



## **Developing a Data Base Supporting Extended Storage and Transportation Program of SNF in the USA**

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## Why Extended Storage and Transportation (EST) of SNF Now?

- Current stakeholder interest high: Administration announcements, evolving national strategy for SNF, blue ribbon panel
- Data base needed to support regulatory guidance for safe, secure, environmentally sound EST of SNF



## NRC Program Goals for EST

- Streamline the Storage and Transportation Regulatory Process
- Identify any Issues related to Extended Storage and Transportation (EST) > 120 years that may require rulemaking or guidance sooner rather than later
- Determine extent to which HBU related storage phenomena are reflected in regulations

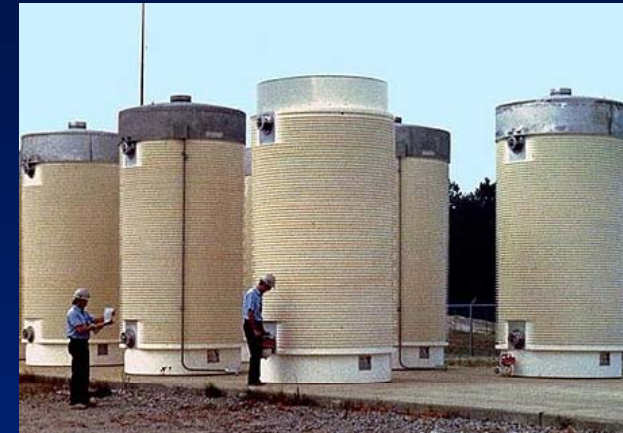


## Potential Regulatory Requirements

- Potential rulemaking to address long-term requirements
- Possible integration of storage and transport regulations – currently separate
- Risk informing
- Reevaluate standards, guidance

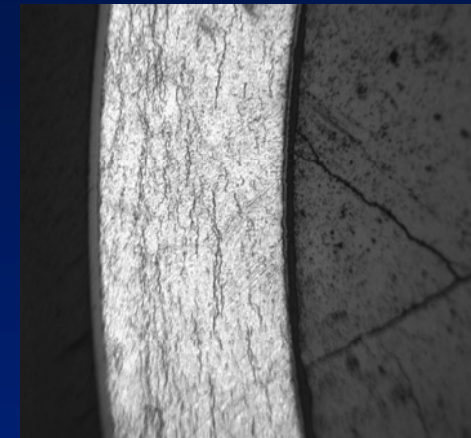
## Current NRC Storage Regulatory Framework

- Forty-year License Periods
- Aging Management Plan
  - Time-Limited Aging Analyses
  - Design for Prevention
  - Monitoring – How, frequency, in-situ
  - Maintenance – what type
  - Corrective Actions -when



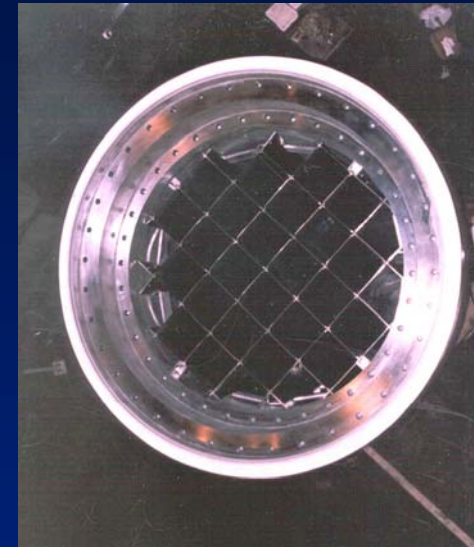
# Cladding Integrity

- Safety Functions
  - Primary Fission Product Barrier
  - Geometry Control
  - Defense-in-Depth
- Technical Challenges
  - Higher Burnup Levels
  - Temperature Effects
  - New Cladding types
  - In-situ monitoring in sealed canisters



# Canister Integrity

- Safety Functions
  - Confinement
  - Inert Environment
  - Criticality Control
- Technical Challenges
  - Long-Term Corrosion
  - Basket properties
  - Absorber efficiency
  - Monitoring sealed internals



# Overpack Performance

- Safety Functions
  - Shielding
  - Heat Transfer
  - Robustness Against Severe Events
- Technical Issues
  - Long-Term Degradation
  - Response to External Natural Phenomena, external disruption







# Long-term Packaging and Compatibility?

- Degradation conditions that could require repackaging, What are they and when could they be expected to occur
- Condition of fuel, and basket in a sealed canister
- On-site Fuel Handling and Repackaging Capabilities (if needed)
- Influence of Extended storage on compatibility with Transportation and Future Disposition Scenarios

- Environmental Impacts
  - Human Health
  - Resources
- Issues
  - Defining Future Storage Scenarios
  - Defining Surrounding Environment
  - Stakeholder Concerns
  - Data to support evaluation of EST



## Revaluation of Data Needs

- In 1997, and 2003, EPRI evaluated information needs and potential sources of information necessary to provide a technical basis for the storage of SNF for 100 years.
- Documents have shortcomings with respect to the current situation;



# Supporting Research

- Gap analysis of potential safety and security Issues
- Research to develop tools to make regulatory decisions regarding issues identified in the gap analysis
- Long-term Cask Demonstration to confirm results and provide continued assurance



## LONG-TERM CASK DEMONSTRATION

- Demonstration Program for EST of High Burnup fuel (>45GWD/MtU)
- Joint program with external stakeholders (EPRI/Industry/DOE)
- Success: 1) Confirming staff degradation predictions are correct, 2) Identify new phenomena before all storage casks are affected so regulatory action can be taken.



# Potential Demonstration Types

- Initiate new independent test
- Examination of stored US high burnup fuel
- International cooperation



## Summary

- NRC is prepared to enhance regulatory infrastructure to better support very long term dry storage
- Three phase research program of gap analysis, laboratory studies and modeling, long-term cask demonstration
- Industry and Department of Energy support for technical research can help ensure that regulatory solutions are appropriate and efficient
- Encourage International participation and collaboration