

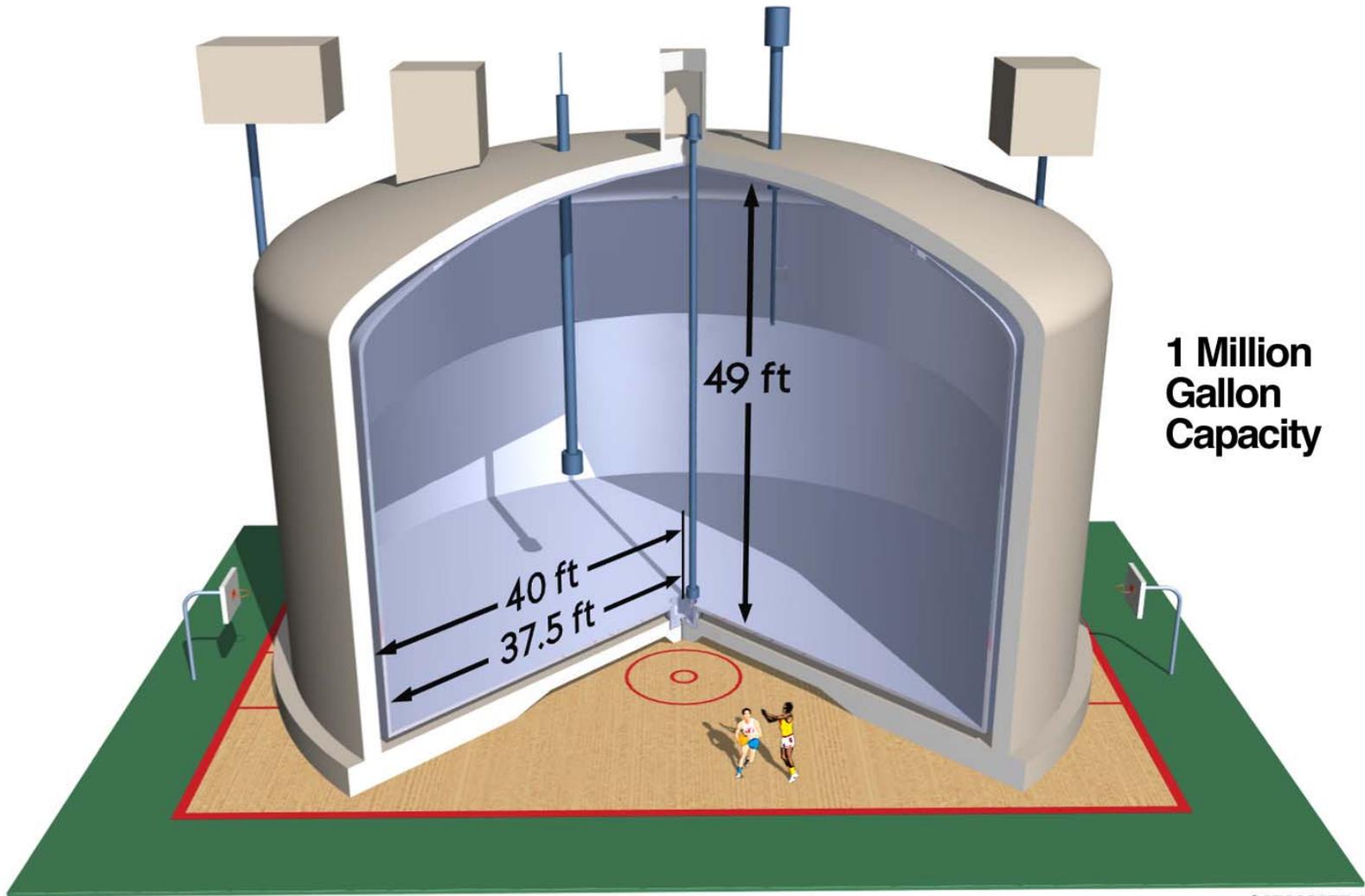


Environmental Management Science Program Workshop Hanford Tank Farm Overview

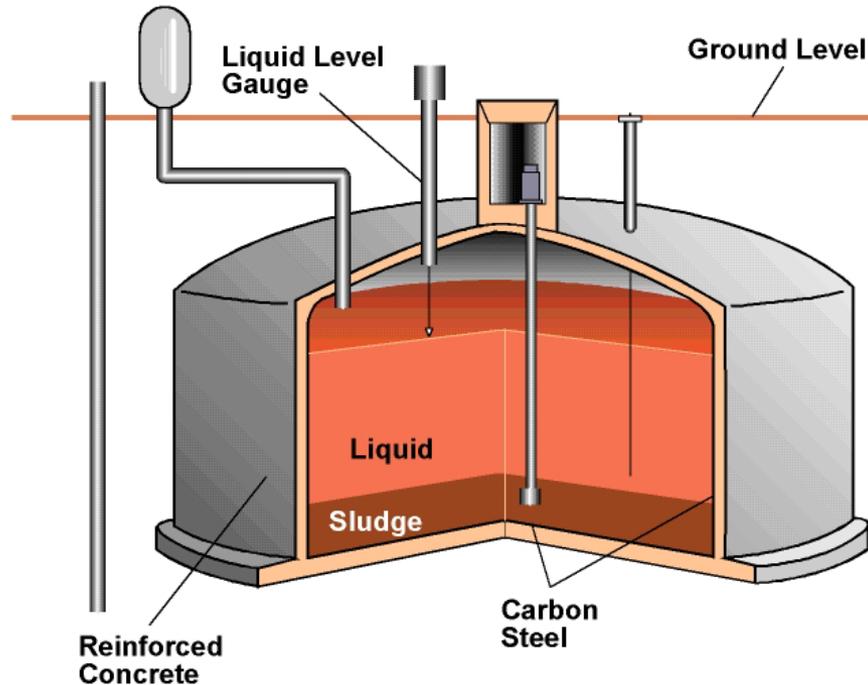
K. A. (Ken) Gasper
Technology Integration
May 6, 2003



