

August 7, 2012

Tank Waste Committee



DEPARTMENT OF ENERGY

Office of River Protection

HANFORD SITE

Rob Gilbert

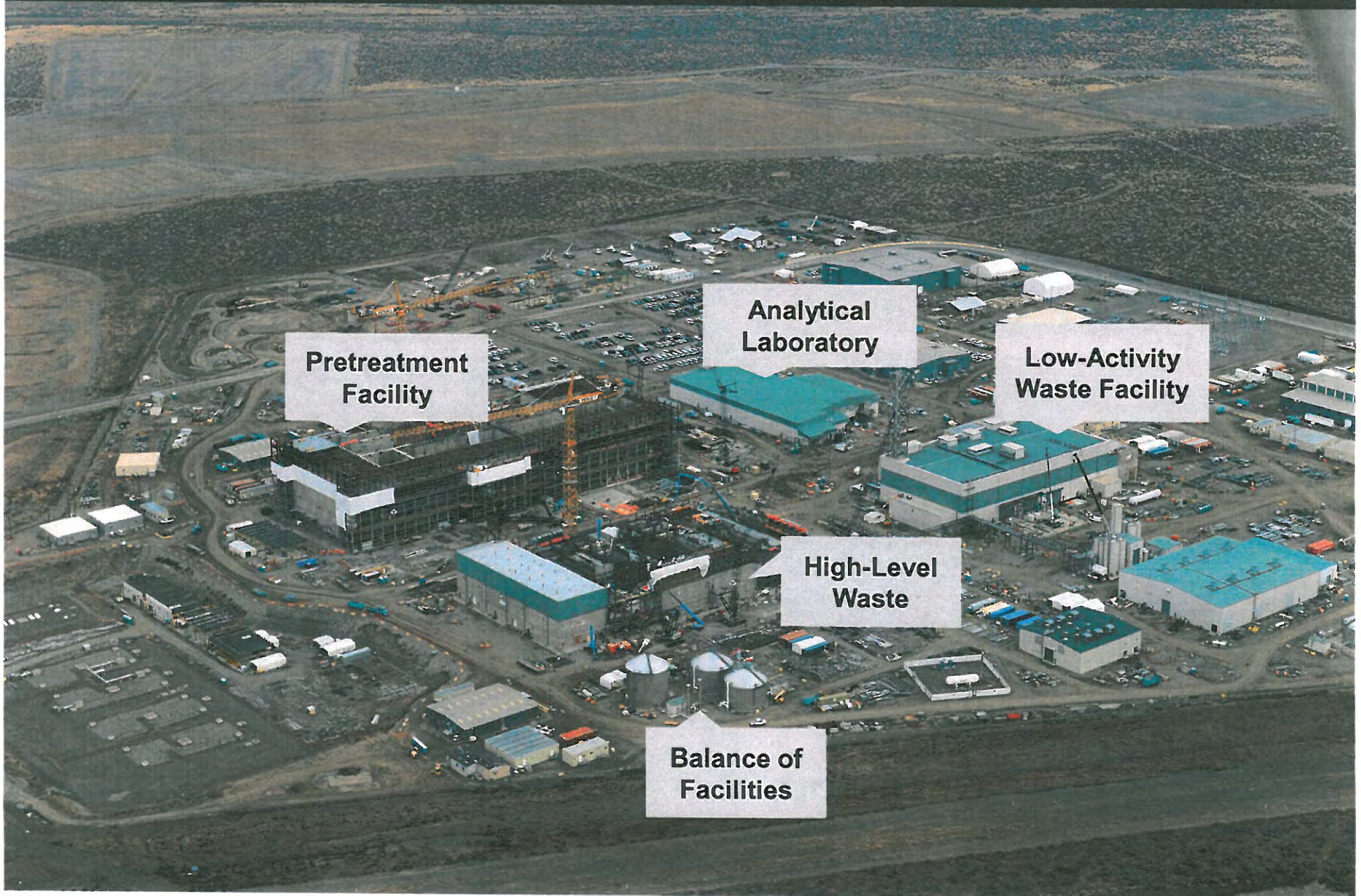
Program Manager, Start-Up Operations



Discussion Topics

- Overview of Waste Treatment and Immobilization Plant (WTP)
- Work Priorities
- Resolution of major technical issues
 - Mixing
 - Erosion/Corrosion

