



OFFICE OF  
**RIVER PROTECTION**  
United States Department of Energy

# Low-Activity Waste Pretreatment System Update

## Hanford Advisory Board Tank Waste Committee

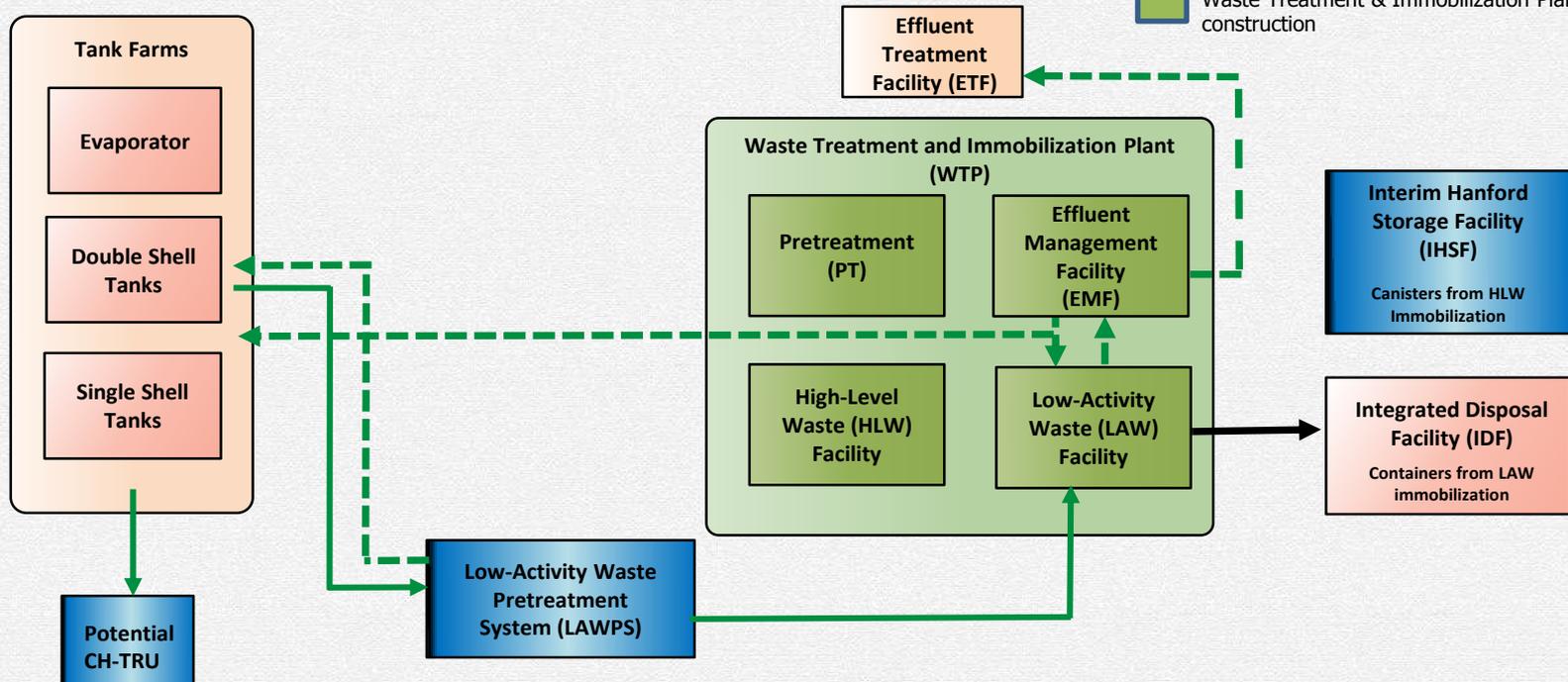
Presented by: **Steve Pfaff, LAWPS Federal Project Director**