Hanford High-level Waste Radioactive Underground Storage Tanks are Large

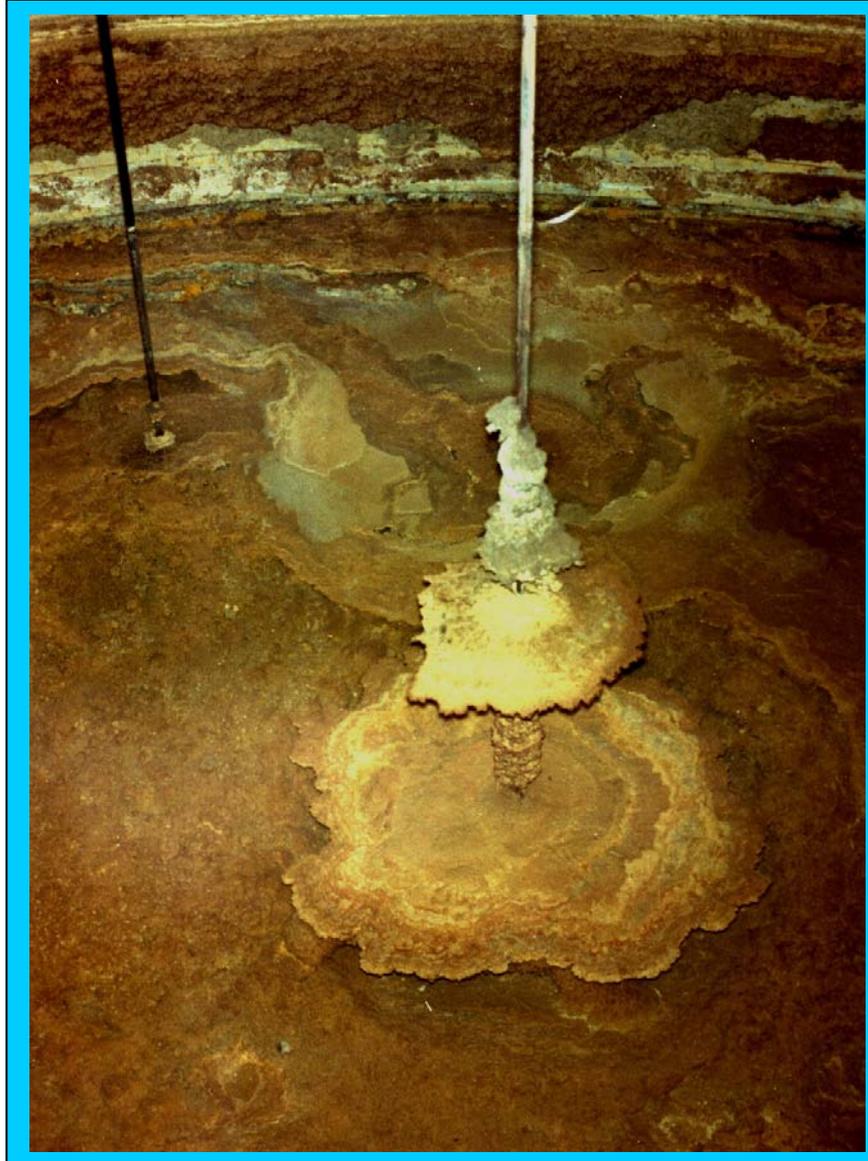


Single-Shell Tanks

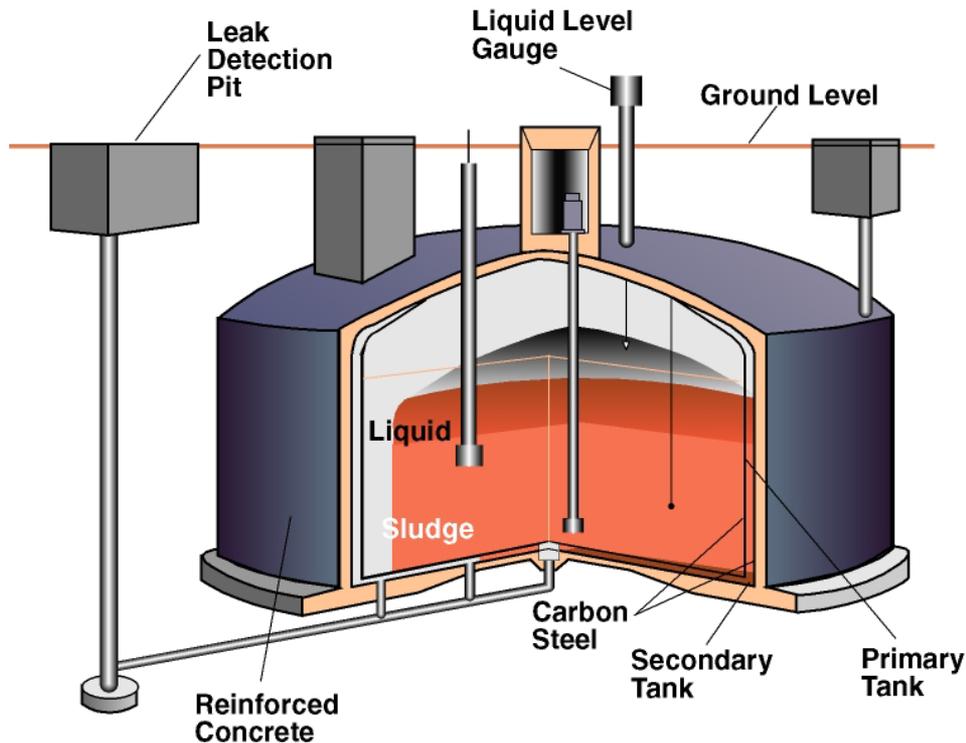


- 149 Tanks Constructed 1943-64
- ~210 m³ to 3,800 m³ Capacity (55 kgal to 1 Mgal)
- Bottom of Tanks at Least 50 m (150 Feet) Above Groundwater
- No Waste Added to Tanks Since 1980
- Tanks Currently Contain:
 - ~132,500 m³ (35 Mgal) of Salt Cake, Sludge, and Liquid
 - ~407 x 10¹⁶ Bq (110 MCi)
- 67 Are Assumed to Have Leaked ~ 3,800 m³ (~1 Mgal)