WTP is 65 Percent Complete



**Pretreatment
Facility**

**Analytical
Laboratory**

**Low-Activity
Waste Facility**

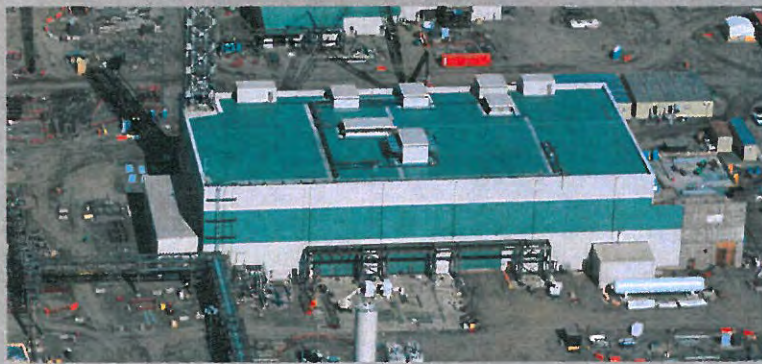
**High-Level
Waste**

**Balance of
Facilities**

Low-Activity Waste (LAW) Vitrification Facility

Turns low-activity waste into glass

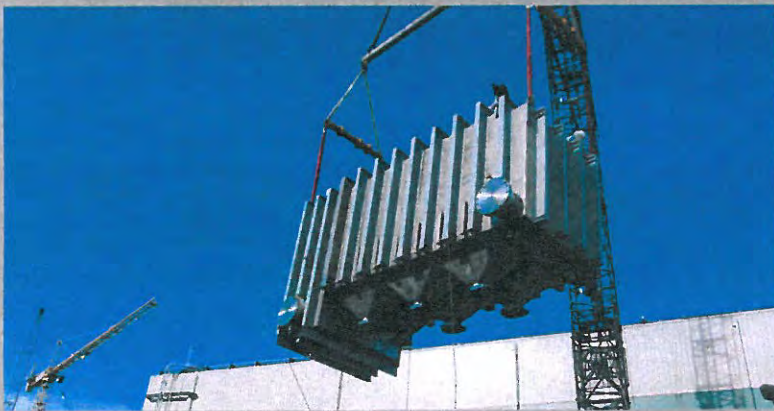
- 84 percent design complete
- 88 percent procurement complete
- 70 percent construction complete



Low-Activity Waste Facility exterior



Overhead pipe racks for steam and glass-formers



Low-Activity Waste carbon bed adsorber



200-ton Low-Activity Waste melter



Low-Activity Waste transfer tunnel

Balance of Facilities

Vast infrastructure to support operations

- 73 percent design complete
- 48 percent procurement complete
- 64 percent construction complete



18 support buildings for the Balance of Facilities



Glass-former piping



Overhead pipe racks for steam and glass-forming materials



Glass-former silos

Analytical Laboratory

Ensures glass meets regulatory requirements

- 79 percent design complete
- 76 percent procurement complete
- 83 percent construction complete



Analytical Laboratory exterior



Analytical Laboratory fume hoods



Analytical Laboratory air-handling systems

High-Level Waste (HLW) Vitrification Facility

Turns high-level waste into glass

- 86 percent design complete
- 76 percent procurement complete
- 41 percent construction complete



