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# Waste Management

February 2007

*Roy Schepens, Manager  
Office of River Protection*

**Office of River Protection**



Bechtel National, Inc.



Washington Group  
International

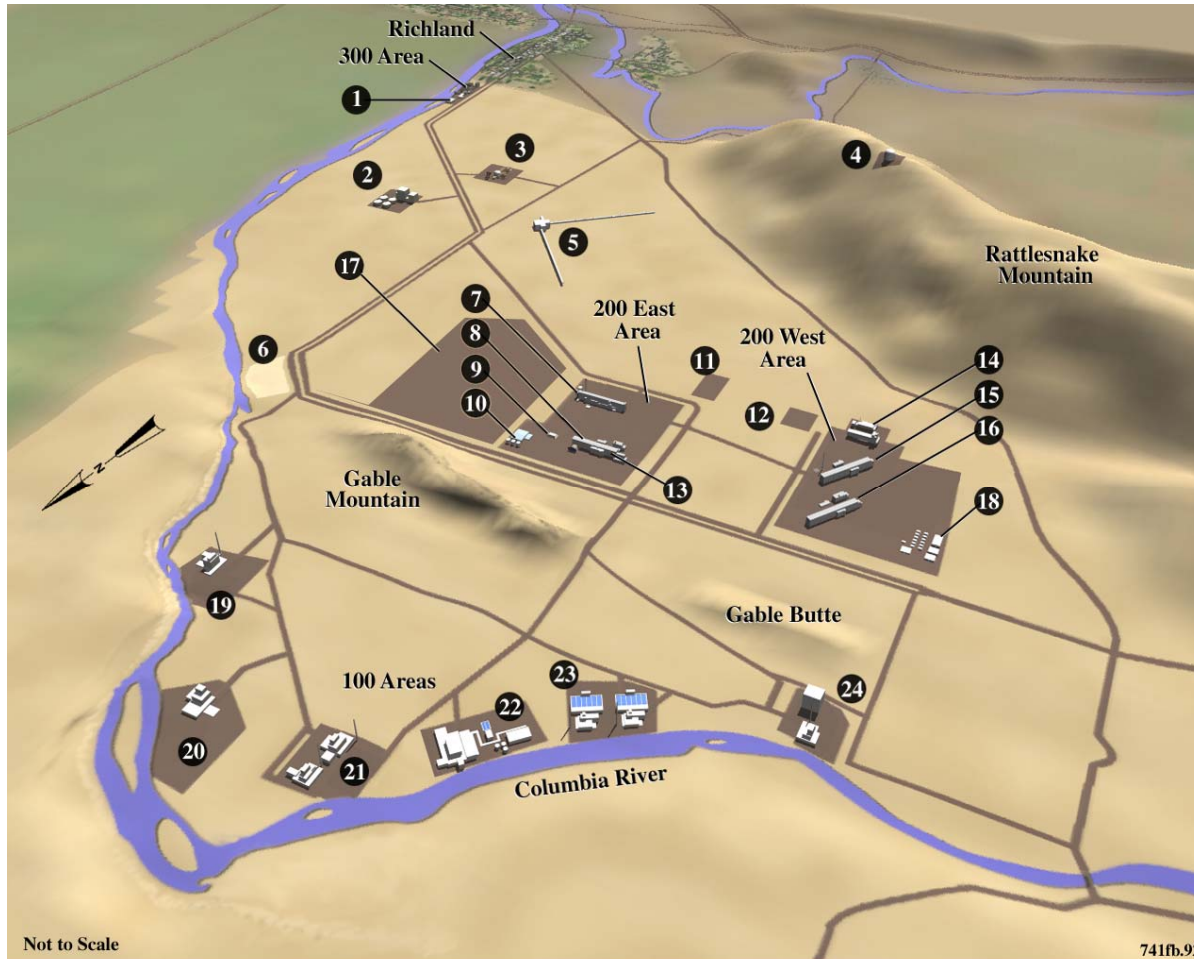


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# Hanford Cleanup Site



1. 300 Area Liquid Effluent Treatment Facility
2. Commercial Operating Nuclear Power Plant
3. Fast Flux Test Facility
4. Observatory
5. Laser Interferometer Gravitational Wave Observatory
6. Old Hanford Town Site
7. Plutonium Uranium Extraction Plant
8. B Plant
9. Prototype Engineered Barrier
10. 200 East Area Effluent Treatment Facility
11. U.S. Ecology Commercial Solid Waste Site
12. Environmental Restoration and Storage Facility
13. Waste Encapsulation and Storage Facility
14. REDOX
15. U Plant
16. T Plant
17. Waste Treatment Plant
18. Waste Receiving and Processing Facility
19. F Reactor
20. H Reactor
21. D and DR Reactors
22. N Reactor
23. KE and KW Reactors
24. B and C Reactors