**Inside
Tank
SX-109**

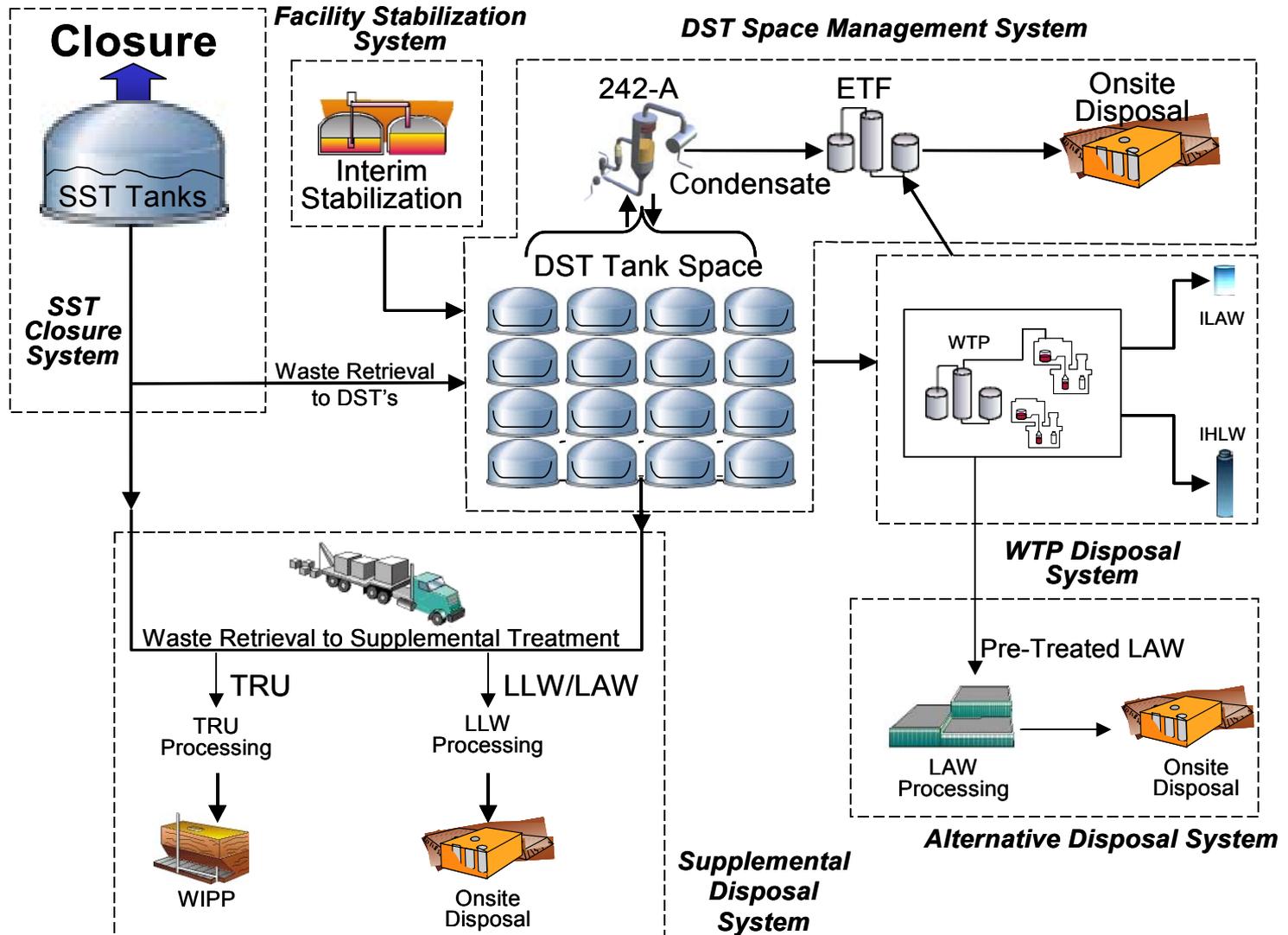


Double-Shell Tanks



- 28 Tanks Constructed Between 1968-86
- ~3,800 m³ to 4,300 m³ (1 to 1.14 Mgal) Capacity
- Tanks Currently Contain
 - ~ 72,000 m³ (19 Mgal) of Mostly Liquids (Also Sludges and Salts)
 - ~ 296 x 10¹⁶ Bq (80 MCi)
- None Have Leaked

Major RPP Integrated Systems



Strategy 1: Retrieve And Close SSTs, DSTs, And Tank Farms

PLANNED ACHIEVEMENTS FY 2003 to FY 2006	PLANNED ACHIEVEMENTS FY 2007 to FY 2034
<ul style="list-style-type: none">• 40 tanks selected for early retrieval and closure• Select/implement proven retrieval systems on the 40 tanks• Up to 40 SSTs interim closed by 2006 (10 years ahead of Target Baseline)• Two SST farms interim closed by 2006 (three years ahead of Target Baseline) – major step in overall footprint reduction for the tank farms• 244-AR Vault interim stabilization completed