

# Yucca Mountain Lessons Learned

Waste Management, 2011

Panel: US DOE Yucca Mountain Site and the Alternatives

February 28, 2011

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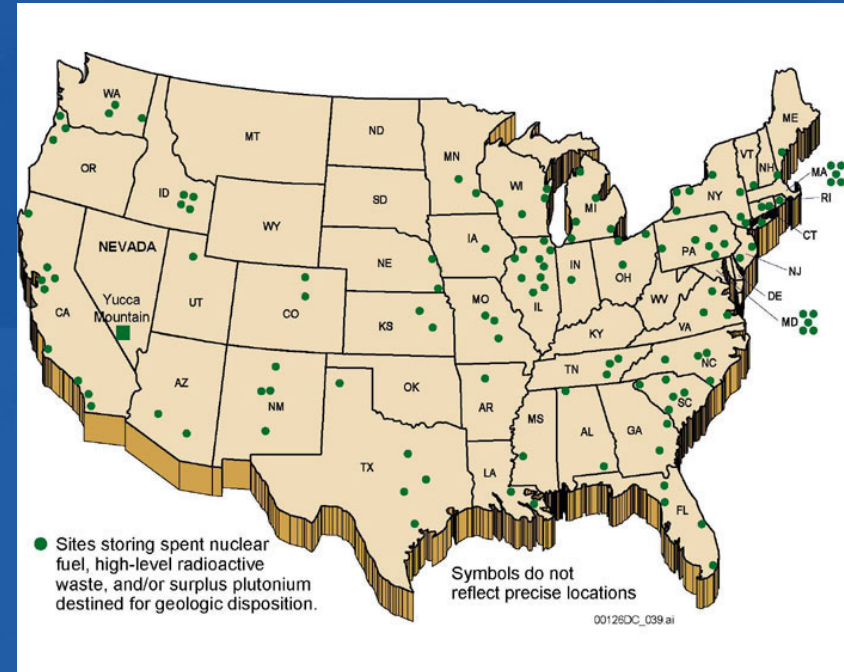
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# Nuclear Energy

- **Sustained exemplary levels of safety and operational performance provide sound basis for confidence in nuclear energy**
- **Public support for nuclear energy is strong and growing**
- **New Plant Development is proceeding in step with economic conditions**
- **Industry success is undergirded by considerable experience with the safe management of used nuclear fuel**

# Used Nuclear Fuel

- **Used fuel inventory thru 2009**
  - Approximately 62,500 MTU
  - Increases 2 - 2.4k MTU annually
- **ISFSI storage thru 2009**
  - 14,000 MTU
  - Over 1200 casks/canisters loaded
  - 49 Operating ISFSIs
- **ISFSI inventory by 2020**
  - Estimating 26,200 MTU
  - 2,600 casks/canisters loaded
  - At 75 ISFSIs
  - Fuel from 118 reactors
  - Harris – lone plant site w/o ISFSI
- **ISFSI inventory by 2040**
  - Likely to exceed 70,000 MTU



# Integrated Used Fuel Management

- **Industry supports a three-pronged approach to used fuel management**
  - **Interim storage at reactor sites and centralized location(s)**
  - **Research, Development & Demonstration of advanced fuel cycles and recycling technologies with deployment at the right time**
  - **Permanent disposal facility**
- **Federal approach to date has been inconsistent and has lacked policy and management accountability, impeding ability to pursue facilities**
- **Blue Ribbon Panel considering lessons learned, options**