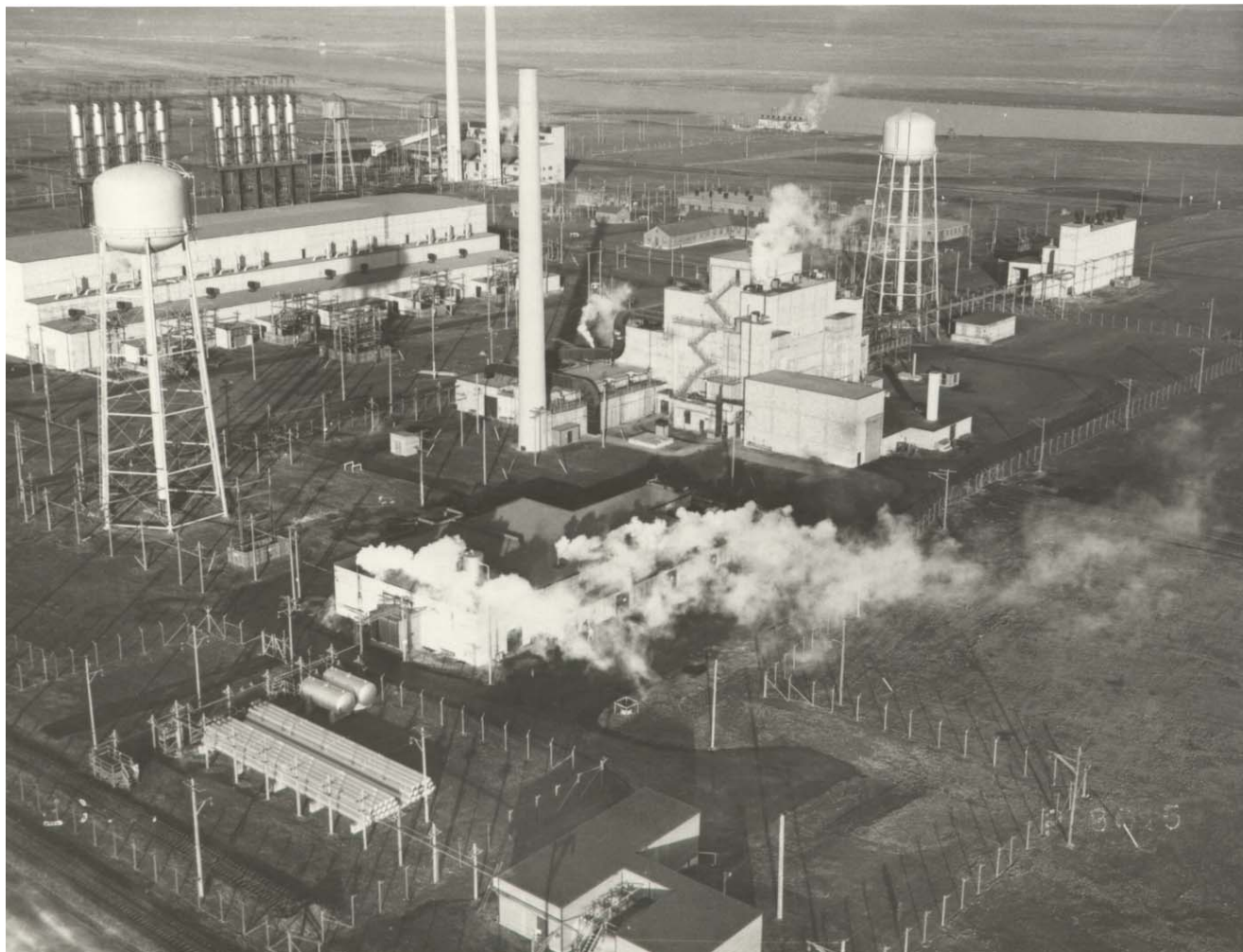


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## *Hanford's B Reactor, as it stood in 1945*



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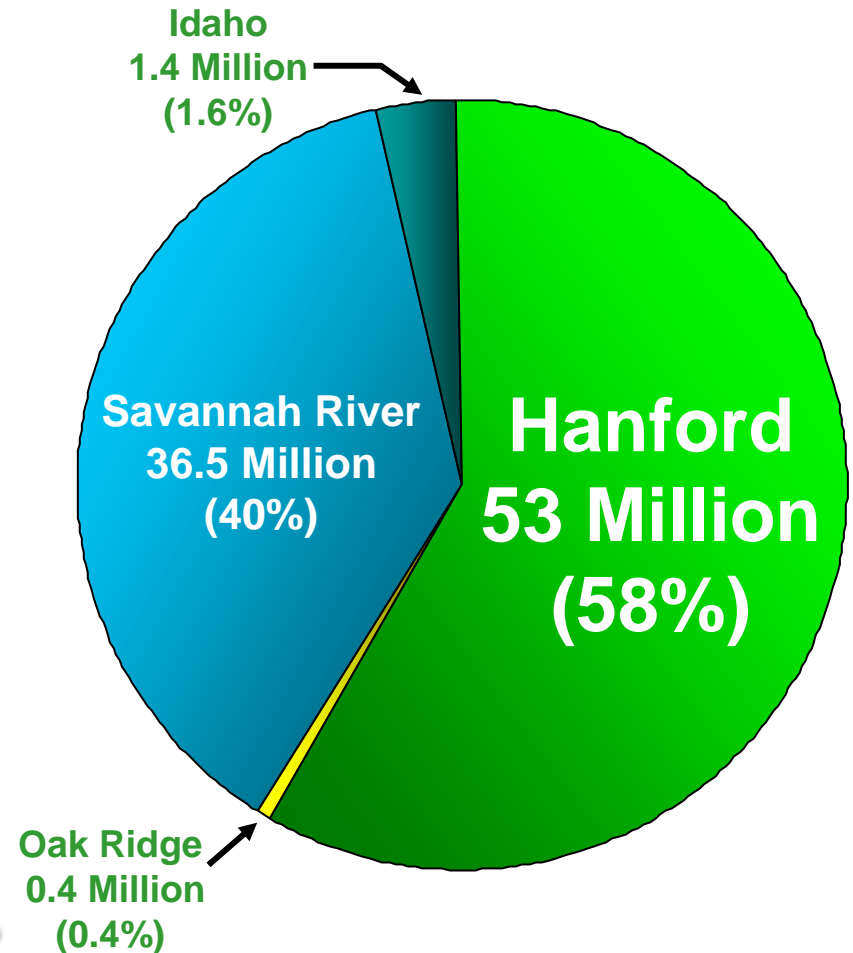
# Hanford Tank Waste Cleanup Challenge



