U. S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: COMPATIBILITY OF EXISTING INTERIM STORAGE SYSTEMS WITH THE WASTE DISPOSAL HANDLING SYSTEMS

PRESENTER: Jeffrey Williams
Dean Stucker

PRESENTER'S TITLE AND ORGANIZATION: Chief, Facilities Development Branch
Chief, Field Engineering Branch

PRESENTER'S TELEPHONE NUMBER: (202) 586-9620
(702) 794-7275

Dallas, Texas
November 1-2, 1993
Out-of-Pool Storage Comparison

Peak Inventory (MTU) vs Year

- No MRS, Repository in 2020
- 1998 MRS, Capacity Limits, Repository in 2010
- No Limits, Repository in 2010
Dry SNF Storage as of October 1993
## STORAGE SYSTEMS IN USE

<table>
<thead>
<tr>
<th>Reactor</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surry</td>
<td>Metal Casks</td>
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<tr>
<td>H. B. Robinson</td>
<td>Horizontal Concrete Storage Modules</td>
</tr>
<tr>
<td>Oconee</td>
<td>Horizontal Concrete Storage Modules</td>
</tr>
<tr>
<td>Ft. St. Vrain</td>
<td>Modular Vault Dry Storage</td>
</tr>
<tr>
<td>Palisades</td>
<td>Vertical Concrete Casks</td>
</tr>
</tbody>
</table>
DRY STORAGE TECHNOLOGIES IN USE

### Metal Casks

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Where Used</th>
<th>Status</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNS</td>
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<td>Castor V-21</td>
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<td>Westinghouse</td>
<td>Surry</td>
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## DRY STORAGE TECHNOLOGIES IN USE

### Concrete Casks

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<td>HB Robinson</td>
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<td>NUHOMS-7P</td>
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<tr>
<td>Pacific Nuclear</td>
<td>Oconee</td>
<td>ISFSI License</td>
<td>NUHOMS-24P</td>
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<td>Fort St. Vrain</td>
<td>ISFSI License</td>
<td>MVDS</td>
</tr>
<tr>
<td>Sierra Nuclear</td>
<td>Palisades</td>
<td>Certificate for</td>
<td>VSC-24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General License</td>
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## FUTURE DRY STORAGE TECHNOLOGIES

<table>
<thead>
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<th>Vendor</th>
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<td>TN-40</td>
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<td>CONSTAR</td>
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<td>Burns &amp; Roe</td>
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<td>Generic design for storage</td>
<td>Concrete Vault Storage</td>
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<tr>
<td>GNS</td>
<td>TBD</td>
<td>Under Review</td>
<td>CASTOR X</td>
</tr>
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</table>
COMPATIBILITY WITH THE WASTE MANAGEMENT SYSTEM

- Existing Storage casks not licensed for Transportation.
- The existing storage technologies unlikely to be licensed for Transportation.
- Need to return to fuel pool for unloading, and reloading into transport casks.
- Consequence of unloading at reactors has been evaluated.
- New Dual Purpose Technologies
  - Once licensed for Storage/Transportation DOE will take appropriate actions to include this as acceptable Waste Form.
COMPATIBILITY OF STORAGE TECHNOLOGIES WITH MRS

• All can be used for storage at the MRS.

• Receipt of these technologies at MRS not fully evaluated.
  - do not see problems.
  - evaluated opening NUHOMS dry storage canisters.
TECHNICAL ISSUES WITH COMPATIBILITY GOALS

**Part 71 Issues**

Burnup Credit Criticality Control

Transportation Structural Criteria

**Waste Acceptance Criteria**

Full Range of SNF Characteristics

**System Optimization**
COMPATIBILITY OF EXISTING STORAGE SYSTEMS WITH MPC

- Commerce Business Daily Notice
- Response by commercial vendors
  - Pacific Nuclear
  - Nuclear Assurance
  - B&W Fuel Co.
  - Burns & Roe
  - Transnuclear, Inc.
  - Sierra Nuclear Corp.
- MPCs cause small impact on existing storage designs.
SUMMARY

• Several technologies are available.

• At reactor dry storage will increase.
  - an MRS facility can reduce this burden.

• Anticipated that more storage technologies will be developed.

• Existing at reactor storage only technologies are not compatible with DOE-OCRWM program.

• DOE propose to take appropriate action to make anticipated transportation/storage technologies an acceptable waste form for the DOE-OCRWM program.
Repository Requirements

• Must meet Title 10 CFR Part 60

  - Long term criticality control
    - Sufficient neutron absorber materials
    - Gap only flux trap designs not acceptable

  - Thermal output
    - Large packages compatible with above boiling thermal loading
    - Requires high thermal conductivity basket

  - Design life
    - Greater than 1000 years
    - Materials must survive in the anticipated repository environment
MGDS Waste Disposal
Handling Impacts

- Variety of interim storage systems will have major differences in height, weight, diameter, heat load and radiation dose rate

- Standardization improves surface facilities operations, equipment reliability, maintenance, and safety

- Waste package transporter design more complex due to need for added flexibility
MGDS Waste Disposal
Handling Impacts (Continued)

- Management of thermal loading more complex due to variety of waste package heat loads

- Emplacement and retrieval operations more complex due to differences in waste package configurations

- Standardization of waste package configurations reduces MGDS life cycle costs
Interim Storage Strategy Summary

- No existing technical barriers to interim storage
- MRS siting remains key institutional issue
  - MRS host conditions are unknown
- Challenge is to integrate an institutionally acceptable approach into a safe, environmentally sound, cost effective system that meets currently existing storage and transportation requirements, without precluding disposal requirements
- MPC effort is a key part of this work