**August 9, 2017**



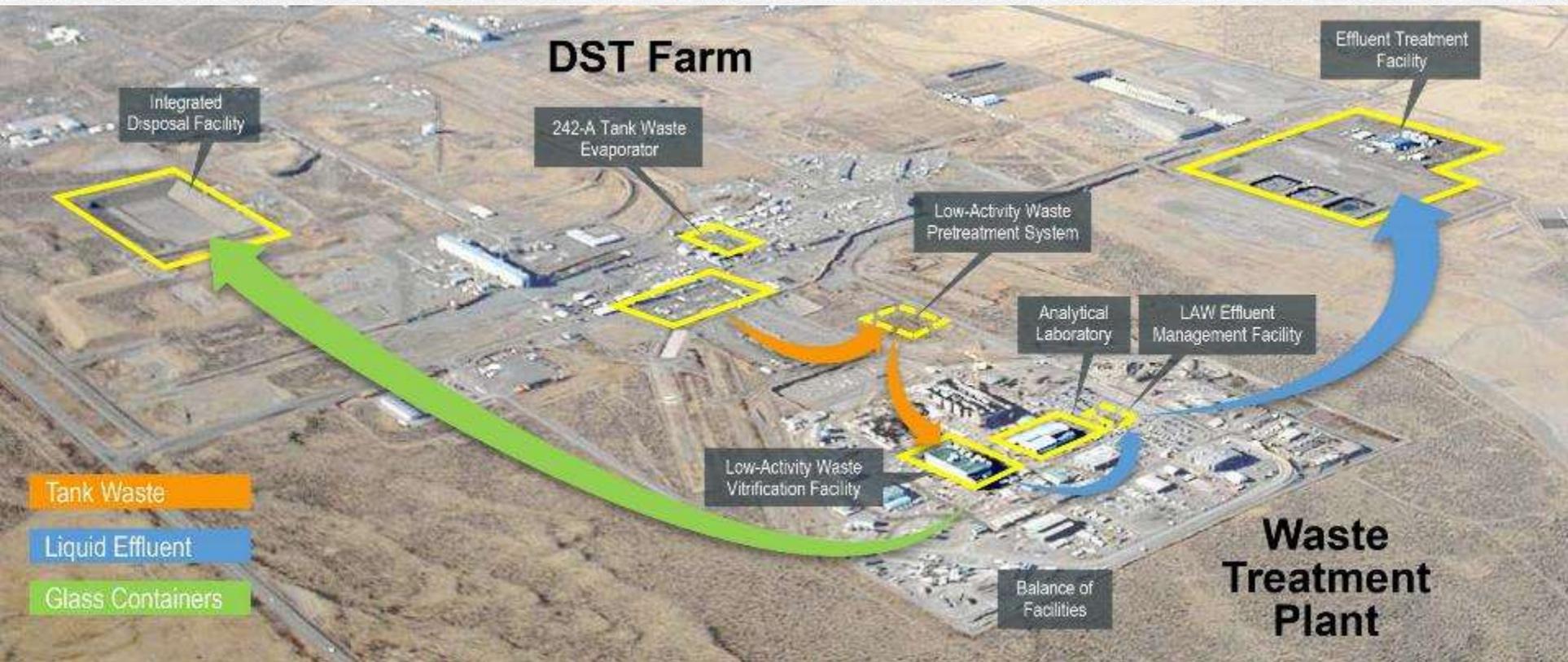
# Direct-Feed Low Activity Waste Treatment Approach

-  Facilities in the Tank Farm Baseline to be constructed
-  Facilities/Capabilities proposed
-  Existing facilities
-  Waste Treatment & Immobilization Plant (WTP) in construction



The DFLAW approach sends pretreated tank liquids to the Low-Activity Waste (LAW) Facility, enabling treatment operations as soon as practicable.





- First step in sequential approach to tank waste treatment and disposal
- Provides earliest practicable tank waste disposition





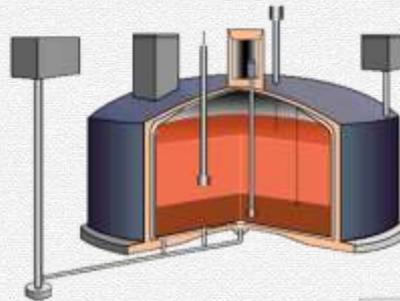
- Completed 60% Design Review.
- Completed Preliminary Safety Design Report.
- Developing system testing reports.
- Permit modification available for public comment through Sept. 15, 2017; public meeting Aug. 21 at Richland Library.
- Requesting DOE HQ approval of Critical Decision 3A to begin site preparation and fabrication of selected equipment.
- Anticipating full construction start by mid-FY 2019.