## Hanford has:

- ❑ 63% of DOE tanks; 80% of DOE single-shell tanks
- ❑ 58% of DOE total tank waste
- ❑ ~194 million curies of radioactivity in tanks (148 million already removed)
- ❑ ~190,000 tons of chemicals

## Total Number of Gallons in Waste Tanks at DOE Sites:



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# *Double-Shell Tanks under construction*

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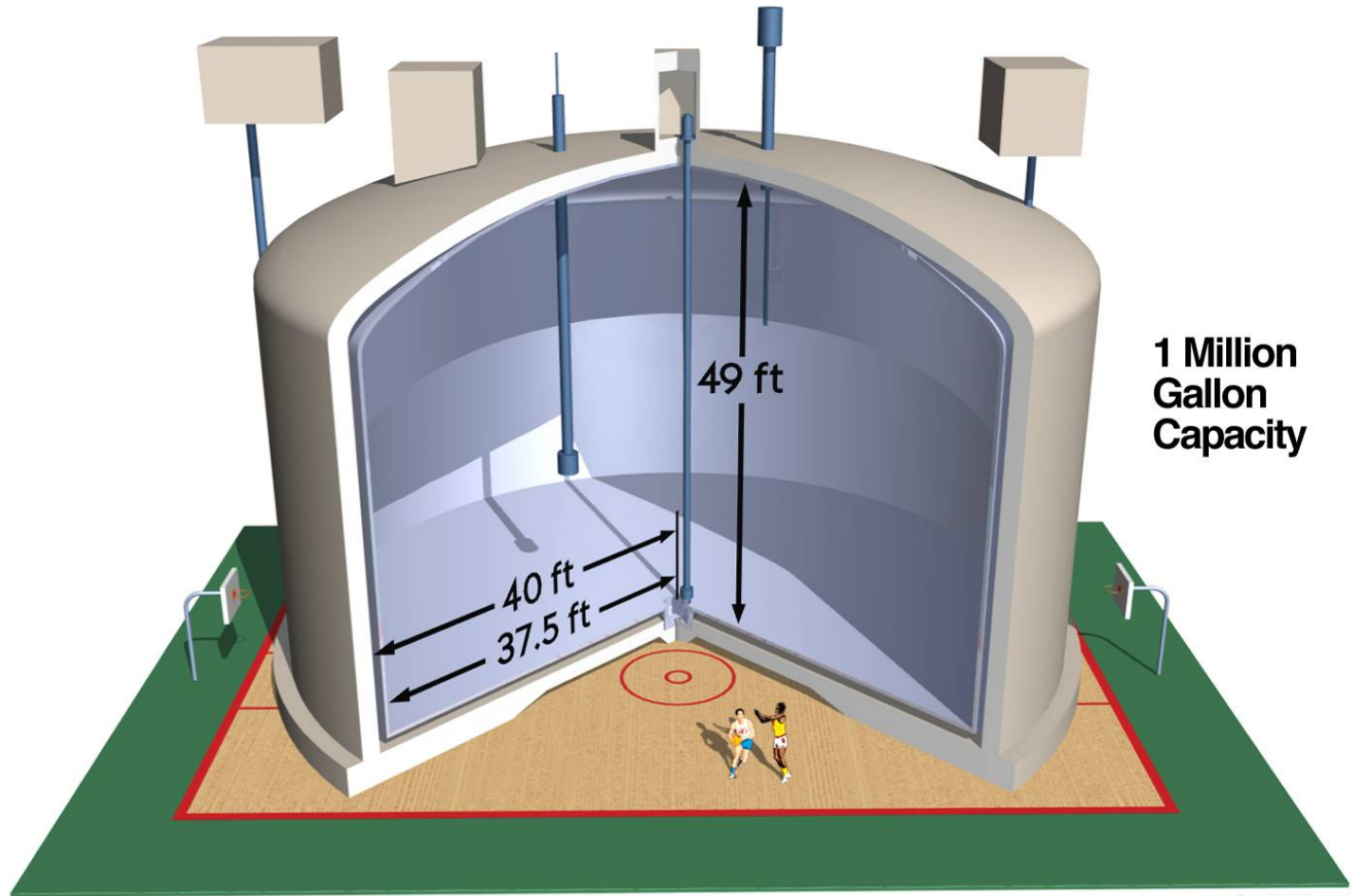


