

High-Level Waste Canister Storage, Evaluation and Recommendation

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West Valley Demonstration Project**



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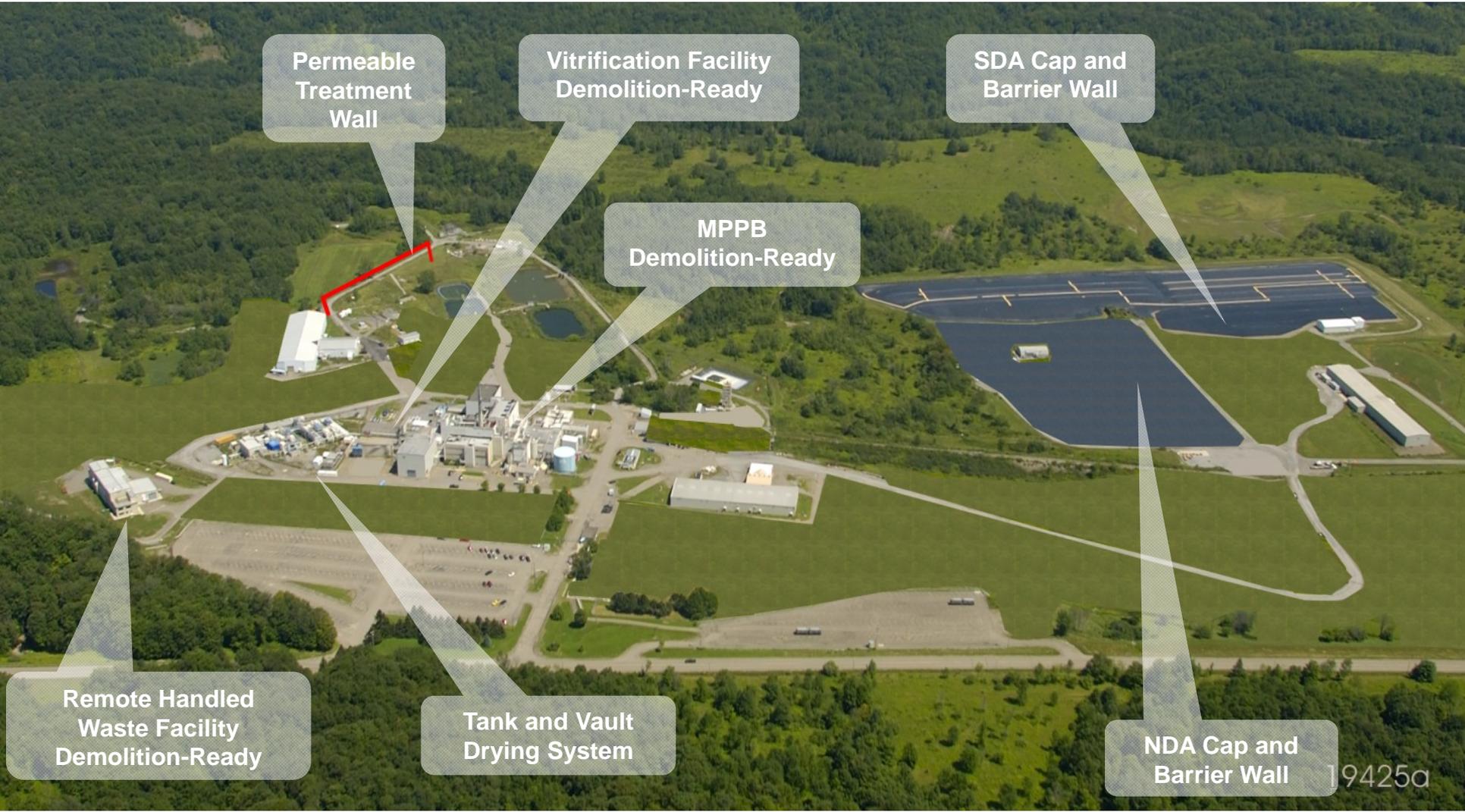
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Agenda

- Phase 1 Decommissioning
- West Valley Demonstration Project High Level Waste
- Storage Option Evaluation
 - Siting Evaluation
 - Storage Options
- Recommendation and path forward



Phase 1 Decommissioning



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West Valley High-Level Waste



275 HLW Canisters in Safe Storage in Main Plant Process Building

- 2 feet Outside Diameter
- 10 feet Tall
- Reversed-dish Bottom End
- Welded Lid after filled
- Grappling Pintle on Top
- Avg. canister fill height > than 90%
- Avg. Weight = 5,500 pounds
- Avg. Contact Dose = ~2,600 R/hr

Problem Statement: Storage of HLW Canisters in the MPPB is no longer the preferred option.

Evaluate Options and provide a recommendation as to which storage system provides optimum, safe, economical future storage of HLW canisters not in the MPPB.