in 2003• Interim stabilization of SSTs completed in FY2004• 9.4 million gallons of additional usable DST space gained• Dry Retrieval/SST Waste Staging option evaluated and implemented if feasible• Targeted SST waste retrieved directly to Supplemental Processing, avoiding DSTs and WTP	<ul style="list-style-type: none">• Interim closure of West Area SST Farms by 2010 (20 years ahead of Target Baseline)• All SST Farms interim closed by 2018 (13 years ahead of Target Baseline)• DSTs, WTP, and RPP facilities interim closed by 2033 (two years ahead of Target Baseline)• Evaluate and improve performance of retrieval systems to optimize performance, safety, schedule, and cost.• DST space managed efficiently based on WTP and supplemental processing performance

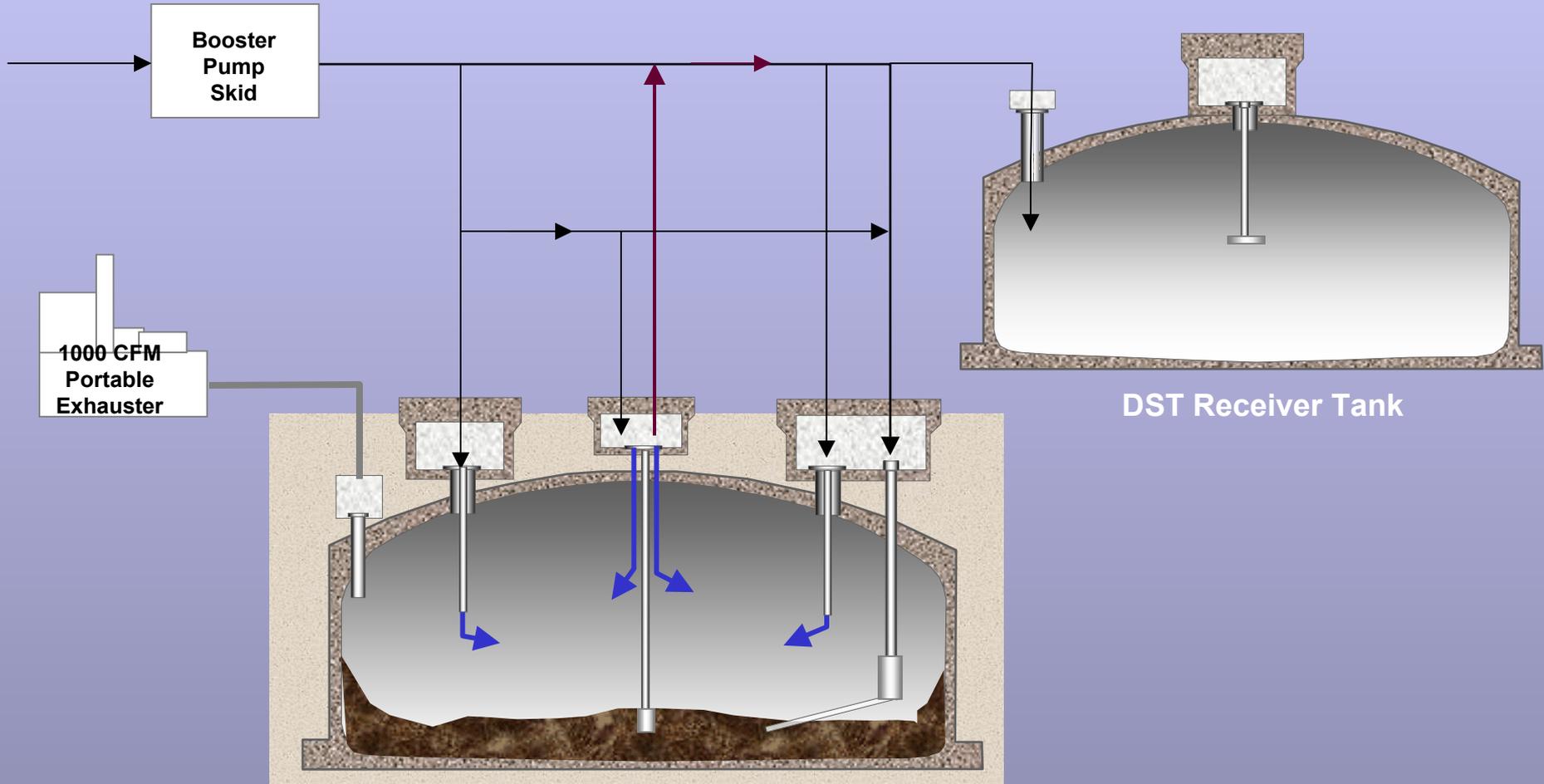
Strategy 2: Provide Waste Feed Delivery To Satisfy Accelerated WTP Processing Rates

