Effluent Treatment Facility Upgrades to Support Direct-Feed Low-Activity Waste

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Hanford’s DFLAW program integrates a group of individual projects, facilities, and infrastructure upgrades, with involvement from all of Hanford’s contractors. Through DFLAW, the U.S. Department of Energy’s contractors will retrieve, treat, and immobilize low-activity waste.
Direct-Feed Low-Activity Waste Process Flow
Introduction

Effluent Treatment Facility (ETF)

Liquid Effluent Retention Facility (LERF)
Mission: Receive, treat, and dispose of liquid effluents from authorized programs and projects

The liquid waste processing facilities include:
- LERF
- ETF
- State-Approved Land Disposal Site (SALDS)
- Treated Effluent Disposal Facility (TEDF)
Purpose: The discharge of wastes to the soil is not allowed. LERF provides needed interim storage of large quantities of low-level, low-hazard liquid effluents

- Three Resource Conservation and Recovery Act (RCRA)-permitted surface impoundments, or basins
- Permitted storage capacity of 7.8 million gallons each
- During DFLAW operations, primary effluent streams consist of 242-A Evaporator, leachates, and the Waste Treatment and Immobilization Plant (WTP)
Effluent Treatment Facility
**Purpose:** The discharge of wastes to the soil is not allowed. ETF treats aqueous waste from LERF in a series of process units to remove or destroy waste constituents

- Aqueous waste is processed through the main treatment train (MTT). Reject streams from MTT are processed through the secondary treatment train (STT)
- Effluent treated by ETF is discharged to a SALDS north of the 200 West Area
Effluent Treatment Facility Unit Operations
State-Approved Land Disposal Site

2010
State-Approved Land Disposal Site (Cont.)

**Purpose:** SALDS is a gravel-filled drain field that provides a controlled and monitored location for water discharge after ETF treatment

- ETF cannot effectively remove tritium
- SALDS was sited within the Central Plateau to allow for the decay of tritium (half-life of approximately 12.5 years) to below drinking water standards before reaching any waters
Treated Effluent Disposal Facility
Purpose: TEDF is a separate collection system that accepts nonradioactive, nonhazardous effluent collected via pump stations in the 200 East Area and 200 West Area

- Effluent streams include steam condensate, cooling water, raw water, etc.
- The system consists of approximately 12 miles of pipeline, three lift stations, a sample station, and two adjacent 5-acre infiltration ponds
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In order to receive and treat DFLAW effluent, the liquid waste processing facilities must improve:

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The U.S. Department of Energy, Office of River Protection (ORP) funds the work needed to ensure the facilities have the capability, capacity, and reliability to support DFLAW operation.
Direct-Feed Low-Activity Waste Projects List

• Treatment System Life Extension Projects:
  o Replace peroxide destruction modules
  o Install brine loadout system
  o Replace ultraviolet/oxidation units
  o Replace reverse osmosis pumps and valves

• Infrastructure Life Extension/Upgrades:
  o Replace HVAC chiller units
  o Replace transfer line leak detection systems
  o Replace compressed air and cooling water systems
  o Repair verification tank coating
  o Replace LERF covers and leachate systems

• Operational Reliability:
  o Conduct of operations, training, procedure improvements
Reliability: Air Compressor – Before
Purpose: The ETF compressed air system provides service air to process equipment and dry instrument air to process instrumentation and air-operated valves

- Compressed air system is critical to ETF – failure to supply air will shut down ETF processing operations
- Completed upgrade in fiscal year 2019 with new compressor system components
- Upgraded configuration by removing and replacing the single air compressor with two new compressors
Capability: Connect WTP to LERF

200-E-288-PL, PC-5000 Pipeline

200-E-311-PL, Backup WTP Pipeline

200-E-310-PL, Primary WTP Pipeline
Capability: Connect WTP to LERF (Cont.)

**Purpose:** The purpose of the transfer lines is to transport radioactive, dangerous waste liquid effluents from the WTP to the LERF for processing by the 200 Area ETF

- Transfer lines 200-E-310-PL (primary) and 200-E-311-PL (backup) were built in 2001
- Prior to these transfer lines being placed into service, integrity testing (along with some upgrades and/or modifications) must be performed
Capacity: LERF Basin 41
Purpose: Design, permit, and install an additional LERF basin to provide more storage capacity for Hanford Site generators

- Rough excavation was performed at the location of LERF Basin 41, but no further work to complete the basin
- Design is ongoing and will be similar to the existing LERF basins taking into account any changes in code (e.g., piping, electrical, dangerous waste, etc.)
- A piping configuration evaluation will be performed to assess potential operations improvements at LERF
Key Takeaways

• Liquid waste processing facilities are last step in DFLAW before treated effluent is discharged to the environment

• To receive and treat DFLAW effluent, liquid waste processing facilities must improve capability, capacity, and reliability

• ORP funds the work needed to ensure the facilities have the capability, capacity, and reliability to support DFLAW operation
Questions?