# Yucca Mountain Timeline

1982 Nuclear Waste Policy Act (NWPA)

1987 NWPA amended – Site characterization narrowed to Yucca Mountain

1998 contractual deadline for DOE waste acceptance

2002 Yucca Mountain Development Act completes site characterization, begins licensing

2004, DOE misses commitment date for License Application (LA), initiates changes

June 2008 DOE submits LA

Feb. 2010 NRC staff questions on LA answered

Oct. 2010 Project Terminated



1982

2011

# Yucca Mountain 2010

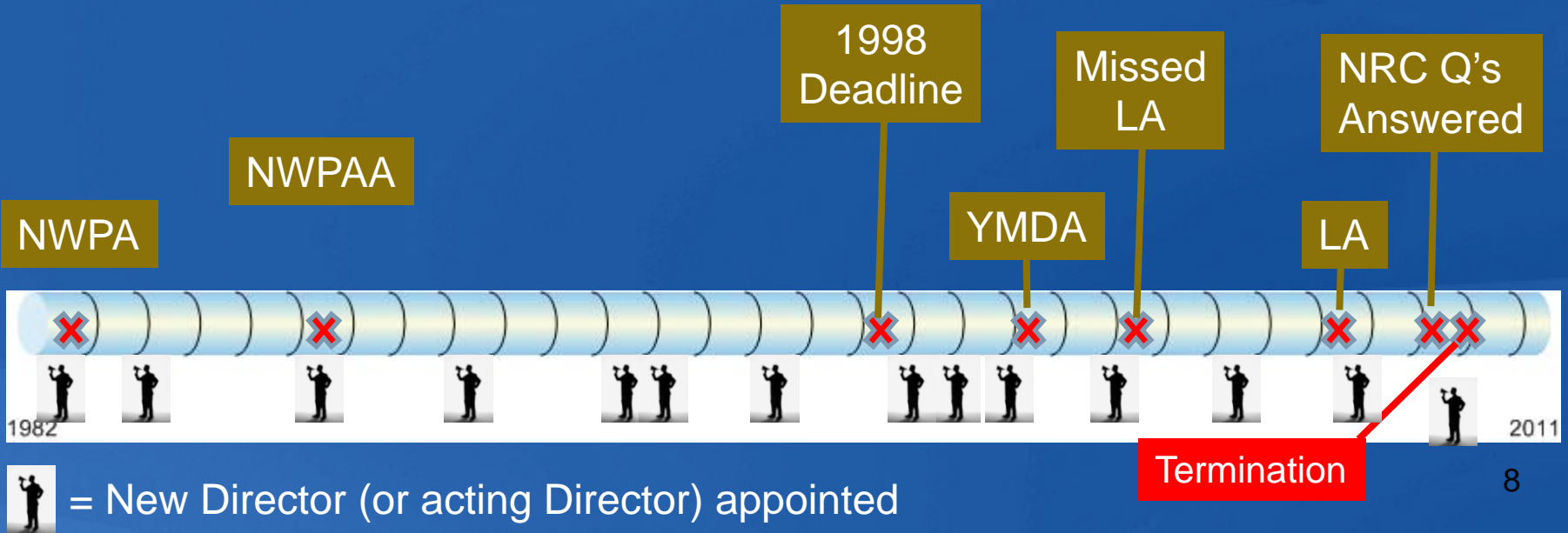
- **February:** DOE budget request zeros out funding for the project
- **March:** DOE files motion with NRC Licensing Board (ASLB) to withdraw License Application (LA)
- **March through June:** Multiple Stakeholders oppose motion to withdraw before ASLB and in U.S. Court of Appeals
- **June:** ASLB rules DOE does not have legal authority to withdraw LA
- **June - December:** NRC Commissioners consider review of ASLB ruling, but have yet to issue a decision while courts await final agency action
- **October:** DOE Office of Civilian Radioactive Waste Management “ceases to exist”, all project records turned over to DOE Office of Legacy Management
- **October:** NRC initiates “orderly closeout” of LA review

