



WTP Project Overview

Vijay Jain

Manager, Research &
Technology (Vitrification)
May 19-21, 2009

Presented at:
EM-21 Technical Exchange
Denver, CO

Waste Treatment & Immobilization Plant Project





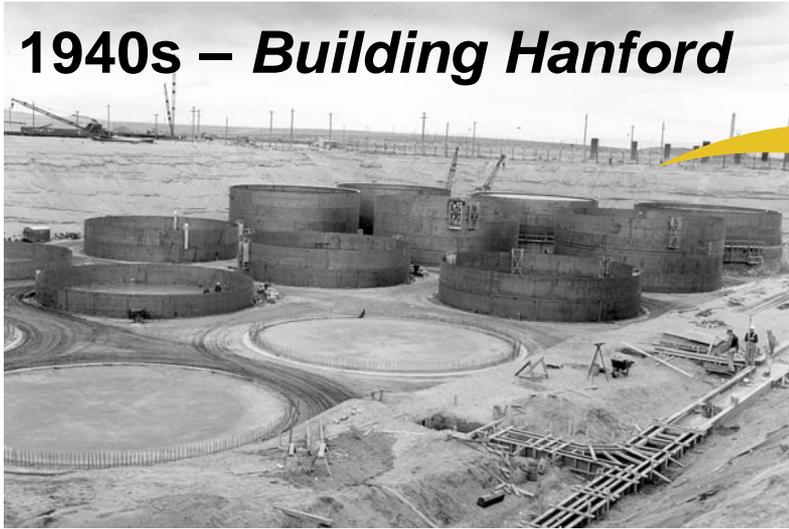
Outline

- **Background**
- **Status of construction, engineering and equipment procurement for WTP key facilities**
- **Ongoing technical evaluations**
 - **Closure of EFRT issues**
 - **Addressing opportunities to reduce conservatism**
- **Summary**