PLANNED ACHIEVEMENTS FY 2003 to FY 2006	PLANNED ACHIEVEMENTS FY 2007 to FY 2034
<ul style="list-style-type: none">• “Just-in-time” project schedule for feed delivery established and implemented• Develop and implement an “Implementation Plan” that will form the contract basis for feed delivery to the WTP• Construction of immobilized high-level waste (IHLW) Storage facility completed in 2006 to store 880 canisters• Projects completed in time to support feed delivery requirements to the WTP• Alternatives evaluated and implemented as feasible to optimize meeting mission needs• Feed projects• Storage/disposal projects	<ul style="list-style-type: none">• Evaluate project schedule and scope based on ongoing WTP progress and supplemental treatment progress• Optimize the RPP Lifecycle through optimal glass production• Flexible and more efficient waste feed qualification improving life-cycle costs

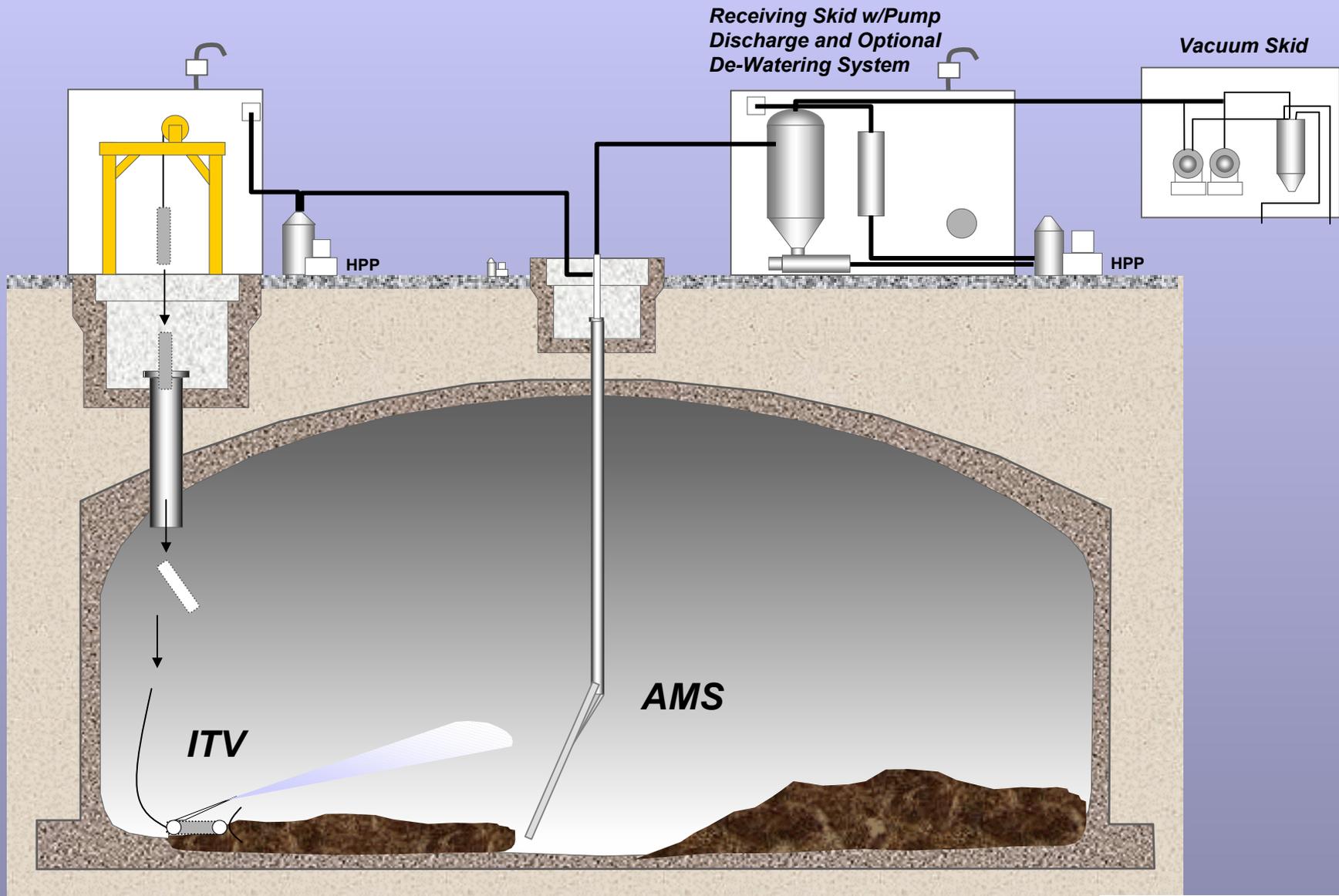
Strategy 3: Process Waste Through Supplemental Or Alternate Treatment/Disposal