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Evaluation Summary

- Review scope and review historical documents
- Independent Siting Evaluation
- Options reviewed
 - Spent Nuclear Fuel (SNF) technology
 - Three vendor presentations (horizontal/vertical)
 - Single canister container design (not SNF)
 - Above- and below-grade vault – SRS/ Ft St. Vrain / WVES model
 - SNF Shipping Cask for storage
- Site Visits
 - Webster, NY, Ginna, Constellation Energy (horizontal SNF)
 - Phoenix, AZ, Palo Verde, Arizona Public Service (vertical SNF)
 - Oswego, NY, Fitzpatrick Nuclear Power Station, Entergy Nuclear (vertical SNF)
- Functional requirements developed
- Options evaluated to criteria/requirements
- Recommendation and path forward options presented



Scope of the Evaluation

- Scope Requested
 - Evaluation will be predicated upon and consider the following:
 - Ability of the system to safely contain and store the canisters for a minimum of 50 years
 - Ability for the selected storage system to remain uncontaminated,
 - Minimization of future operational costs
 - Removal and disposition of the uncontaminated storage system after canisters have been shipped off site
- System evaluation will consider:
 - Using dry casks for storage system similar to those used to store SNF
 - Constructing individual storage containers for each canister
 - Other WVES selected options



Siting Evaluation

- Evaluation was independent of other reports/conclusions
 - Historical documents focus on what the system should be, not where it should be located
 - Area was to be valid for all options considered
 - Least overall impact on current and future work
 - Least potential environmental impact
- Siting Recommendation:
 - Area in the southwest corner of the Project premises bordered by the rail line and access road
 - Geotechnical work can begin now to define area needs for construction of any option



HLW Canister Storage Options

Options Criteria	Horizontal SNF	Vertical SNF	Single Canister Container	Above-Ground Vault
Store the canisters for a minimum of 50 years	Designed to 50 years; licensed on 20-year cycle	Designed to 50 years; licensed on 20-year cycle	Design could accommodate	Design could accommodate
Ability for the selected storage system to remain uncontaminated	Requires clean overpack	Requires clean overpack	Requires clean canister	Requires clean canister
Minimization of future operational costs	Surveillance and maintenance low; vendor service for rail shipping	Surveillance and maintenance low; vendor service for rail shipping	Surveillance and maintenance similar to SNF; design would minimize remote-handling; TBD for shipping	Design would minimize maintenance; remote-handling in facility for shipping
Removal and disposition of the uncontaminated storage system after canisters have been shipped off site	Modular unit disassembly and disposal of concrete and steel	Modular unit disassembly and disposal of concrete and steel	Same as SNF, but more units	Building demolition requires all HLW canisters shipped before demolition



Cost Comparison

Options Cost	Horizontal SNF (5 Canister Overpack)	Vertical SNF (5 Canister Overpack)	Single Canister Container	Above Ground Vault
EDR/CPC Upgrades:	8,675,000	8,515,000	6,575,000	6,575,000
First Canister moved into system:	12,527,000	9,653,000	7,805,000	18,801,000
Subtotal	21,202,000	18,168,000	14,380,000	25,376,000
Move remaining canisters into system	36,960,000 600k/container	33,430,000 600k/container	13,047,000 30k/ccontainer	6,032,000 Incl unloading
Total Cost To Empty MPPB	58,162,000	51,598,000	27,427,000	31,409,000
Surveillance & Maintenance Annual Labor cost (security and inspection)	188,000/yr	188,000/yr	320,000/yr	320,000/yr
Decommissioning (based on concrete volume to be removed)	15,351,000	8,631,000	9,512,000	2,440,000



High-Level Waste Storage System Summary

- Summary

- Below-grade options not technically viable for WVDP
- All reviewed above-grade options are viable
- Above Grade Vault viable and economical but extends schedule at least 1 year and may include additional NEPA
- Storage in Spent Fuel Shipping Casks are not viable economically
- Viable options remaining:
 - Spent Fuel Storage Container Designs using multiple canister overpack de-rated for HLW
 - Single Canister Container
- Both of the remaining are competitive based on conceptual models.
- If single canister containers can be designed to provide acceptable shielding within a 25t limit. Single Canister Containers have the highest probability of making schedule and being cost effective both for initial startup and interim storage and decommissioning.



Recommendation

To meet stated schedule and provide optimal, safe and economical storage, WVES recommends proceeding with the conceptual design of the single canister container and vendor designs of de-rated SNF storage system options.