Waste Treatment Plant

1940s – Building Hanford



1945-1985 – Hanford Production



Present – Cornerstone of Hanford Cleanup

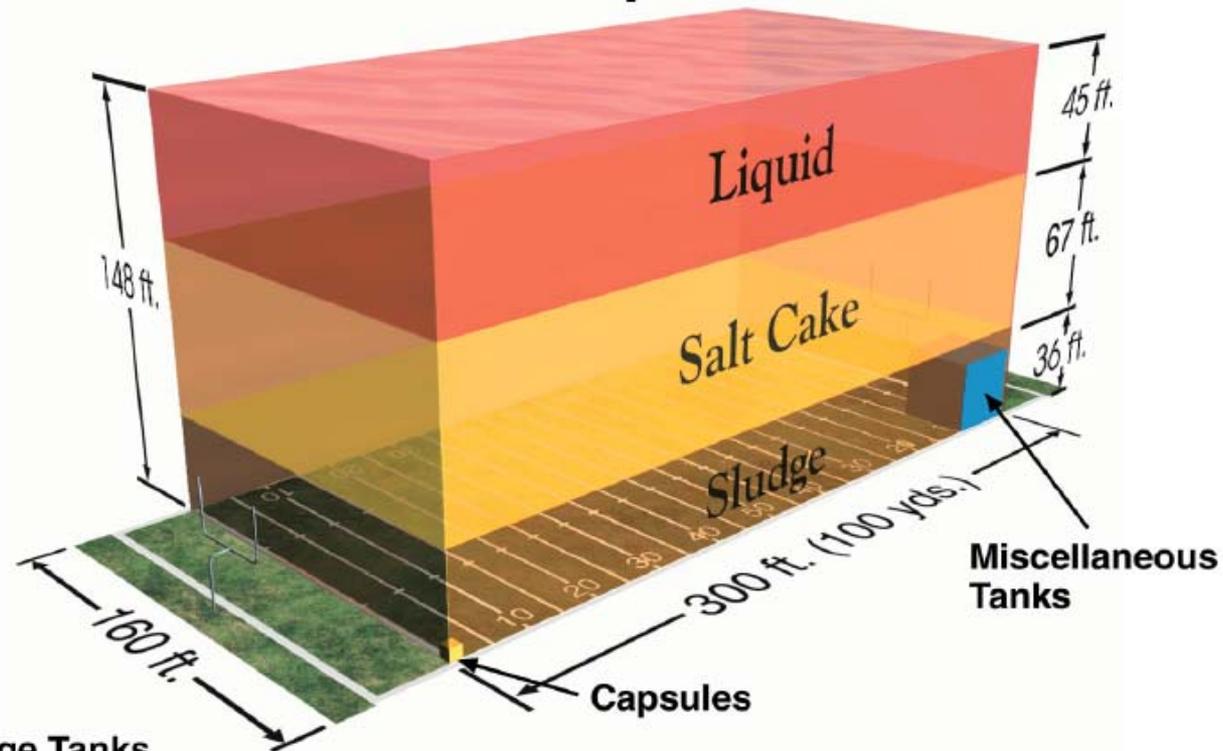


1990s – Decommissioning





Hanford Tank Waste Would Cover a Football Field 148 Feet Deep

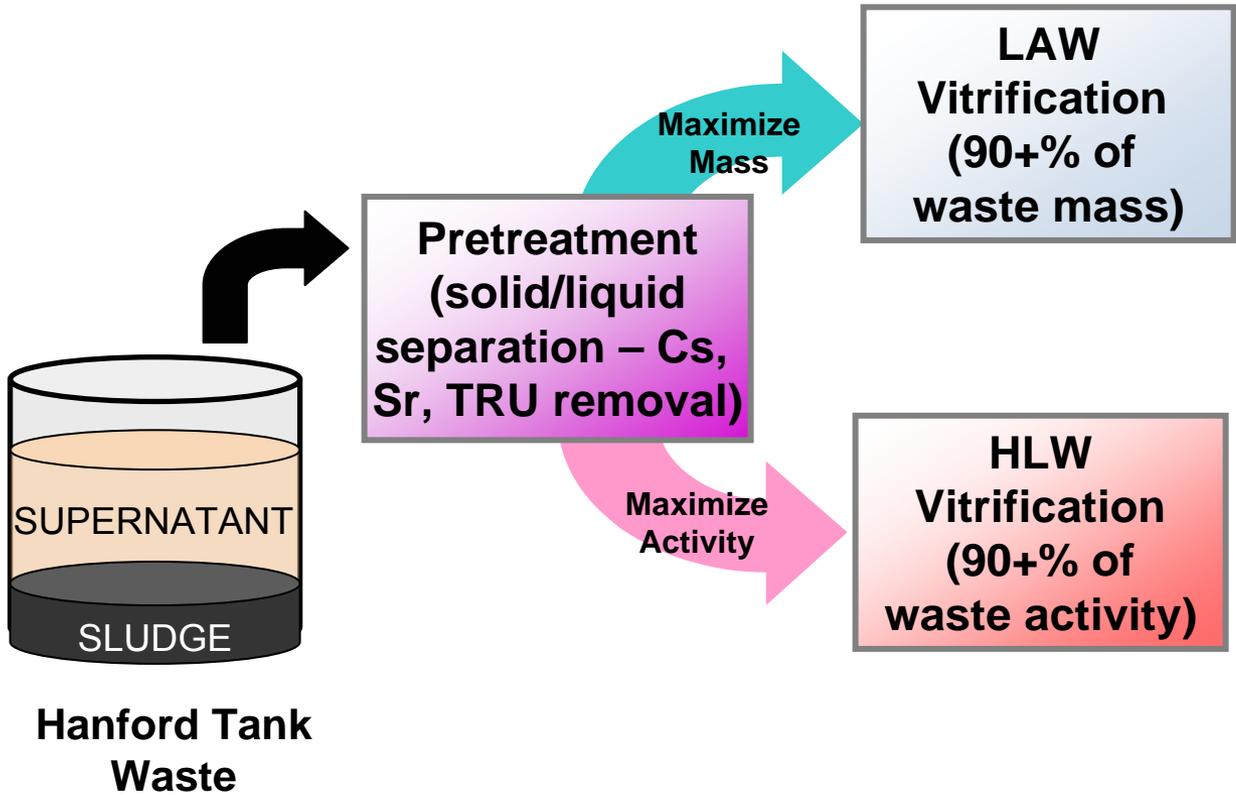


- 177 Storage Tanks
- Volume ~53 Million Gallons (December 1999)
- ~40 Inactive Miscellaneous Underground Storage Tanks
- 1933 Cs/Sr Capsules
- 340 Million Curies of Radionuclides