# Yucca Mountain Lessons Learned

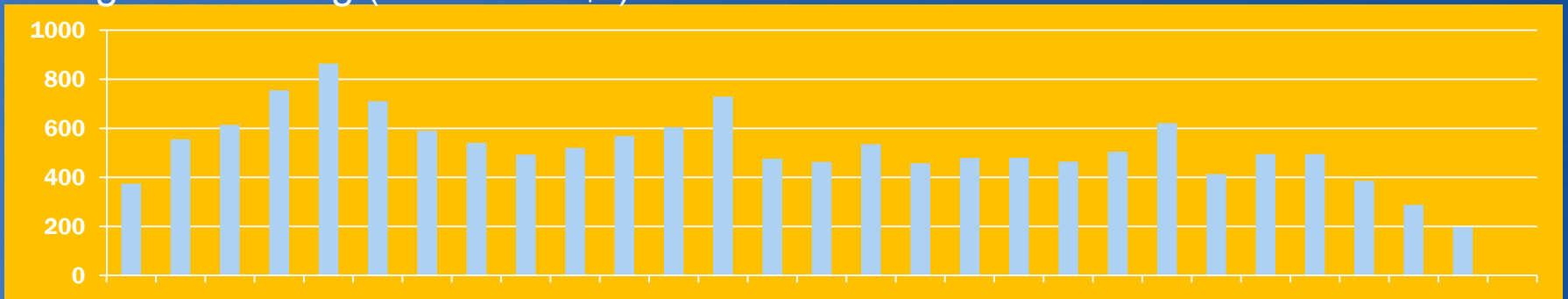
- **What did not work**
  - **Governance**
  - **Financing via Appropriations**
- **What did work**
  - **Public Process**
  - **Regulatory framework**
  - **Science**
  - **Step-wise implementation**
  - **Systems integration**



# Funding and Governance Timeline



Program Funding (Millions of \$\*)



\* Constant 2007 \$ until 2007, actual \$ thereafter



# Public Process

- **All aspects of project vetted in hundreds of public meetings over two decades**
  - DOE, NRC, NWTRB, ACNW mtgs.
  - Site Recommendation hearings
  - Others
- **Numerous project documents subjected to public review and comment**
  - EPA, DOE and NRC rulemakings
  - Multiple EISs
  - Science and Engineering Report
  - Site Recommendation documents
- **Extensive record documenting that all comments were addressed**

# Regulatory Framework

- **NRC Regulations based on state-of-the-art science**
  - Total Systems Performance Assessment
  - Risk-informed, performance-based rule and review plan
- **NRC staff was well prepared for review**
- **Extensive pre-LA interactions**
  - Key technical issues identified early, many resolved prior to LA
- **Thorough and efficient technical review of LA**
- **Process engendered public confidence in many areas**
- **Adversarial licensing adjudication as final test**
- **Nevertheless, some room for improvement**
  - Timing of regulation issuance
  - Narrow court ruling on time of compliance
  - Dual rulemaking responsibilities (EPA & NRC)

# Science

- **Expertise from multiple National Laboratories, leading universities, USGS, and others**
- **Thousands of scientific and technical experts**
- **Extensive on-site and laboratory investigations**
- **State-of-the-art methodology (TSPA)**
- **International peer review**
- **Comparative review with independent organizations**
  - EPRI, Nevada, NWTRB, ACNW, etc.
- **Whenever concerns were raised, additional work was done and confidence in results strengthened**
  - Licensing process would have further challenged results

# Step-wise implementation

- **Repository design process was iterative and informed by independent scientific, technical, and stakeholder views**
  - NWTRB
  - ACNW
  - EPRI
  - International Peer review
  - Opponents
- **Each iteration was implemented in a transparent manner**
- **NRC Safety Evaluation Report Vol. I recognized step-wise implementation going forward**

# Systems Integration

- **Engineered barriers designed to work in harmony with natural environment**
- **TAD program developed to minimize commercial used fuel handling at site**
- **Aging pad designed to address thermal issues**
- **Repository designed to accept multiple waste forms**

# Conclusion

- **Nearly 30 years experience with DOE management of used fuel indicates the need transformative change**
  - **Effective and stable leadership to assure sustained success**
  - **Access to funding sufficient to support sustained long-term commitment**
  - **Accountability to industry, ratepayers, and public**
  - **Operate like a private company, not DOE – driven by sound business practices, not political whim**
- **Fed-Corp concept is capable of effecting change**
- **The Yucca experience also produced many valuable positive lessons learned – what was gained should not be lost**