West Valley Demonstration Project

West Valley Environmental Services

High-Level Waste Canister Storage Evaluation and Recommendation

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September 23, 2009

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West Valley High-Level Waste Canisters

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

Step 1: Evaluate options and recommend a storage system to provide optimum, safe, economical future storage of HLW canisters outside the Main Plant Process Building

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Evaluation Summary

- Review scope and review historical documents
- Independent siting evaluation
- Options developed
  - Spent fuel technology: three vendor presentations (horizontal / vertical)
  - Single canister container design
  - Above- and below-grade vault: SRS, Ft St. Vrain, WVES model
  - Spent fuel shipping cask for storage
- Site visits
  - Ginna Nuclear Power Plant, Webster NY (horizontal SNF)
  - Palo Verde, Arizona (vertical SNF)
  - James A. Fitzpatrick Nuclear Power Plant, Oswego NY (vertical SNF)
- Functional requirements developed
- Options evaluated to criteria / requirements

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Historical Document Review

- Historical Document Review
- Most reports did not make recommendations but provided comparative options
- Above-ground, shielded storage was the only consistent storage recommendation developed

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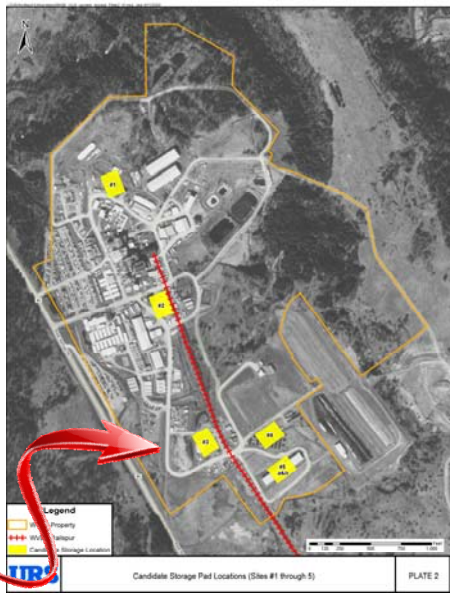
Siting Evaluation

- Evaluation was independent of other reports/conclusions
  - Historical documents do not analyze where but focus on what the system should be
    - 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 WMA #6 bordered by the rail line and access road
  - Geotechnical Work can begin now to define area needs for construction of any option



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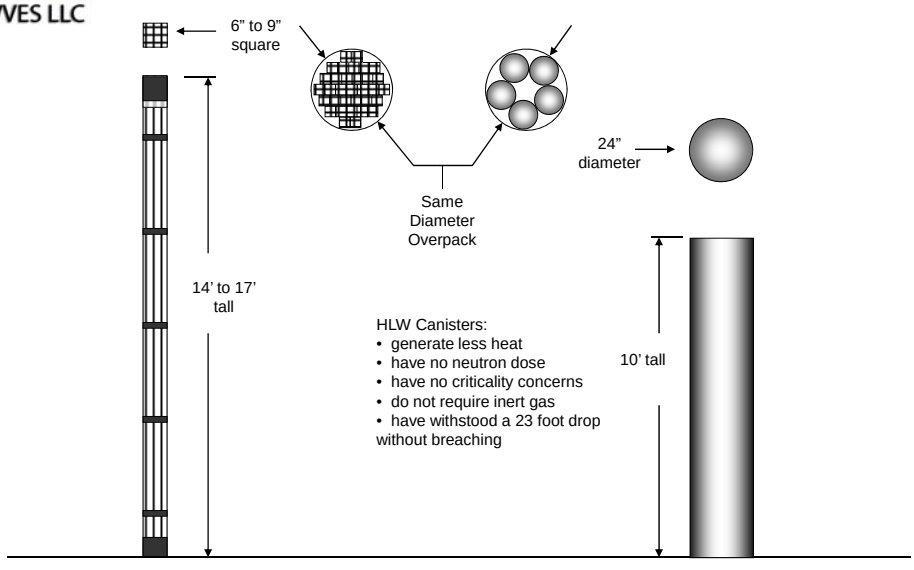
Spent Fuel Designs Adaptable to HLW



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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	Licensed on 20 year cycle	Licensed on 20 year cycle	Design could accommodate based on spent nuclear fuel	Design could accommodate
Ability for the selected storage system to remain uncontaminated	Clean overpack used	Clean overpack used	Requires clean canister	Requires clean canister
Minimization of future operational costs	Surveillance & maintenance low	Surveillance & maintenance low	Surveillance & maintenance similar to spent nuclear fuel	Design would minimize maintenance
Removal and disposition of 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 spent nuclear fuel but more units	Building demolition requires all canisters shipped prior to demolition

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Horizontal Spent Fuel Storage System

- Considerations Relative to Other Options
  - Advantages
    - Proven licensed design for spent nuclear fuel
    - Current designs accommodate up to five canisters
    - Solid low profile
    - Passive storage function
    - Overpacks same as spent nuclear fuel used in shipping cask designs
    - Decommissioning modular (can be done one unit at a time as emptied)
  - Disadvantages
    - Only one vendor has current licensed design – limits competition
    - Overpack decreases accessibility to single canister

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Vertical Spent Fuel Storage Systems

- Considerations Relative to Other Options

  - Advantages
    - Proven licensed design for spent nuclear fuel
    - Current designs accommodate up to five canisters
    - Solid, low profile
    - Passive storage function
    - Overpacks same as spent nuclear fuel used in shipping cask designs
    - Decommissioning modular (can be done one unit at a time as emptied)
    - Two vendors can provide competitive designs
  - Disadvantages
    - Overpack decreases accessibility to single canister

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Single Canister Container

- Considerations Relative to Other Options

  - Advantages
    - Single canister easily retrievable
    - Could shift to multiple units if required
    - Many construction vendors available to compete
    - Single canister loads easier to transport
    - Decommissioning modular (can be done one unit at a time as emptied)
    - Could adapt current licensed spent nuclear fuel design
  - Disadvantages
    - Transfer 275 loads versus 55
    - Decontamination of canister essential to contamination control

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Above-Grade Vault

- Considerations Relative to Other Options
  - Advantages
    - Savannah River high-level waste / Fort St. Vrain designs in use
    - Single canister easily retrievable
    - Many construction vendors available to compete
    - Single canister loads easier to transport

  - Disadvantages
    - Not Modular
      - Must be completely constructed prior to operation
      - Shipping must be complete to start demolition
    - Transfer 275 loads versus 55
    - Extended schedule associated with construction
    - Decontamination of canister essential to contamination control
    - Potential for additional maintenance (passive HEPA ventilation)

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HLW Storage System Summary

- Summary
  - Below-grade options not technically viable for WVDP
  - Spent fuel shipping casks are not viable economically
  - All reviewed above-grade options are viable
  - Above-grade vault did not meet project schedule and mission objectives
  - Viable options remaining
    - Spent fuel storage container designs using multiple canister overpack designated for high-level waste
    - Single canister container
  - Both of the remaining are competitive based on conceptual models

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Path Forward

To meet project objectives and provide optimal, safe and economical storage, WVES recommended proceeding with the conceptual design of the single canister container and vendor options for spent nuclear fuel storage systems designed for high-level waste storage

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