G00010076.2

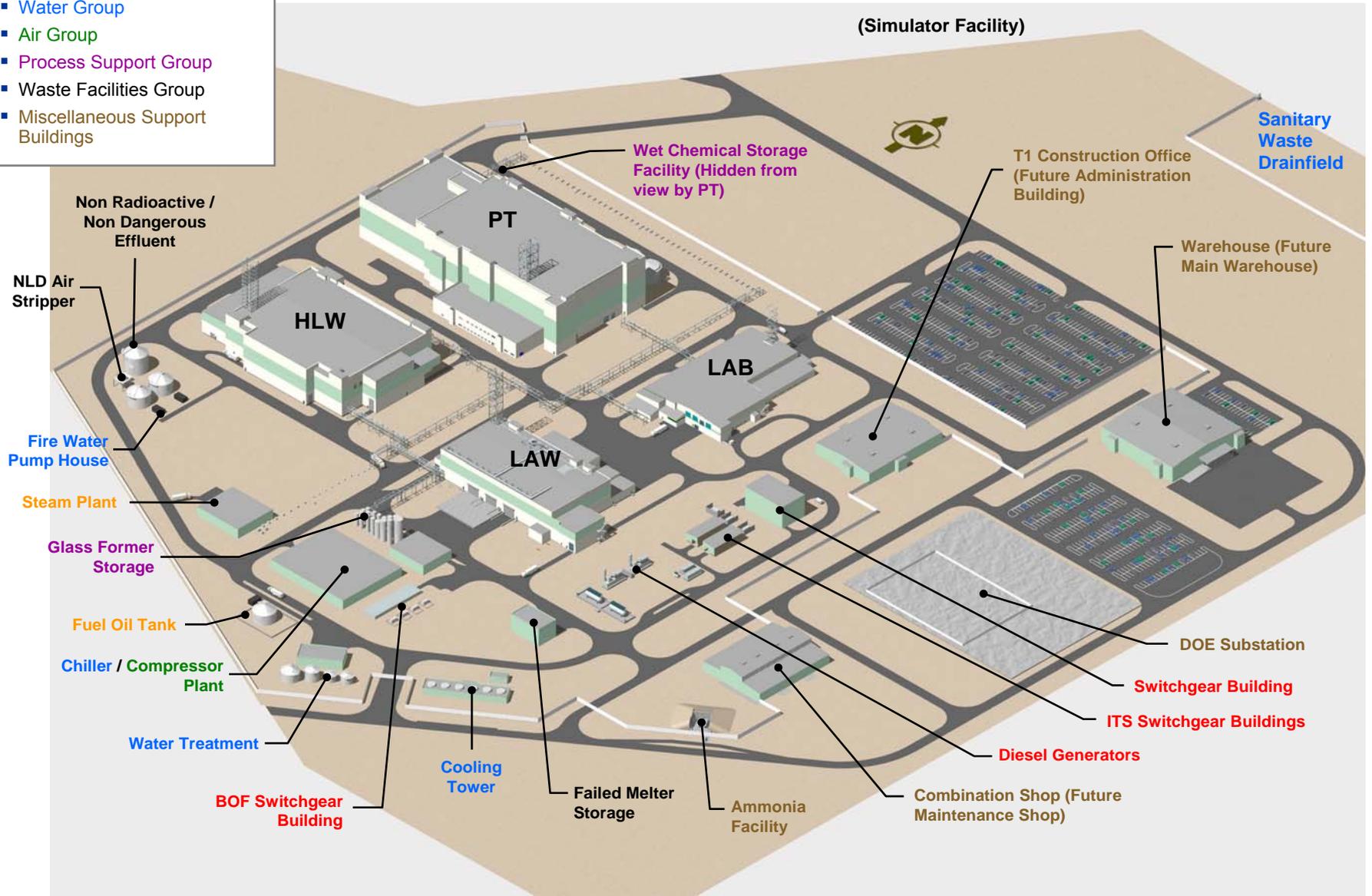


WTP Flow Sheet – Key Process Flows



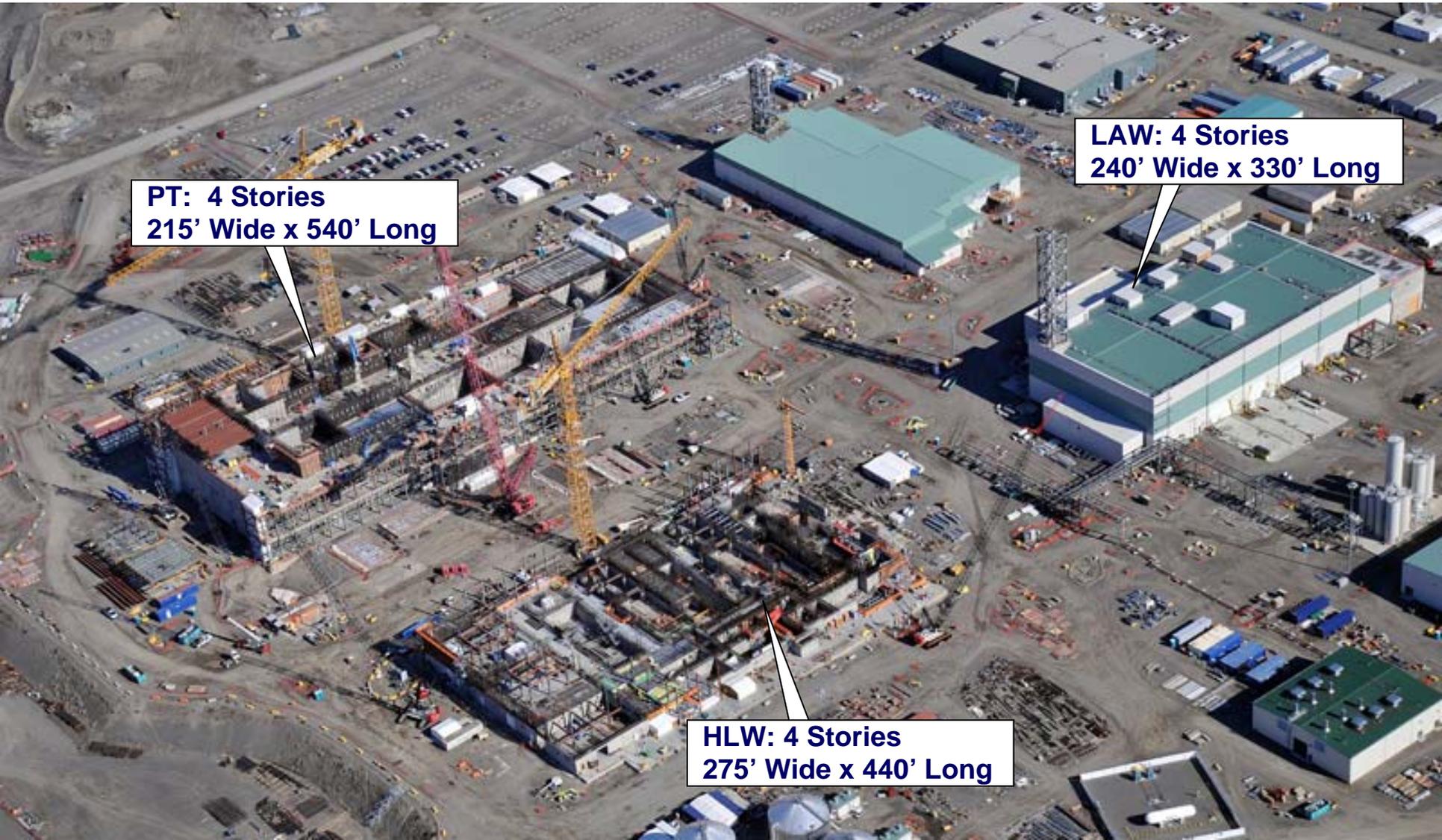


- Power Group
- Steam Group
- Water Group
- Air Group
- Process Support Group
- Waste Facilities Group
- Miscellaneous Support Buildings





Waste Treatment Plant (April 2009)