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# Double-Shell Tank



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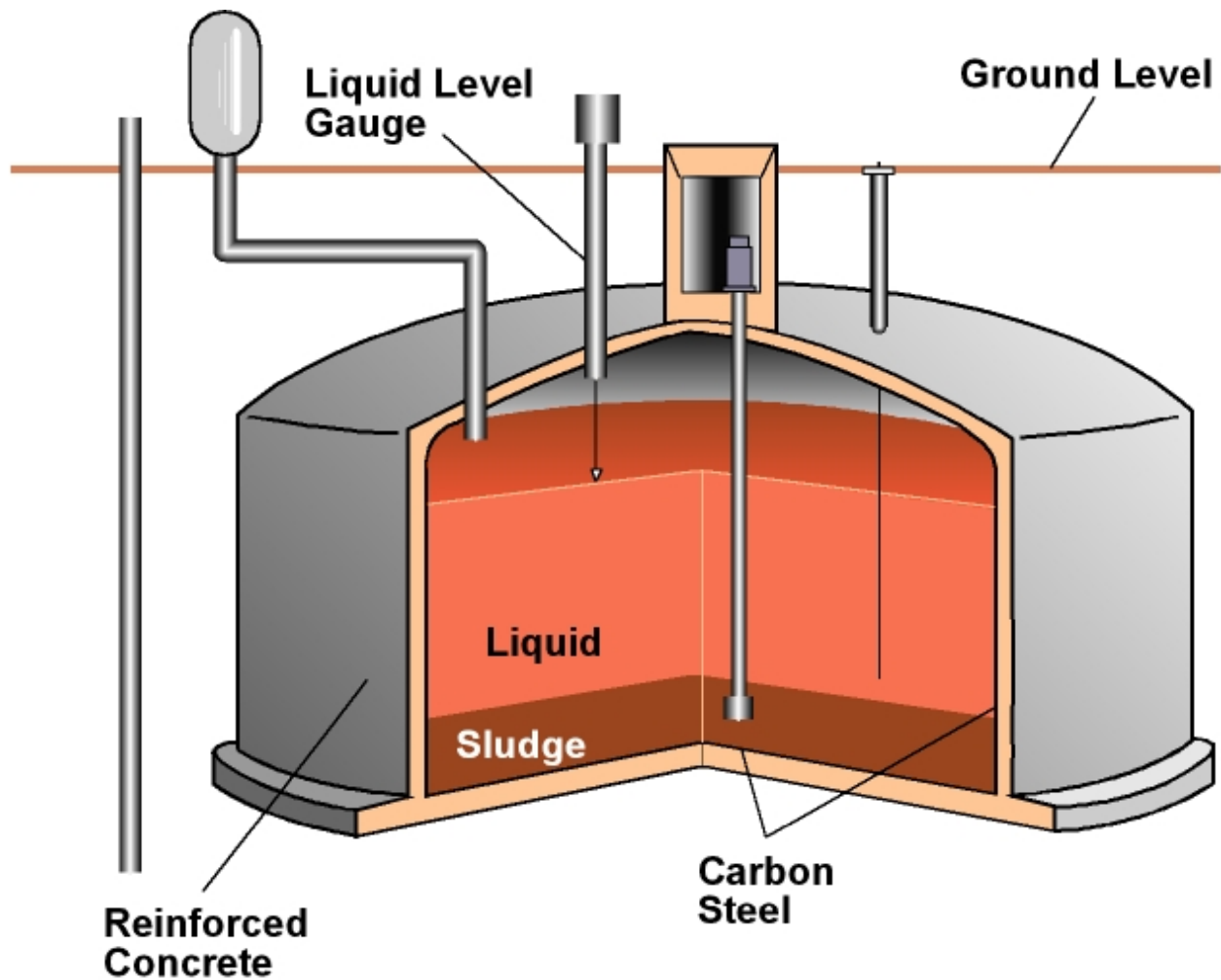


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# Single-Shell Tank



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## Safety is Office of River Protection's (ORP) Highest Priority

- Immediate Safety Risk Reduction
  - Interim Stabilized Tanks
  - Tank Retrievals
- Conservative Facility Design – Design Requires Defense in Depth
  - Elimination of Hazards Preferred
  - Engineered Safety Feature Preferred if Hazards cannot be Eliminated
  - Administrative Controls
  - Personnel Protective Equipment
- Highly Skilled, Trained and Experienced ORP and Contractor Staff
- Safety is Effectively Integrated into All Programs and Process through Integrated Safety Management