High-Level Waste Facility exterior



High-Level Waste Facility truck bay walls



High-Level Waste Facility bridge crane



High-Level Waste Facility melter bay

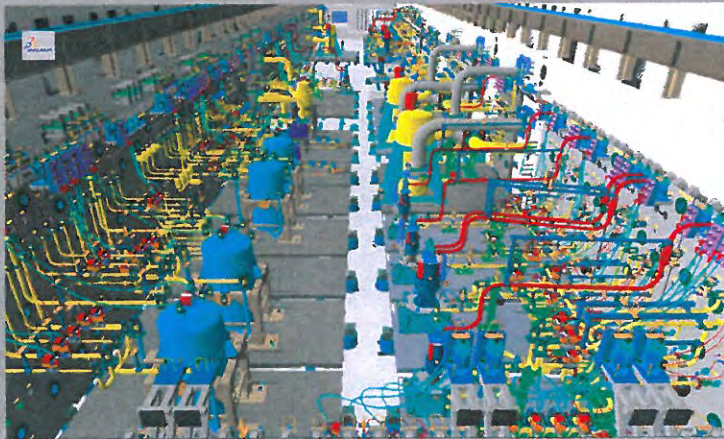
Pretreatment Facility

World's largest radioactive chemical separations facility

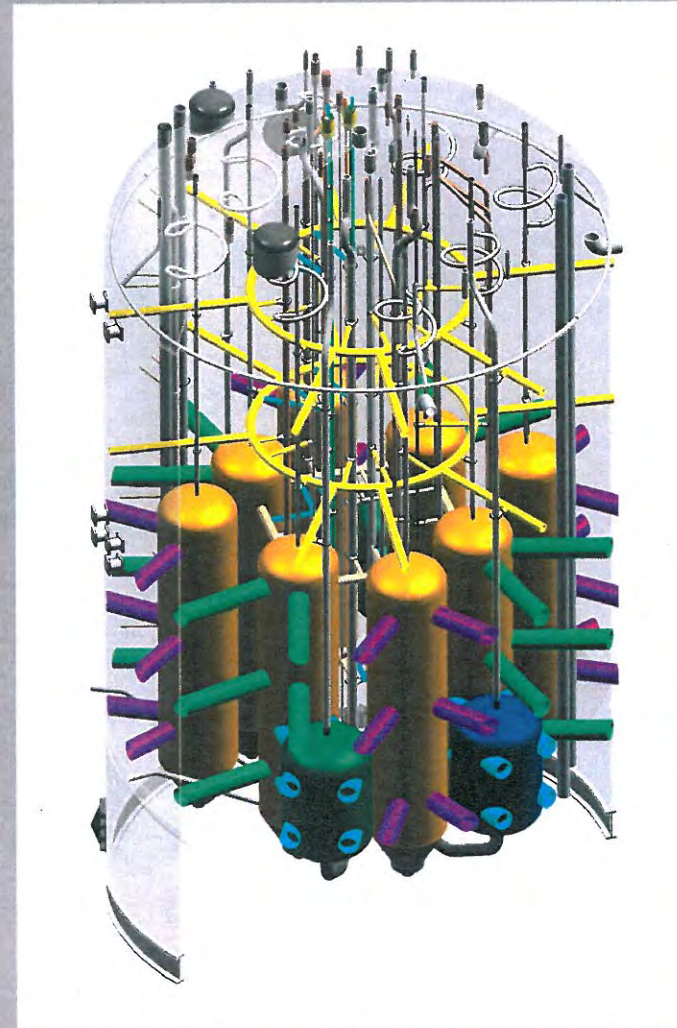
- 79 percent design complete*
- 52 percent procurement complete*
- 42 percent construction complete*