PT: 4 Stories
215' Wide x 540' Long

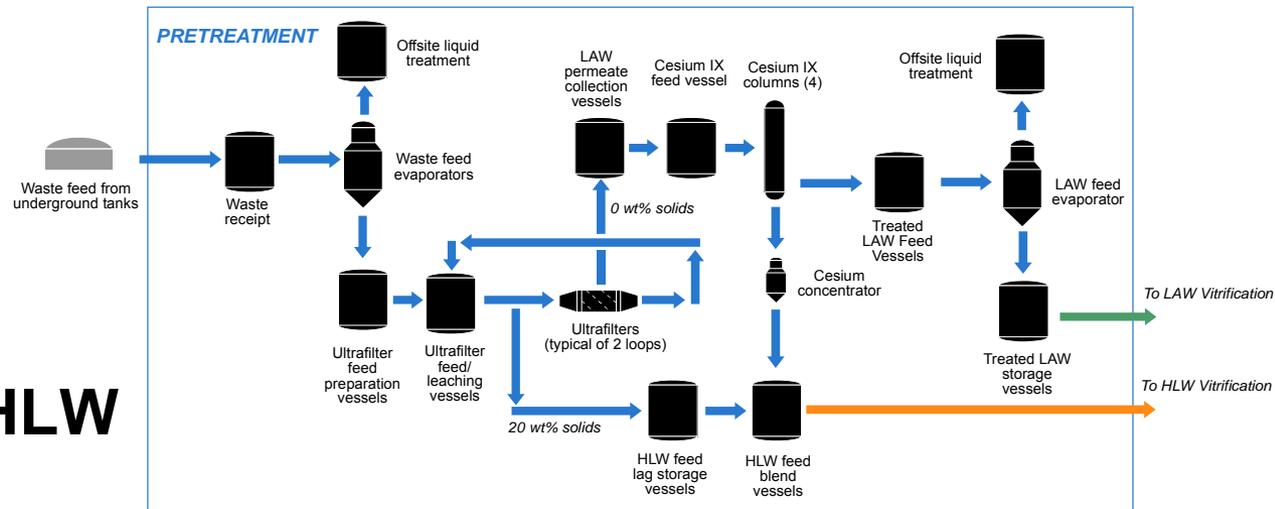
LAW: 4 Stories
240' Wide x 330' Long

HLW: 4 Stories
275' Wide x 440' Long



Pretreatment Facility

- **Receives waste feed from Hanford Tank Farm**
- **Separation and conditioning of waste feeds for HLW and LAW**
 - **Evaporation**
 - **Ultrafiltration**
 - **Leaching**
 - **Caustic/oxidative**
 - **Ion exchange**
- **Lag storage for HLW and LAW feed**





Pretreatment Facility



72% Engineered



34% Procured



28% Constructed



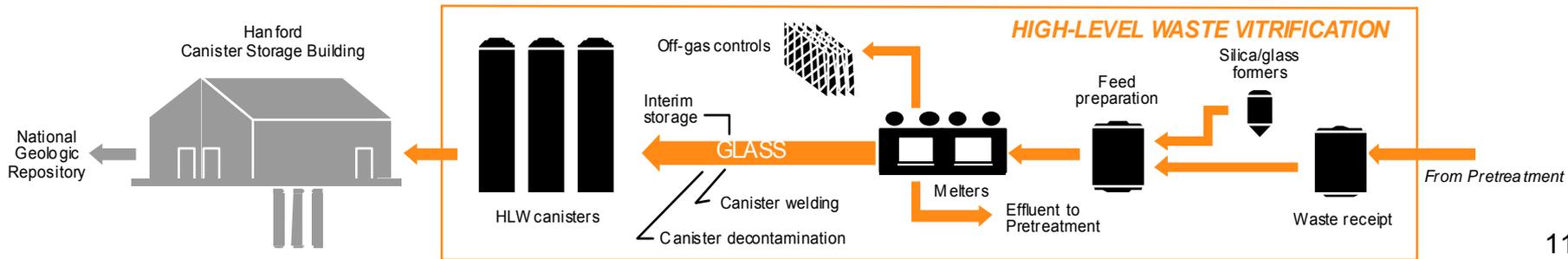
PT – Accomplishments

- **Construction**
 - **Restarted PT construction following 2-year curtailment (December 2007)**
 - **Focus on civil construction**
 - **Steel, concrete and cell liners**
- **Engineering/Equipment Procurement**
 - **Froze PT mechanical system design (P&ID)**
 - **Many tanks procured**
 - **Receiving shield doors and cranes**
 - **Restarted fabrication process on tanks and evaporators**
 - **Number of equipment specifications in preparation (IX columns)**
- **PEP Phase 1 Testing successfully completed**
 - **UFP equipment procurement hold released**



High-Level Waste Facility

- Receives high-level waste feed from Pretreatment Facility
- Mixes waste feed with glass formers
- Two HLW melters – 3 MT/d per melter
- Remote handling equipment
- 480 canisters average per year
- Canister handling
- Offgas treatment system removes particulates, organics, mercury, acidic gases, and NOx