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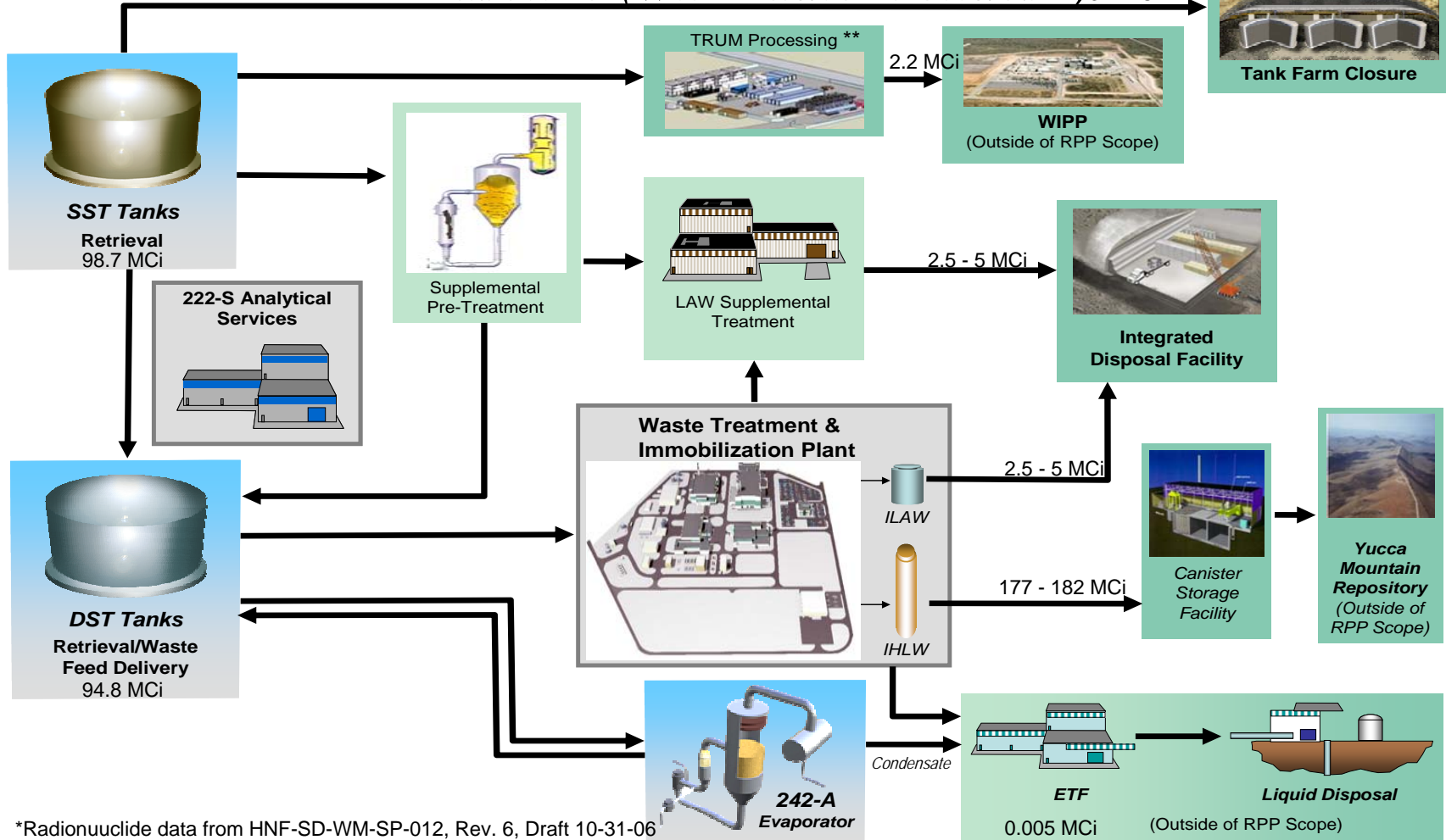
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# River Protection Project Flow Diagram

## Baseline (with radionuclides\*)



\*Radionuclide data from HNF-SD-WM-SP-012, Rev. 6, Draft 10-31-06

\*\*A decision for disposal at the Waste Isolation Pilot Plant (WIPP) will not be made until (1) the waste meets the WIPP Waste Acceptance Criteria, with special emphasis on the waste determination as delineated in the WIPP recertification decision by the US EPA in March 2006; and (2) it meets the regulatory eligibility requirements for disposal as described in the WIPP Hazardous Waste Facility Permit.



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# Status of the River Protection Mission



- Waste Treatment Plant (WTP) Construction
  - Construction 30% complete
  - Design 70% complete



- Additional Low-Activity Waste Treatment Capacity
  - Designing and Testing Bulk Vitrification

- Tank Retrieval and Closure Activities

- Six tanks retrieved to date
- Three tanks in retrieval
- Two tanks are being outfitted for retrieval
- New retrieval technologies are working