PLANNED ACHIEVEMENTS FY 2003 to FY 2006	PLANNED ACHIEVEMENTS FY 2007 to FY 2034
<ul style="list-style-type: none">• 750,000 gallons of transuranic (TRU) waste retrieved from SSTs and processed using supplemental technology• 250,000 gallons of LAW/LLW retrieved and disposed using supplemental treatment technology• Evaluate steam-reforming, bulk vitrification, containerized grout and other supplemental processing technologies that could be implemented to minimize quantity of waste sent to WTP• Technologies selected for physical demonstration on real waste	<ul style="list-style-type: none">• Remote handled TRU waste retrieved from DSTs and processed• Implementation of cost effective supplemental processing optimized, reducing waste sent to WTP• Alternate processing of waste pretreated in WTP implemented by 2010

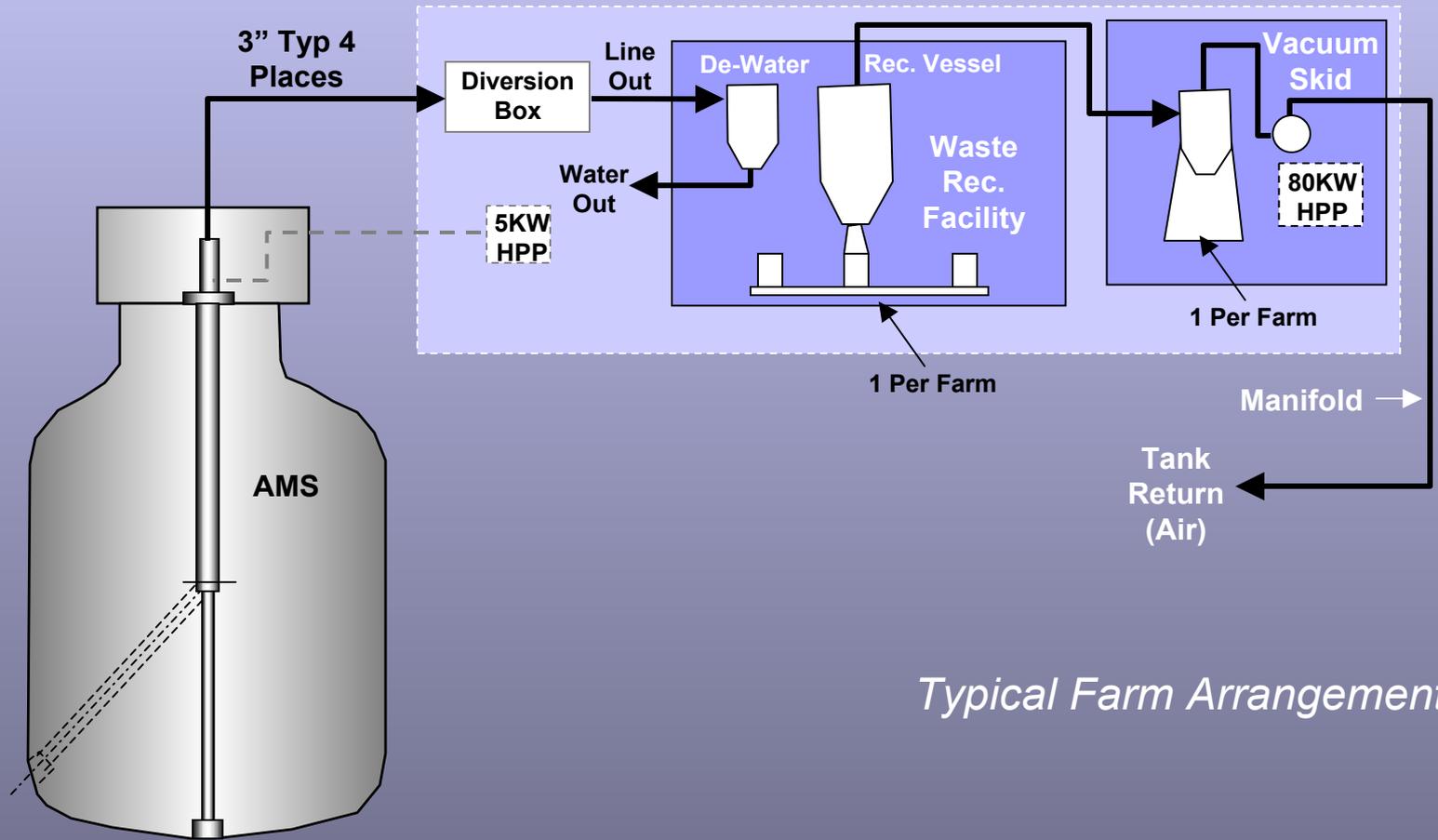
Typical Modified Sluicing Approach



Typical Mobile Retrieval System (MRS)



Typical Vacuum Retrieval System



Typical Farm Arrangement

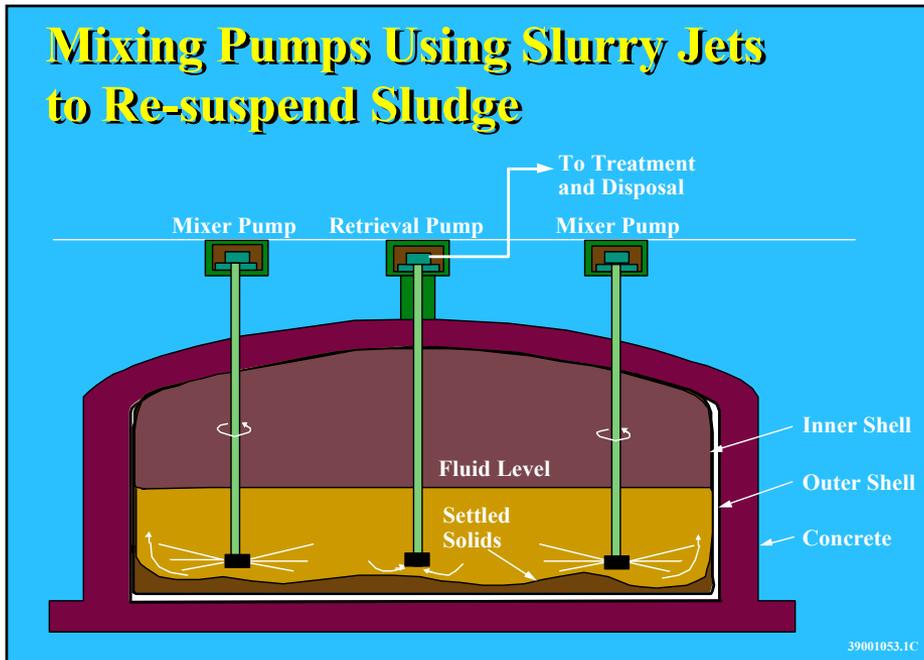




Crews removing a valve pit cover block

DST Mixer Pump Retrieval System

- 101-AZ Demonstration mobilized the bottom sludge layer with two 300 hp mixer pumps



Prefabricated Hose-in-Hose Transfer Line



Supplemental Processing Planning Basis

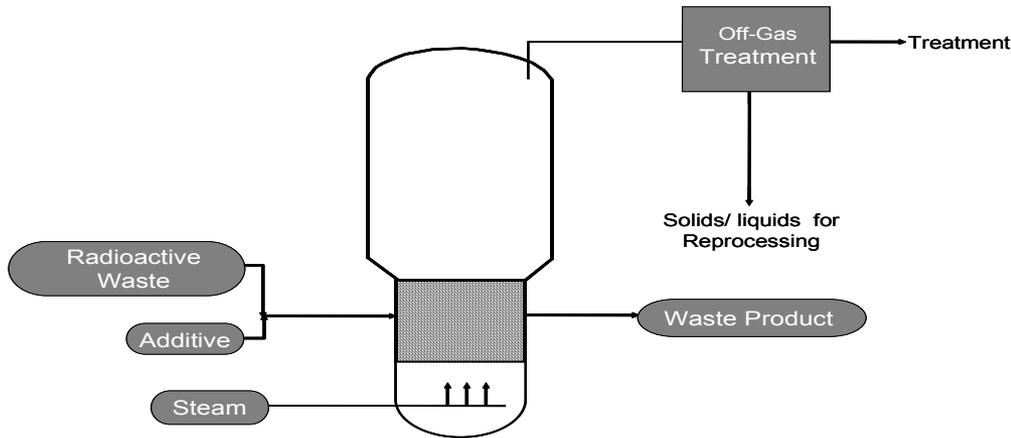
Tank	Handling	Volume (kgal)	Handling Type Total Volume (kgal)
T-201	Contact	29	731
T-202	Contact	21	
T-203	Contact	37	
T-204	Contact	37	
B-201	Contact	30	
B-202	Contact	29	
B-203	Contact	51	
B-204	Contact	50	
T-111	Contact	447	
SY-102	Remote	145	
AW-103	Remote	273	
AW-105	Remote	263	