High-Level Waste Facility



78% Engineered



49% Procured



23% Constructed



HLW – Accomplishments

■ Construction

- Focus on civil construction
 - Steel, concrete and cell liners
- Raised skyline (structural steel) to elevation +37 ft

■ Engineering/Equipment Procurement

- Achieved mechanical systems design freeze (P&ID)
- HLW Capacity Modification – Increased HLW throughput from 6.0 to 7.5 MT/D incorporated in design
- HLW – mechanical agitation and fluidic mixers technical issues resolved/demonstrated
- Engineering design priority is 37' – 58' elevation
- Number of equipment procurements/specifications in preparation

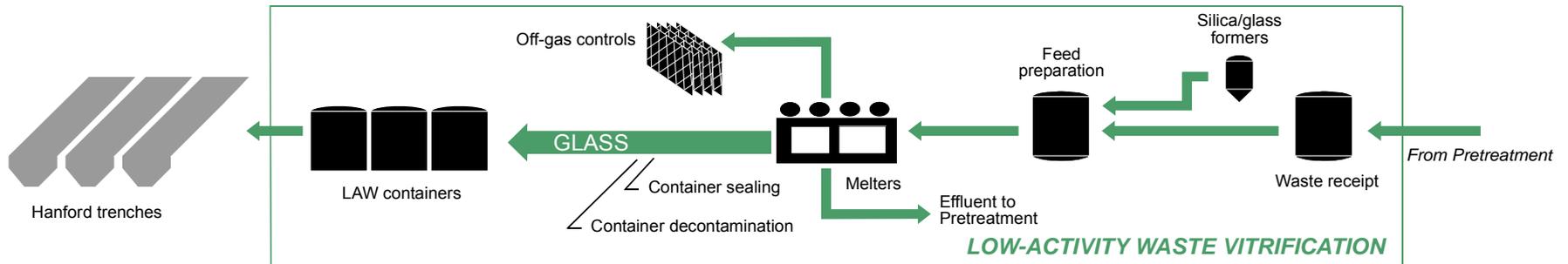
■ Process Engineering/Qualification

- Completed glass formulation/scaled melter studies
- Issued Rev. 2 HLW Waste Compliance Plan
- Incorporating DOE comments on HLW Waste Qualification Report



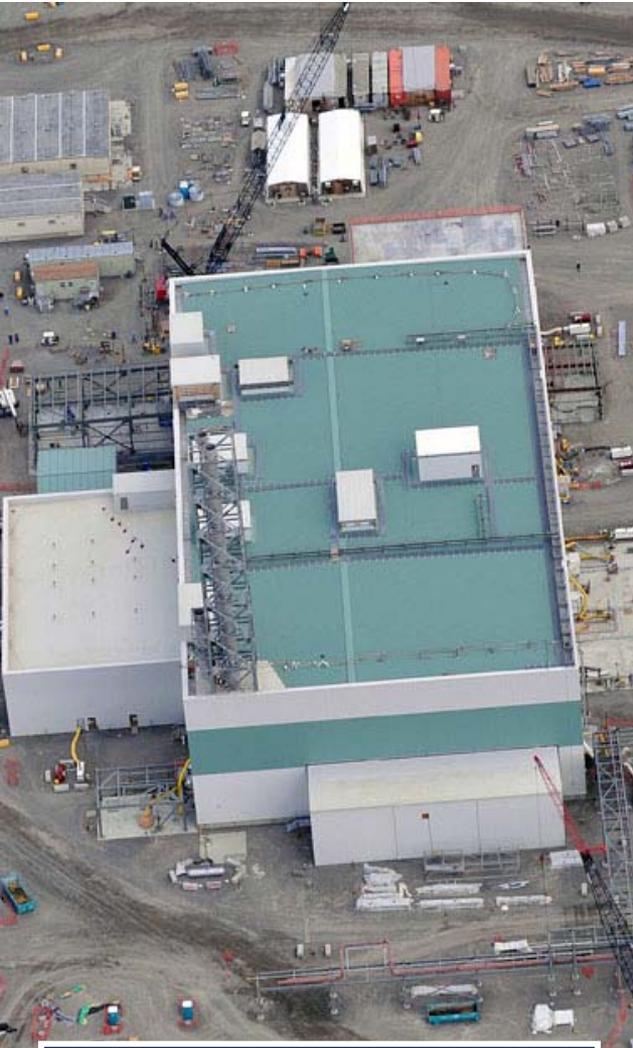
Low-Activity Waste Facility

- Receives low-level waste feed from Pretreatment Facility
- Two melters at 15 MT/d per melter
- Container capacity approximately 7 tons
- 1,100 cans per year
- Container finishing lines lidding, decontamination, and swabbing
- Offgas treatment system removes particulates, organics, mercury, acidic gases, and NOx





