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Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste

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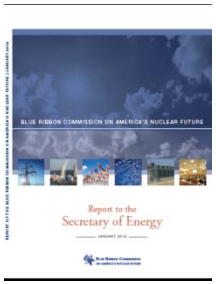
BRC Assessment of DOE-NE Program
(Chapter 13 Near-Term Actions)



"DOE remains responsible for nuclear waste management activities of the Federal Government, it is important that those steps that do not require the new organization to be in place be initiated as soon as possible."

DOE should :

- Begin laying the groundwork for implementing consolidated storage (perform system analyses, design studies)
- Prepare to respond to information requests from communities, states, and tribes interested in hosting a consolidated storage facility
- Begin providing funding, for working with state and regional-state government groups and training local and tribal officials in preparation for movement of spent fuel from shutdown reactor sites to consolidated storage
- Work with nuclear utilities, the nuclear industry, and other stakeholders to promote better integration of storage into the waste management system, including standardization of dry cask storage systems

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DOE Implementation Strategy: Interim Storage Facilities

- **Facilities sited using consent-based process and licensed by the Nuclear Regulatory Commission**
- **Pilot-scale interim storage facility**
  - Focused on servicing shutdown reactors
  - Operational in 2021
- **Consolidated interim storage facility**
  - Larger capacity to provide system flexibility
  - Operational in 2025
- **Facilities could service environmental cleanup and defense sites**

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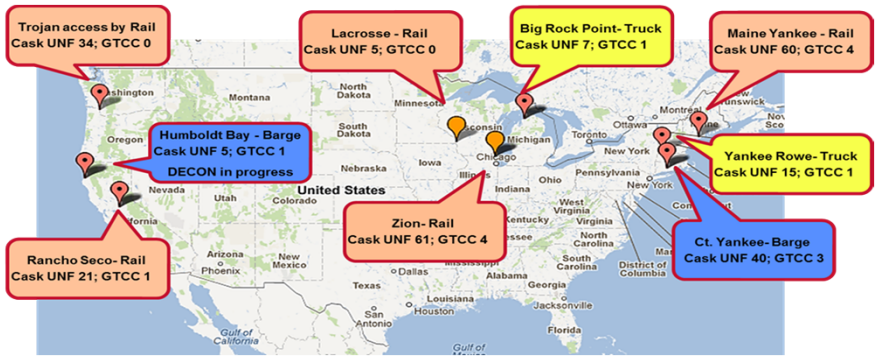
Key Activities: Transportation

- **Investigating routes for shipment from shutdown reactors**
- **Collaborating with stakeholders to address issues and publish revised NWPA 180(c) policy**
- **Planning for design, testing and procurement of transportation casks and rail cars**
- **Assessing needs and developing plan for removing UNF from shutdown sites**

BRC recommendation:
"Complete development of procedures and regulations for providing technical assistance, funding, and training to local groups in preparation for movement of spent fuel"



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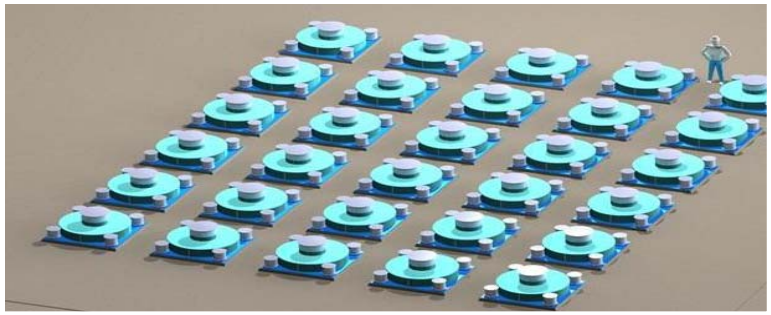
Key Activities: Storage

- **Completed task on design concepts using 3 separate industry contractors**
- **Prepared NFST concept report based on industry concepts and NFST system architecture studies to provide a guidance document for conceptual design and to support siting activities**
- **Evaluate costs and impacts of opening non-disposable storage canisters**
- **Preparing to award to industry design contract for conceptual design alternatives for generic interim storage facility and transportation of used nuclear fuel**

BRC recommendation:
"Perform systems analyses and design studies needed to develop a conceptual design for a spent fuel storage facility"



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Storage Facility

- **The functional requirements for an interim storage facility (ISF) are much broader than for a reactor-specific ISFSI, e.g.,**
  - much larger capacity (security, ALARA, siting, operations issues)
  - must be able to accommodate UNF already loaded in various systems (facility design and operational issues)
  - must be able to store fuel for potentially many decades (need for remediation and expanded monitoring capabilities)
  - may ultimately be able to repackage UNF for disposal (facility design and siting)

- **A range of facility design alternatives require evaluation to enable implementation of a flexible waste management system incrementally.**

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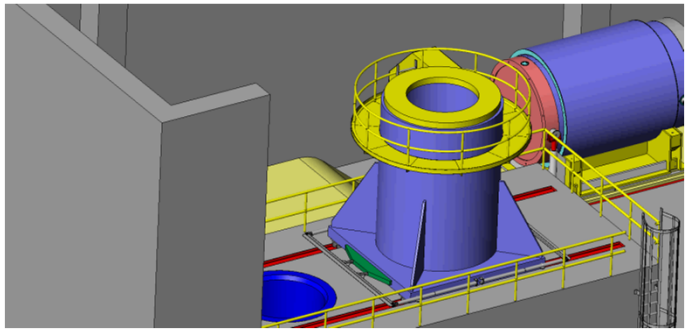
ISF functional requirements are not the same as a reactor ISFSI