Project Status

- DOE provided technical direction to WVES to not pursue the single canister storage option
- Pursue instead HLW storage in multi-package configuration
- Funding shortfall suspended project



Path Forward

- Include scope as a performance element in follow-on contract, OR
- Obtain additional funding to continue work:
 - Prepare and issue RFP for HLW storage in multi-package configuration
 - Evaluate and select vendor
 - Complete conceptual and final design
 - NRC review/certification
 - Modify Load-Out Facility
 - Construct Storage Facility
 - Relocate Canisters



Back up Slides

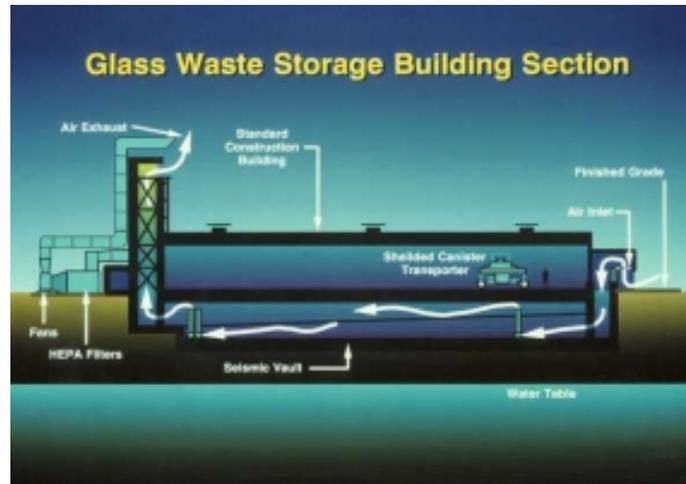


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HLW Storage Systems



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Horizontal Spent Fuel Storage System

- Considerations relative to other options:
 - Advantages
 - Proven licensed design
 - Current designs accommodate up to 5 canisters
 - Positive psychological impact (solid, square low profile)
 - Reference case in EIS
 - Passive storage function
 - Pre-fabricated off-site
 - Overpacks based on SNF designs used in Shipping Cask
 - Decommissioning modular (can removed as emptied)
 - Disadvantages
 - Only one vendor has current licensed design – limits competition
 - Operationally more difficult due to tipping and alignment needs
 - Loads exceed current facility and potentially haul road capacities requiring further upgrades
 - Overpack decreases accessibility to single canister
 - Requires potential WQR modifications



Vertical Spent Fuel Storage Systems

- Considerations relative to other options:
 - Advantages
 - Proven licensed design
 - Current designs accommodate up to 5 canisters
 - Solid, low profile
 - Bounded by reference case in the EIS
 - Passive storage function
 - Overpacks based on SNF designs used in Shipping Cask
 - Decommissioning modular (can be removed as emptied.)
 - Two vendors can provide competitive designs
 - Disadvantages
 - On-site fabrication and fabrication area required
 - Vertical height challenges current EDR limits requiring modifications
 - Loads exceed current facility and potentially haul road capacities requiring further upgrades
 - Overpack decreases accessibility to single canister
 - Requires potential WQR modifications



Single Canister Container

- Considerations relative to other options:
 - Advantages
 - Startup less costly due to limited facility and transport modifications needed
 - Consistent with WQR documentation
 - Could shift to multiple units if required
 - Single canister easily retrievable
 - Many construction vendors available to compete
 - Single canister loads easier to transport from EDR
 - Fewer modifications existing facilities/road
 - Decommissioning modular (can be done one unit at a time as emptied)
 - Disadvantages
 - No proven design (SNF used as model)
 - Transfer 275 loads versus 55
 - 275 units on storage pad increases inspection/visual impact
 - Decontamination critical to contamination control



Above Grade Vault

- Considerations relative to other options:
 - Advantages
 - SRS / Fort St. Vrain designs in use
 - Potentially small footprint
 - Single canister easily retrievable
 - Consistent with WQR documentation
 - Many construction vendors available to compete
 - Single canister loads easier to transport from EDR (fewer modifications existing facilities/roads)
 - Could incorporate shipping package loading
 - Disadvantages
 - Not Modular
 - Must be constructed prior to operation
 - Shipping must be complete to start demolition
 - Transfer 275 loads versus 55
 - Extended schedule associated with construction and potential NEPA
 - Decontamination critical to contamination control
 - Canisters stored in circulating air environment (dust, pollen, humidity)



Evaluation of Options

- Functional Requirements (WVNS-FRD-052)
 - Systems considered could be designed to meet functional requirements except:
 - Below-grade vaults or drywells were not considered to be totally passive and not technically feasible at West Valley as extensive drainage or water management and leak detection would be required
 - Above-ground vault based on historical and projected timelines could not reasonably be constructed to be operational by 2011
 - Below-grade and above-grade storage vaults would require additional NEPA evaluation and potentially additional analysis that could further extend the operational start of those systems



If the single canister container cannot meet acceptable shielding requirements within the 25t limit, de-rated spent fuel storage using multiple canisters in an overpack are as attractive, however any package over 25t will have facility modifications that are likely to challenge the schedule.

Comparative Example – Repetitive Costs – Storage Units Total Costs for Various Unit Costs

Conceptual Cost Schematic for HLW Canister Dry Storage

-  **Repetitive Costs**
(Storage units, transfer operations, etc)
-  **Non-Repetitive Costs**
(Handling & Transfer Equipment, Infrastructure Improvements)