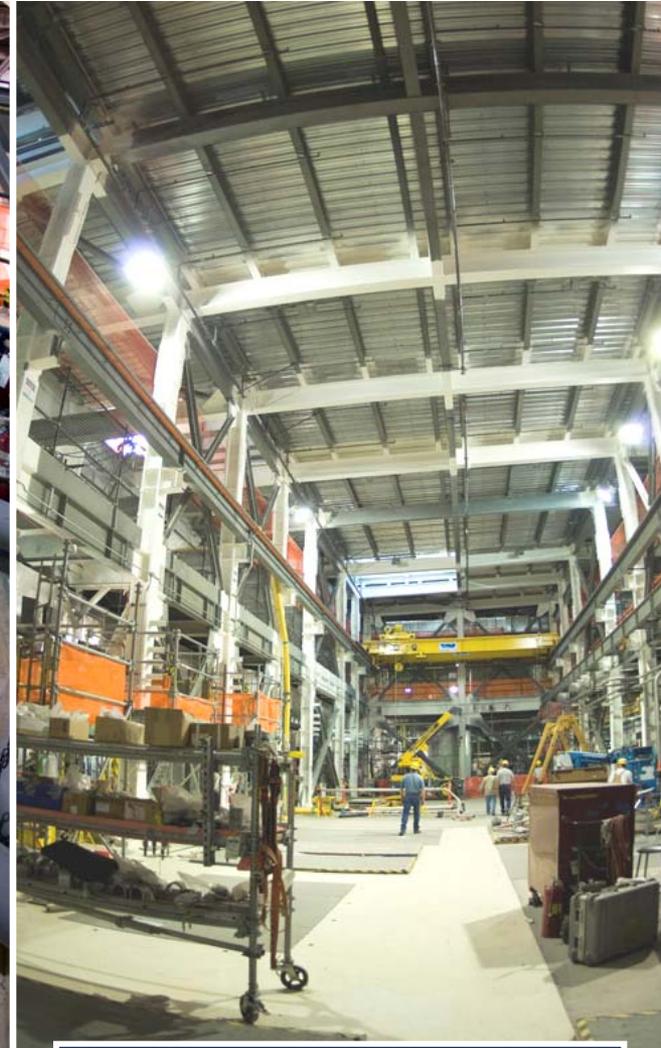
Low-Activity Waste Facility



88% Engineered



74% Procured



59% Constructed



LAW – Accomplishments

- **Construction**
 - Essentially completed the building infrastructure
 - Installing specialty equipment, piping, air handling systems
 - Canister turntables installed
- **Engineering/Procurement**
 - Achieved mechanical systems design freeze (P&ID)
 - Releasing C&I conduit raceway and power schematics
 - Delivery of melter and offgas components in progress
 - Many equipment in fabrication (ASX system)
- **Process Engineering/Qualification**
 - Completed glass formulation/melter studies
 - Issued Rev. 3 LAW Product Compliance Plan
 - Issued Rev. 0 LAW Product Qualification Report



Analytical Facility



75% Engineered



67% Procured



54% Constructed



Analytical Laboratory – Accomplishments

■ Construction

- Completed Lab siding and roofing, achieving weather enclosure
- Placed Lab emissions stack
- Completed hot cell exterior floor and wall coatings
- Completed facility structural steel fireproofing

■ Engineering

- Completed Title II Design
- Released C&I cable and conduit design

■ Operations/Testing

- Received laser ablation equipment, successfully completed performance testing in the Hot-Cell



Balance of Facilities



72% Engineered



41% Procured



62% Constructed



Balance of Facilities – Accomplishments

■ Construction

- Fabricated and installed glass former storage facility silos and associated hoppers
- Completed steam plant construction
- Completed bulk installation of underground cathodic protection raceway
- Completed fire service water system turnover to Start-up

■ Engineering

- Issued civil material foundation and wall drawings for ammonia facility
- Received standby diesel generators