Pretreatment Facility exterior



Pretreatment Facility hot cell

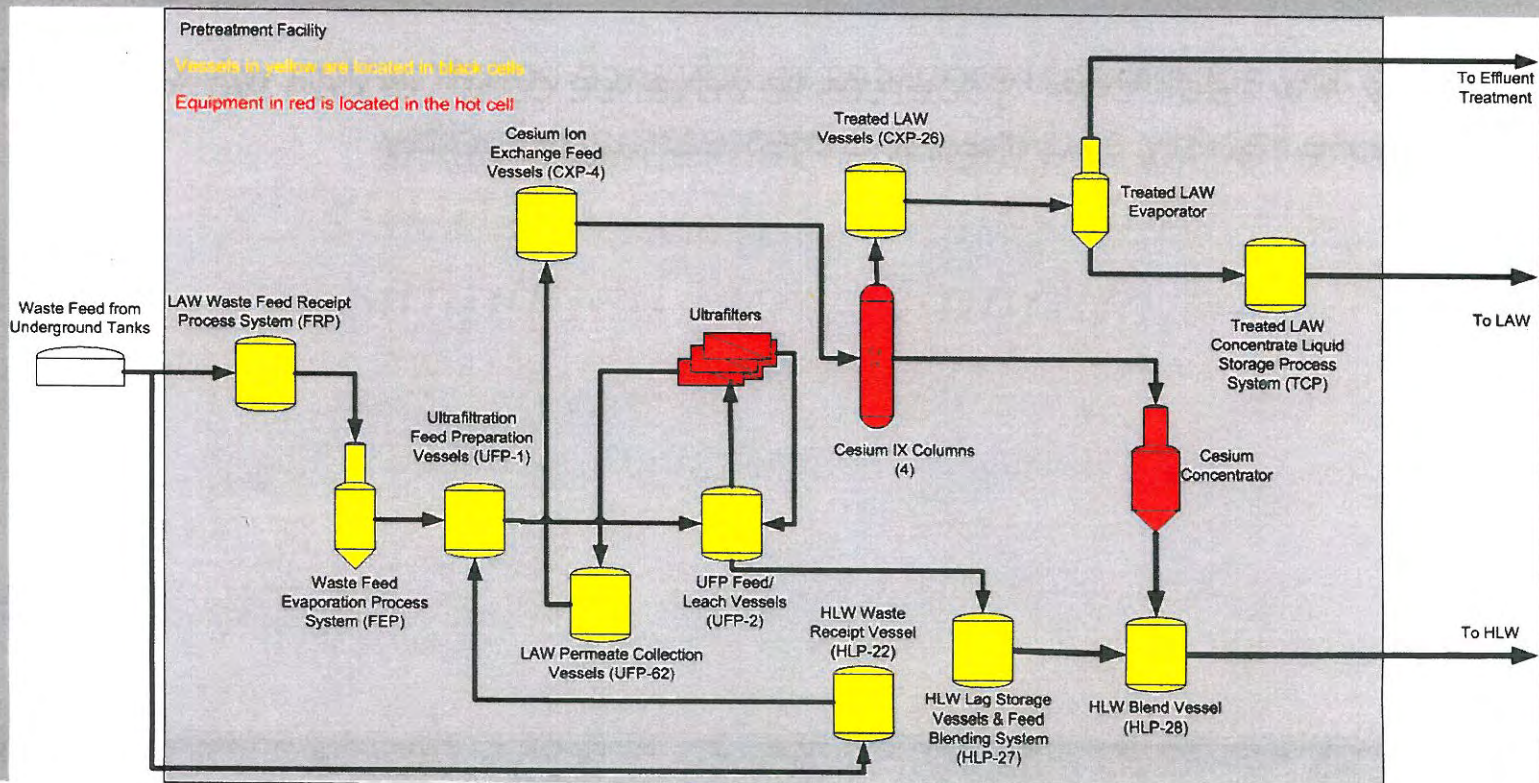


3-D model of Pretreatment Vessel

**Percent complete data is being re-evaluated due to replanning and rebaselining efforts and resolution of technical issues*

Pretreatment Facility Functions and Simplified Flow Diagram

- Receives waste feed from Hanford Tank Farm
- Separation and conditioning of waste feeds for High-Level Waste (HLW) and Low-Activity Waste (LAW)
 - Evaporation
 - Ultrafiltration
 - Leaching
 - Ion exchange
- Lag storage for HLW and LAW feed





Work Priorities

- Taking advantage of planned slow down of work at the Pretreatment and High-Level Waste Facilities to resolve technical issues
- Completing construction of the Low-Activity Waste Facility, Balance of Facilities, and Analytical Laboratory
- Directing any additional resources to advance construction work at the High-Level Waste Facility and then the Pretreatment Facility



Pulse Jet Mixing at the Waste Treatment and Immobilization Plant

Five unresolved technical concerns related to pulse jet mixing:

- Limitations of the small-scale testing program
- Modeling of the mixing performance
- Tank Waste characterization and feed certification
- Planned WTP process vessel modifications
- Limitations of pulse jet mixer controller and instrumentation testing

