Project Case: Leveraging NAC-MPC and STC Cask Systems to Support DOE’s Waste Management Integration Objectives

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The Department envisions an integrated waste management system that may contain:

- a pilot interim storage facility, initially focused on accepting spent nuclear fuel from shutdown reactor sites;
- a full-scale, consolidated interim storage facility that provides greater capacity and flexibility within the waste management system;
- a geologic repository for commercial spent nuclear fuel
- a separate repository for high-level waste from atomic energy defense activities; and
- an adaptable consent-based approach to siting these facilities.

Integration = Leveraging synergies across the backend value chain
• Integrated Waste Management System Requires an Optimized Backend Value Chain for both Spent Fuel (130,000 MT+) and HLW(13,000 MT+)
• Synergies in packaging and logistics can drive efficient integration (Example STADs, etc..)
• DOE’s authority and ability to effectively incentivize integration?
• Lack of clear disposition strategy (repository requirements)
• Political risks?
• Competing priorities (DOE vs. utilities)
• Impact of DOE settlements (reimbursements)

Technology and industry trends have been driven by nuclear utility requirements, but does the current situation discourage integration?

Only if we fail to recognize integrated processing options that address both utility and DOE priorities for waste management.
Consider Integration Model that Leverages Existing MPC Systems

• Modern Dry Storage / Transport (DS/T) Systems are proven and widely used across the country, offering valuable lessons learned.

• Modern DS/T Systems are licensed for a myriad of contents with relatively higher nuclear/thermal/radiological hazards than most DOE defense wastes (example WVDP, SRS).

• These systems can be easily adapted to accommodate any foreseeable waste stream generated across the DOE complex.

• Licensing under part 72 and 71 can be easily leveraged as foundation to DOE’s Safety Cases when implementing across the DOE complex.

• There is a large efficiency incentive for DOE to leverage the MPC model used for SNF storage at utilities for HLW storage at DOE sites.
Example: Use of Existing Commercial SNF Casks at WVDP for Storage of HLW

- U.S. DOE-EM approved use of Commercial MPC technology for the implementation of a dry storage facility at the West Valley Demonstration Plant (WVDP) in support of decommissioning activities.

- NAC-MPC System (NRC Docket No. 1025): Multipurpose canister system licensed for both storage and transport used at various decommissioning sites:
  - Connecticut Yankee
  - Yankee Rowe
  - Dairyland LaCrosse

- Solution included licensing for Transport in the NAC-STC Cask (NRC Docket No. 9235)
Key Project Attributes - WVDP

- Design of MPC Canister Basket to Accommodate Five (5) 24-Inch DOE HLW Canisters

- Design and Licensing of the Storage Facility under 10CFR 830 B (Site Facility Safety Case)

- Transport licensing under NRC 10CFR71
  - HLW Waste originated from demonstration commercial fuel
  - NAC-STC cask to ship 5 HLW canisters without repackaging

- Delivery of 55 Casks with Transfer and Process Equipment - first batch delivery commenced on October 2014

- Leveraged procedure, training and operation support modules (Welding etc..)

- Four (4) systems loaded as of 12/31/15
## Design and Licensing

- Design and Licensing of the Storage Facility under 10CFR 830 B (Safety Basis Requirements)
  - Part 72 FSAR -> used as template for DOE SARP
    - Methodologies and analytical methods similar to Part 72 Licensing (NAC-MPC)
  - Site is the applicant - analogous to utility site specific licensing / Approval by DOE with NYSERDA concurrence
  - NAC QAP approved by DOE and Site M&O
  - Approach proven successful - Independent DOE timely approval - within 24 months and with local stakeholder consent.
- Licensing under NRC 10CFR71
  - Using the NAC-STC cask to ship 5 HLW canisters is a simple content change
  - Similar packaging methodology as other MPC canisters (spacers, etc.)
Facility Processing with Standard Ancillaries Adapted for the Project
• Highly adaptable systems designed to accommodate hotter and more reactive commercial fuels
  • WVDP systems meet site specific ultra low dose with 4-inch liner (vs. 2.5 inch std.)
  • Standard storage cask vents sealed at WVDP (not required - for thermal)
  • Cask facility interface issues can be addressed with off-the shelf ancillary equipment
  • Address other stakeholder interests: NAC-STC cask to ship 5 HLW canisters without repackaging (275 shipments vs. 55)
**Aligning with DOE’s integration objectives (benefits)**

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<tr>
<th>Benefits</th>
<th>WVDP Integration Accomplishments</th>
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<td><strong>Economics/ System Efficiencies</strong></td>
<td>- Leverages hardware, methodologies and procedures that are <em>well-proven</em> and accepted&lt;br&gt;- Capitalizes on mature and efficient supply chain for casks and ancillaries&lt;br&gt;- Commonality in transport technology with two other facilities in the Northeast.</td>
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<td><strong>Licensing/ Safety Cases</strong></td>
<td>- Safety evaluation approach viewed as efficient and conservative&lt;br&gt;--- from 72 -&gt; SARP -&gt; SC&lt;br&gt;- Flexibility when changing contents / optimizing system design</td>
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<td><strong>Adaptability</strong></td>
<td>- Leverage proven transfer ancillaries and methods to retrieve and move materials rather than modifying or building new DOE facilities.&lt;br&gt;- Adaptability and versatility of designs drives efficient integration</td>
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<td><strong>Consent Based Approach /Political Risks / Stakeholder</strong></td>
<td>- Demonstrated robust, self-protecting, modular/discrete and recoverable systems.&lt;br&gt;- Demonstrates technology alignment regardless of long-term disposition strategy. Less impact due to political stalemate.</td>
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**Benefit: Reduces Current and Future Liabilities and Builds Public Trust**
Summary

The Department envisions an integrated waste management system structured around an adaptable consent-based siting approach for future facilities.
- Any integration effort significantly benefits from adoption of proven and efficient technologies that are compatible across the waste management system.
- Trends have already been set by commercial industry representing the highest portion of all SF and HLW disposition inventories: 72,000MT Commercial Fuel vs. 13,000MT Defense HLW (2015)
- Based on the lack of incentives to change the commercial technology trends, it makes more sense to promote integration of HLW streams by using existing commercial SNF storage and transport technology
- This in turn will support consent based efforts because proven and widely adopted systems already foster good public confidence.
- Furthermore, DOE has recently been able to successfully demonstrate the elements of such technology integration benefits by adapting existing commercial technology for storage and transport of HLW at WVDP.