- **Storage facility concepts for the Pilot ISF could be rather simple (e.g. pad); however**
  - A wide variety of storage concepts need to be accommodated
  - Regulatory Framework needs to be established
  - At a minimum there is a need for a canister transfer facility
  - Canister transfer facility will need to accommodate different sized canisters
  - Development of a standardized transportation cask may be beneficial
  - Alternative approaches to design need to be evaluated



Canister Transfer Facility — Holtec International

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Many Factors affect the requirements and design of the larger ISF

- **Storage facility concepts for larger ISF can differ, depending on UNF management approach taken**
  - Start dates of ISF and repository
  - Acceptance and disposal rate
  - Fuel receipt - canisters, bare fuel
  - Storage method – dry (vertical/horizontal canisters, vaults); bare fuel storage (pools)
  - Imposed capacity limits
  - Regulatory requirements, e.g. security and safety
  - Host preferences/requirements
  - Impact on cost and operations (ALARA)
- **Strategy for managing UNF in fuel pools once the storage facility begins operation will affect design and future waste packaging/re-packaging**

All Canistered	vs.	Canistered and Bare
• Transport all fuel in Dual Purpose Canisters (DPC) • Dry canister storage • Re-packaging of all DPCs • More LLW generated from additional DPCs		• Transport fuel from pools in re-useable casks • Dry canister + bare fuel storage • Reduced number of DPC re-packaging + bare fuel packaging

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ISF - More Than Casks on a Concrete Pad

Designs Must be Flexible, Adaptable and Expandable

Dry Storage Alternatives

- Vented Concrete DSC at Grade in horizontal vertical vendor specific systems
- Vaults for dry canisters
- Universal storage over packs
- Universal underground systems

Humboldt Bay Underground Storage

Support Systems are Required

- Cask Handling Facility, large shielded cell vs. transfer cask may offer time in motion and ALARA advantages
- Storage over pack fabrication
- Rail and cask maintenance
- Security systems, infrastructure and balance of plant

Potential Co-located Systems

- Laboratory for supporting long term storage and developing re-packaging techniques
- Fuel remediation pool for damaged or failed fuel
- Cask manufacturing facility

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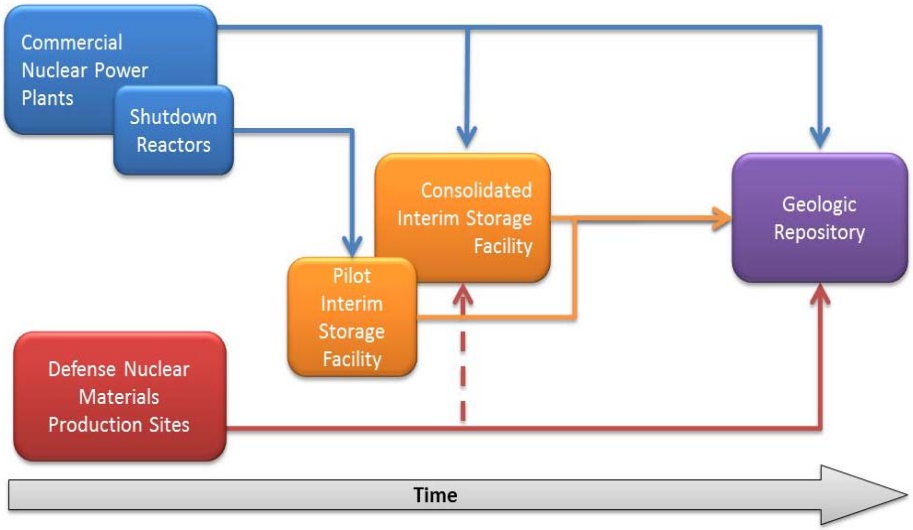
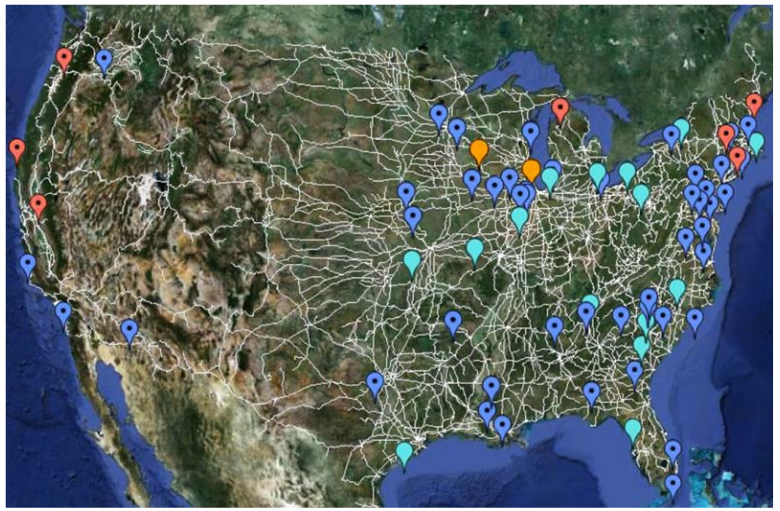
Key Activities: Systems Analysis

- **Performed systems analysis of alternative approaches for accepting and moving fuel; continuing activity**
- **Developing methodologies, approaches, and tools to analyze the overall interface between at-reactor, consolidated storage, and ultimate disposition**
- **Evaluating select UNF disposition scenarios**

BRC recommendation:
"Develop systems analyses to provide quantitative estimates of the system benefits of utility actions"





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Legislation is Necessary To Meet Administration's Goals

- **Legislation is needed that would:**
  - **Permit construction of an ISF before repository construction license by NRC**
  - **Create the Management and Disposal Organization (MDO)—if the MDO is to select the site, license and construct the Pilot ISF by 2021**
  - **Permit new siting studies for a repository**
  - **Allow funding changes for timely implementation by the MDO**

DOE will continue the effort within existing authority until legislation is enacted

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