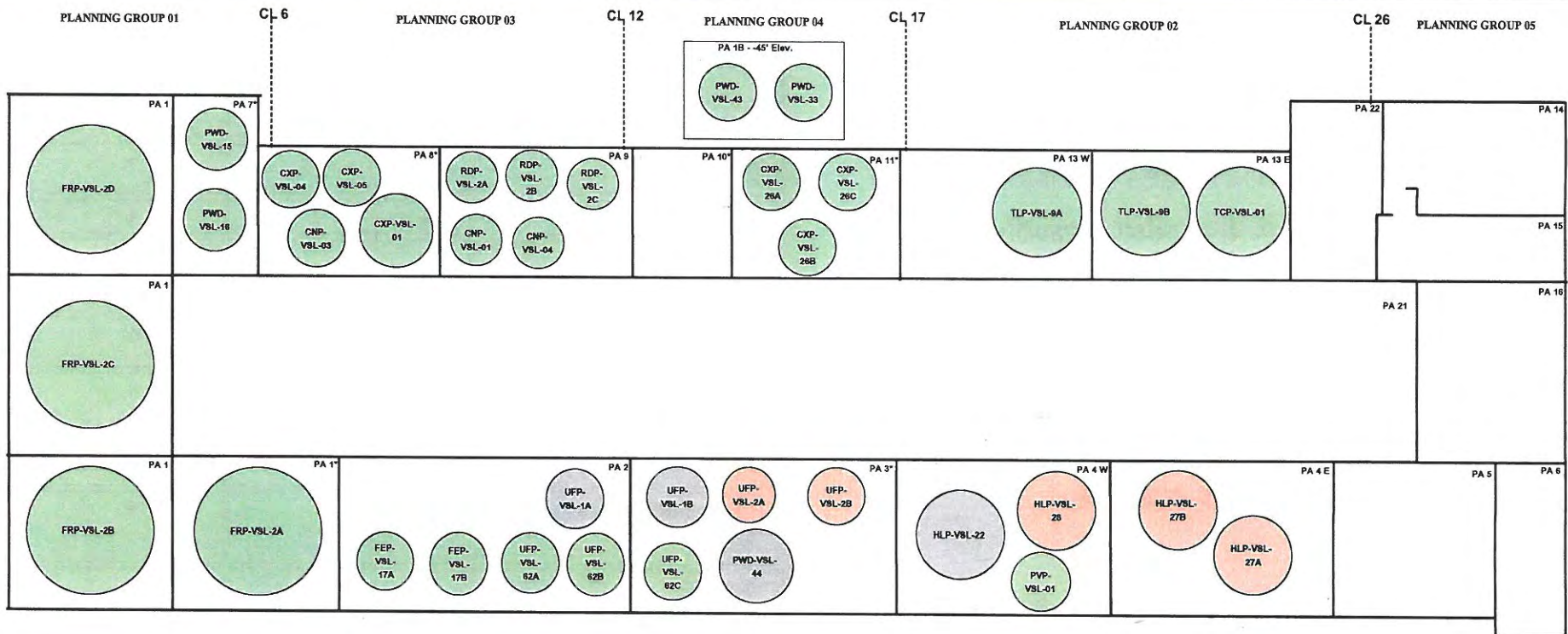


WTP Pulse Jet Mixer Vessels

- 38 Pulse Jet Mixer Vessels
 - 4 Newtonian vessels in the High-Level Waste Facility
 - 34 vessels in the Pretreatment Facility
 - 29 vessels designated “Newtonian vessels”
 - 9 vessels are for liquids only
 - 3 vessels store spent resin
 - 16 vessels are limited to less than 5 wt% solids
 - 1 vessel is limited to less than 10 wt% solids
 - 5 vessels designated “non-Newtonian vessels”

Pretreatment Facility Black Cell Vessels

29 installed (green), 9 not installed (gray, red), 5 non-Newtonian, not installed (red)



*Five vessels are designated as "non-Newtonian vessels":
UFP-2A/B, HLP-27A/B, and HLP-28



Large-Scale Integrated Testing

- Large-scale vessel testing defined to support:
 - Verifying vessel design
 - Establishing operating and control limits
- Three test platform sizes identified:
 - 4 ft, 8 ft, 14 ft diameter vessels
- Four pulse jet mixer (PJM) arrays to be tested:
 - RLD-00008, HLP-00022
 - UFP-00002A, HLP-00027A
- Single PJM tests to be completed verifying PJM control design

Planned Testing				
Test Function	Testing to Support Design Verification			Testing to Support Vessel Operation and Control
	4 Foot Diameter	8 Foot Diameter	Single PJM Test Platform	14 Foot Diameter
PJM Controllability			X	X
Vessel Level/Density Instrument Accuracy		X	X	X
Sampling Capability		X		X
Transfer/Pump Out	X	X		X
Heel Management	X	X		X
Prototypic Integrated Operation				X
Performance Testing and Scaling	X	X		X
Integrated Vessel Sparger Operation		X		X
Design and Safety Margin for Mixing to Support Safety Functions	X	X		X
PJM Restart				X
CFD Comparison/Validation	X	X		X
High Temperature Operation			X	



Erosion Wear of Pulse Jet Mixer Vessels

- Pulse jet mixer vessel erosion wear re-assessments have not been completed
 - Action: Erosion wear calculations to be revised based on comments, including updated vessel-specific waste characteristics

- Wear experiments conducted at Dominion Engineering Inc. (DEI) do not appear to validate the WTP erosive wear rate design basis
 - Action: Re-analysis of the DEI erosion wear experiments for erosion scar depth to accurately determine erosion wear

- Procedures for waste feed control and measurement of waste characteristics important to corrosion/erosion wear have not been developed
 - Action: Develop method for waste feed erosion potential and in-service inspection program



Localized Corrosion of Pulse Jet Mixer Vessels

- Temperature and chemistry controls for preventing localized corrosion of vessels (e.g., pitting, crevice corrosion, and stress corrosion cracking) have not been confirmed
 - Completion of a Vessel Material Localized Corrosion Limit Analysis report that will identify the acceptable margins, chemistry and temperature operating ranges for WTP vessel materials
- Uncertainties exist in localized corrosion data (from external technical papers) when applying the data to anticipated conditions in WTP process environments
 - Assess requirement for additional testing data
 - Assess requirement for vessel material changes



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