TRU Tanks for Supplemental Packaging

Potential LLW/LAW Tanks for Supplemental Processing

Group Number	Potential Waste Type	Number of Tanks	Tanks	Volume (kgal)
1	LLW supernatant	1	AW-105	161
2	LLW sludge	6	T-110, C-204, U-201, U-202, U-203, U-204	385
3	LAW salt (<.01Ci/L Cs)	3	T-109, TX-113, S-109	Approx. 1,200

Steam Reforming



Simplified process flow diagram



- **Immobilizes salt waste stream into an aluminosilicate (mineral-like) waste form in a fluidized bed**
- **Could be deployed using feed from the pre-treatment plant or separately using feed from retrieval**
- **Waste form performance requires additional evaluation**
- **Could be sized to meet wide range of treatment capacity needs**
- **Vendor contract in place**

Containerized Grout



Typical containerized grout in 55-gallon drum



Example mobile facility for grouting LAW



Example fixed facility for grouting LAW

- **Most commonly used LAW disposal method in U.S. and world wide**
- **Salt waste would be immobilized in grout within a container prior to disposal**
- **Could be deployed using feed from the pre-treatment plant or separately using feed from retrieval**
- **Waste form performance requires additional evaluation**
- **Could be sized to meet wide range of treatment capacity needs**
- **Vendor contract in process**

Bulk Vitrification



- Waste mixture staged in insulated box
- Hood and electrodes installed
- Wastes treated
- Melt allowed to cool and solidify
- Hood removed, lid installed
- Box transported to disposal site

Bulk vitrification in a 20 cubic yard roll-off box (off-gas processing hood not shown)

- **Waste is vitrified into an aluminosilicate glass in a disposable container**
- **Could be deployed using feed from the pre-treatment plant or separately using feed from retrieval**
- **Waste form performance requires additional evaluation**
- **Could be sized to meet wide range of treatment capacity needs**
- **Vendor contract in place**

Summary of CH2M HILL Tank Farm Needs

Need for Vendor Products

E.g., Retrieval systems, Piping, Valves, Sensors, Characterization Equipment, HVAC equipment, Instrumentation & Controls, Containers and Casks

Need for Vendor Services

E.g., Safety Analysis, Engineering Studies & Design, Independent Assessments, Transportation, Software Development

VENDORS, YOU CAN HELP WITH *MISSION ACCELERATION*



The US Department of Energy, Office of River Protection (ORP) and CH2M HILL Hanford Group, Inc. (CH2M HILL), in Richland, Washington, have created aggressive strategies to accelerate the closure of the Hanford Site Tank Farms. Successful execution of these strategies will result in up to 40 single-shell tanks (SSTs) being closed and at least one million gallons of tank waste being dispositioned by processing that is supplemental to the Waste Treatment Plant (WTP) by the end of fiscal year (FY) 2006.

This mission acceleration represents significant new technical, cost, and schedule challenges in all CH2M HILL's Hanford Tank Farm Contractor scope areas:

- **Safe Storage (Operations and Maintenance):** safely operate and maintain the tank farms, within regulatory compliance
- **Safe Storage (Life Extension Project):** extend the life of the double-shell tanks (DSTs) to the end of the multi-decade mission
- **Retrieval and Transfer (Equipment):** install the equipment needed to achieve waste retrieval
- **Retrieval and Transfer (Waste Inventory and Properties):** acquire and interpret waste inventory and property information needed to design and operate retrieval and closure systems.
- **Closure:** define and implement actions needed to achieve interim and final closure
- **Disposal:** design and build facilities for storage and disposal of immobilized low-activity waste (LAW) and high-level waste (HLW)
- **Supplemental Treatment:** design, install and operate treatment units that supplement the Waste Treatment Plant.

CH2M HILL has been planning, and is already implementing solutions for these challenges. However, improvements to the planned solutions, or alternative solutions may be available, and CH2M HILL would like to evaluate them.

More detailed descriptions of the main technical challenges that CH2M HILL is currently addressing are provided in our Technical Challenge Sheets. Copies of these, organized by CH2M HILL scope area, are provided in the folders below: please take one, and contact the person indicated on the sheet if you have a proven solution to offer.

Vendors are required to register in the CH2M HILL vendor database. Please go to our website at www.hanford.gov/chgcp to complete the registration forms. If you have questions regarding this information, please contact the Small Business Advocate at 509-373-0606 or e-mail at debbie_m_bone-harris@rl.gov.