- Integrated Disposal Facility

- Construction completed

- Soil Contamination from Past Leaks

- Characterizing extent of contamination
- Implementing remedial actions

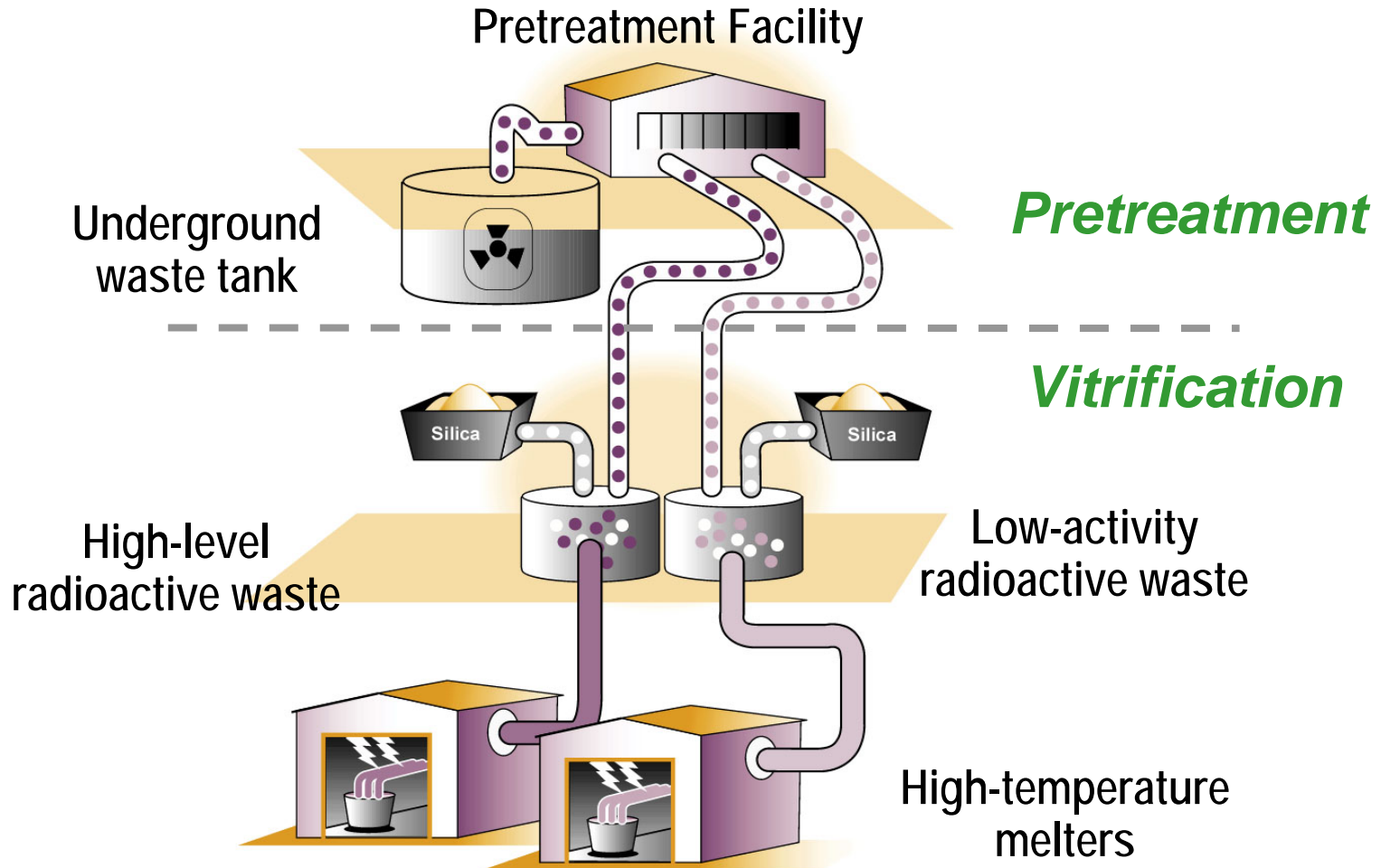


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# Waste Treatment Process



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## *How is the Vitrified Waste Stored?*

- High Level Waste Canisters
  - 2' x 14.5'
  - 6,600 pounds of glass
  - Temporarily stored in Hanford's Canister Storage Building until national repository built
- Low Activity Waste Containers
  - 4' x 7.5'
  - 13,000 pounds of glass
  - Stored at Hanford's Central Plateau



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## *Aerial view of WTP site*