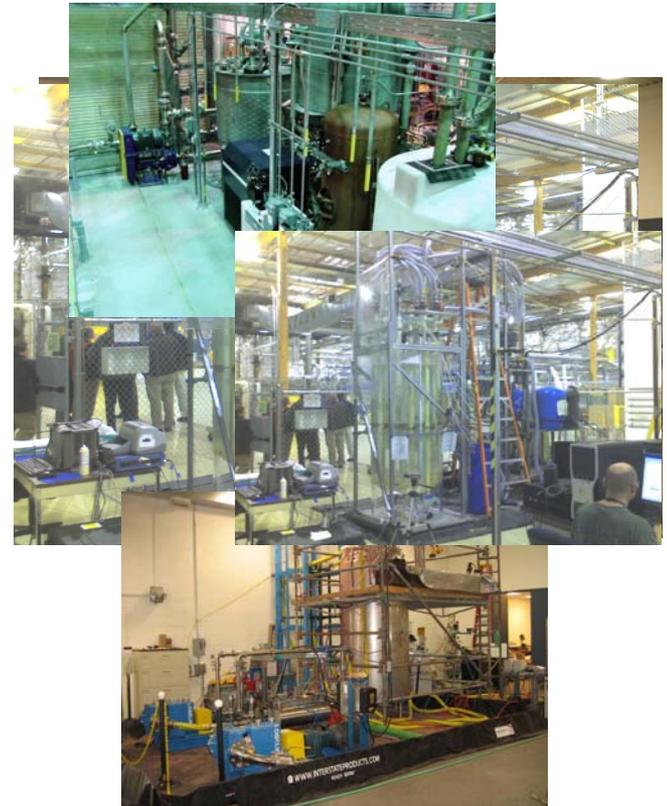
Schedule

- **Start of Cold Commissioning – November 2016**
- **Start of Hot Commissioning – February 2018**



Technical Issue Resolution – EFRT Status

- **External Flowsheet Review Team (EFRT)**
 - 17 Major Issues (15 Closed)
 - 11 Potential Issues (10 Closed)
- **Significant EFRT issue resolution achieved**
 - Reduces technical risk, allows design freeze, critical design, and procurement to progress
- **Key Items Resolved with Minor Design Impacts to Date**
 - Erosion in Vessels ✓
 - Ion Exchange ✓
 - Line Plugging ✓
 - Process Limits ✓





Technical Issue Resolution – EFRT Status

Major Issues Remaining

- **M-12 Undemonstrated Leaching**
 - Phase 1 Pretreatment Engineering Platform (PEP) Integrated Testing Completed
 - Prototypic equipment & chemical processes performed well (UFP equipment hold released)
 - Results analysis underway – supports plant design production capacity – closure by September 2009
- **M-3 PJM Mixing in Vessels with Newtonian Slurries**
 - Parametric testing completed
 - Closure documented for 26 out of 38 PJM vessels
 - Additional CFD, engineering calculations, and operational/design alternatives analysis in progress
 - Prototypic testing in preparation (June '09 Start) to address more challenging vessels
 - Forecast completion in September 2009



Technical Issue Resolution – EFRT Status

Minor Issue Remaining

- **P-9 Undemonstrated Sampling**

- **Prototypic mixing and sampling system testing completed**
- **Sampler system performance acceptable with septum and flushing design changes**
- **Results analysis underway – Earlier documented LAW results supported plant precision and accuracy needs – closure expected by September 2009**



Aggressively Pursuing Opportunities to Reduce Conservatism

- **Material At Risk (MAR)**
 - **Current source term is derived from contract maximums based on “supertank” approach**
 - **Provides radionuclide concentrations that are 50x to 100x higher than bounding feed during plant operations**
 - **This leads to a higher safety classification for plant systems and added complexity of active safety controls**
 - **WTP is proceeding with an updated MAR that is projected to lead to considerable simplification**
- **Hydrogen generation in Piping and Ancillary Vessels (HPAV)**
 - **Greater reliance on piping to withstand explosion loads to reduce active safety controls and complexity**
 - **WTP has initiated HPAV testing program, gas phenomenology evaluations, and development of more appropriate stress limits to reduce the need for active safety control features**



Summary

- **Restarted construction of HLW and PT facilities**
- **Significant progress made to resolve technical issues**
- **Current focus**
 - **Civil construction – steel, concrete and cell liners**
 - **Equipment procurement**
 - **Closure of remaining Technical issues**
 - **Addressing opportunities to reduce conservatism**