repository**
- **Near-term activities:**
  - Consult with states and tribes to develop an approach for coordination of transportation planning and operational aspects
  - Initiate long-lead-time cask acquisition activities
  - Implement National Environmental Policy Act requirements for rail alignment

National Transportation Subprojects

CASKS

ROLLING STOCK

SUPPORT FACILITIES



Nevada Rail Routes Analyzed in the Final Environmental Impact Statement

Recent Nevada Rail Milestones

- 12/03 -- DOE announced a corridor preference for the Caliente corridor with Carlin as a secondary preference
- 12/03 -- Bureau of Land Management issued a Federal Register notice for land withdrawal along Caliente corridor
- 4/04 -- DOE issued a record of decision on the selection of rail as the primary transport mode and selection of the Caliente corridor
- 4/04 -- DOE issued a notice of intent to prepare an Environmental Impact Statement on the rail alignment to the Yucca Mountain Repository

Upcoming Transportation Decisions and Activities

- Solicit public comments through Environmental Impact Statement scoping process
- Begin Environmental Impact Statement for rail alignment
- Initiate cask and rolling stock procurement activities
- Develop routing criteria and approach to assisting state and tribal emergency preparedness efforts
- Initiate specific projects with State Regional Groups

Waste Acceptance - Utility Litigation

- **Litigation over delay in waste acceptance (1/31/1998)**
- **66 lawsuits have been brought by utilities**
  - **Department required to pay damages**
  - **Trials are to determine the amount of damages**
  - **Indiana Michigan trial ended on 3/15/2004**
  - **Trial in three Yankee cases set for 7/2004**

International Repository Program

- Eleven nations have committed to incorporating repositories as part of their nuclear fuel cycle
- Several nations are actively working on disposal options but have not formally established a separate repository authority
- Development of a multination international repository is unlikely
  - Several national repository programs would be jeopardized if an attempt was made to internationalize them

Summary

- **DOE is committed to the safe disposal of high-level radioactive waste and spent nuclear fuel**
- **Submittal of license application is planned for December 2004**
  - Testing, scientific and engineering analyses, and design will continue to address licensing needs
- **Interaction with stakeholders is the key to development of the transportation system**
- **DOE is proceeding toward the goal of waste acceptance in 2010**