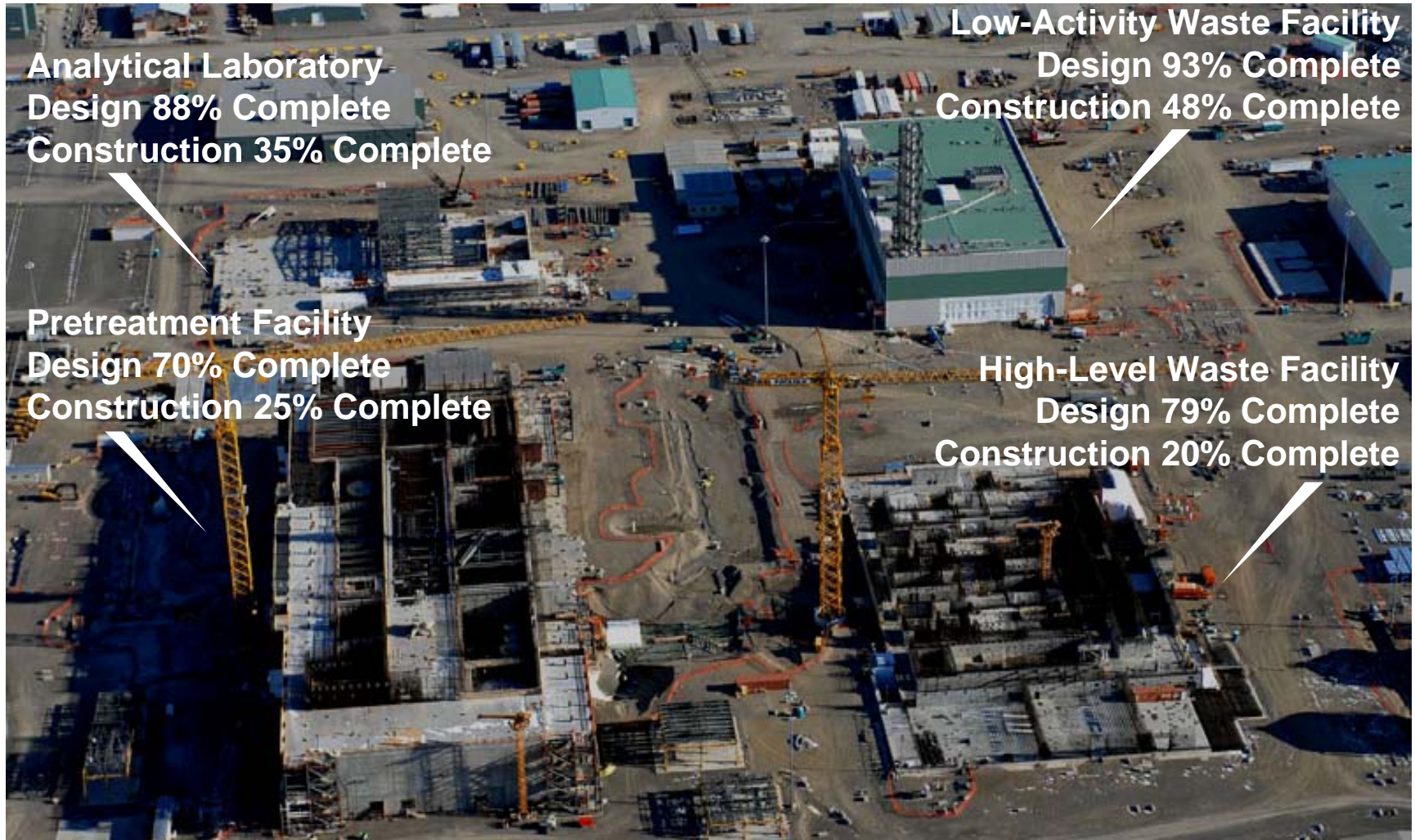


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## *Percent complete as Calendar Year 2007 Begins*



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# *WTP Low-Activity Waste Facility*



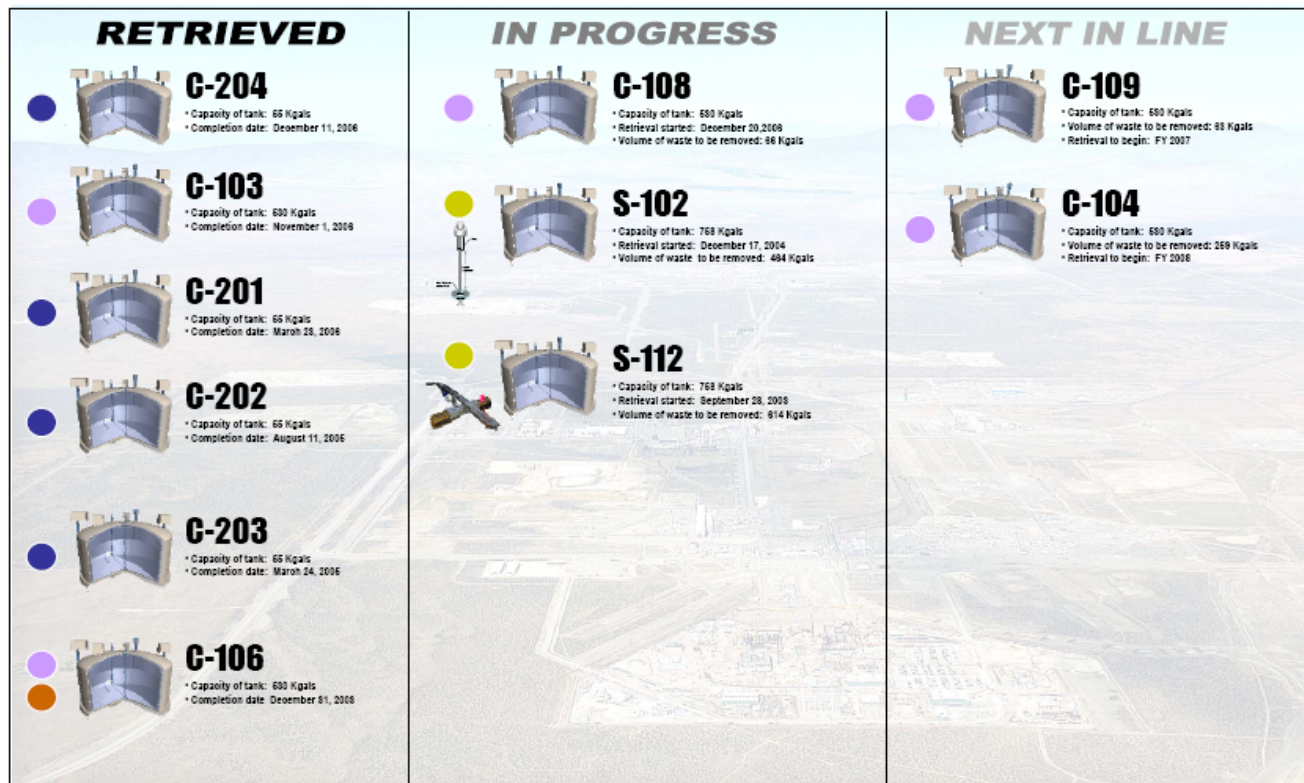
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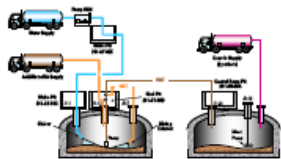
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# Hanford Tank Cleanup Status

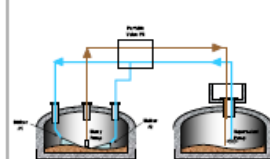
Retrieval Summary Updated through January 3, 2007



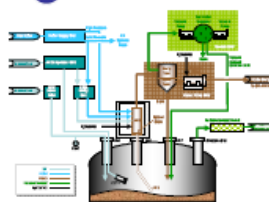
● Acid Dissolution



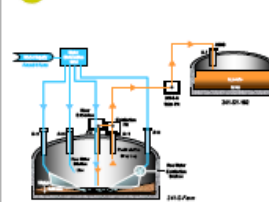
● Modified Sluicing



● Vacuum Retrieval



● Saltcake Dissolution



Remote Water Lance (Salt Mantis)



High Pressure Mixer (Rotary Viper)



CH20611-06 12-15-06



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## New Innovative Tank Waste Retrieval Technologies

- Technologies based on waste characteristics and each tank's physical condition
- Demonstrating achievability of 99% waste retrieval
- Working with State of Washington and Nuclear Regulatory Commission on retrieval effectiveness
- Managing available Double-Shell tank space



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# New Innovative Tank Waste Retrieval Technologies

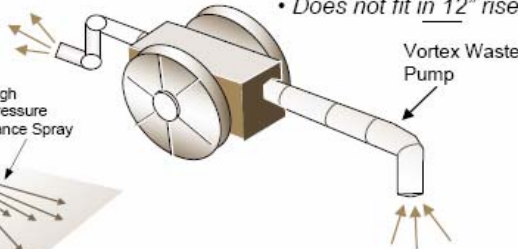
## Salt Mantis: Waste Breakup and Mixing Tool

- High pressure spray breaks up and mixes waste
- Augments other retrieval systems



## Aardvark: Waste Breakup and Transfer Tool

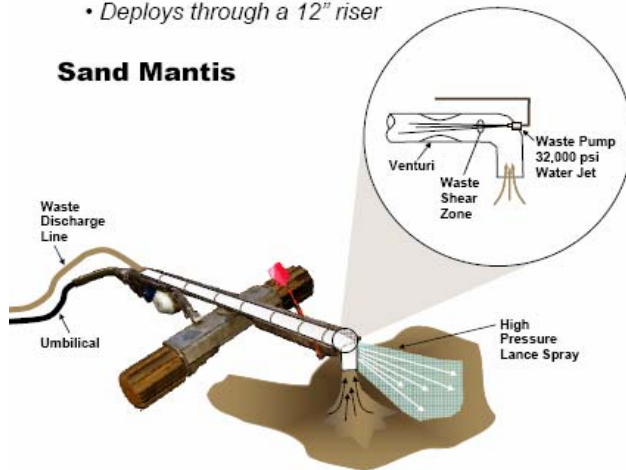
- Developed for mining industry
- Pumps material with Vortex Pump
- Does not fit in 12" riser



## Sand Mantis: Waste Breakup, Mixing, and Transfer Tool

- Waste transfer capability added to "Salt Mantis"
- Deploys through a 12" riser

### Sand Mantis

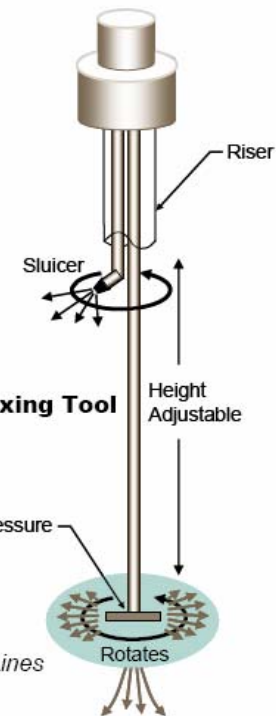
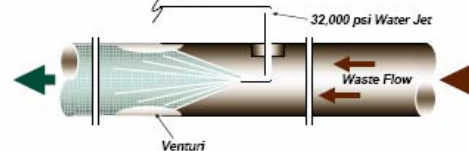


## Rotary Viper: Waste Mixing Tool

- Sluicer
- Mixes Waste
- Fits down 4" Riser

## Squid Pump: In-Line Waste Transfer Tool

- Small size allows installation of Transfer Lines and in existing pits



CHG0606-19.4



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## *Bulk Vitrification (BV) Technology Demonstration Program*

- Results to date indicate that BV glass is comparable to WTP ILAW
- Allows treatment flexibility in treating difficult waste streams
- Secondary waste is minimized and recycled within the process or sent to Effluent Treatment Facility (no orphan waste streams)
- Independent Expert Review Panel Demonstration Bulk Vitrification System review completed
- May allow LAW treatment prior to WTP startup



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## *Path Forward for Fiscal Year 2007*

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- Continue Single-Shell Tank retrievals
- Work on resolution of the WTP technical issues
- Continue with Low-Activity Waste Vitrification, Laboratory, and Balance of Facility Design and Construction
- Completing Pretreatment and High-Level Waste Vitrification design
- Prepare for construction restart on the Pretreatment and High-Level Waste Vitrification facilities
- Continue evaluating Bulk Vitrification for supplemental Low-Activity Waste treatment



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