**20** Proposed waste feed  
delivery campaigns

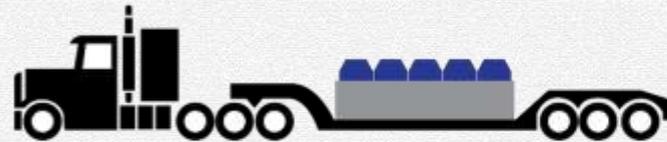
**1,000,000**  
Gallons per campaign



**6.3** Million gallons of  
tank space generated\*

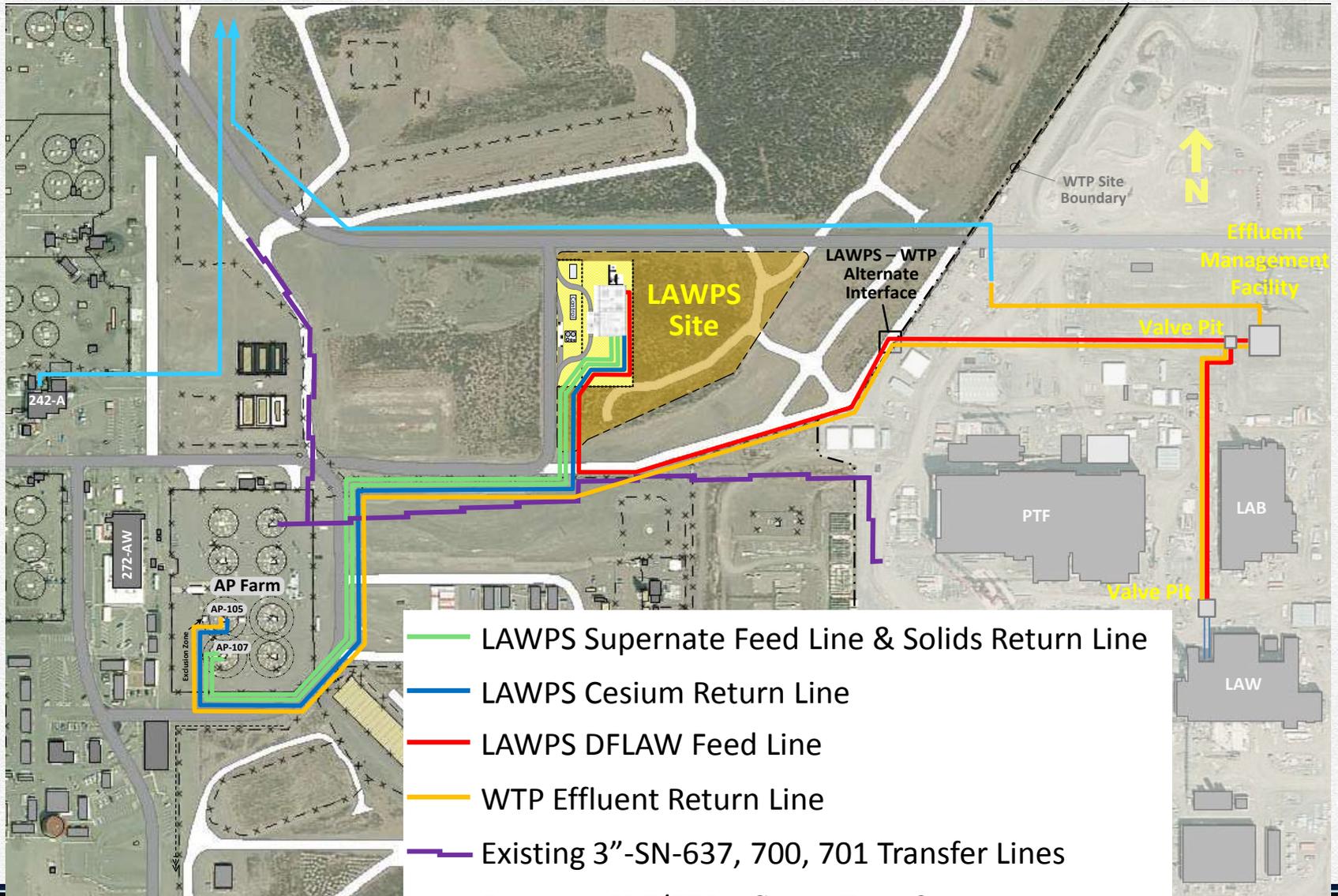
**9,600** Metric tons of  
sodium processed

**15%** of Tank Farm  
sodium inventory



**12,000** Immobilized LAW  
containers produced





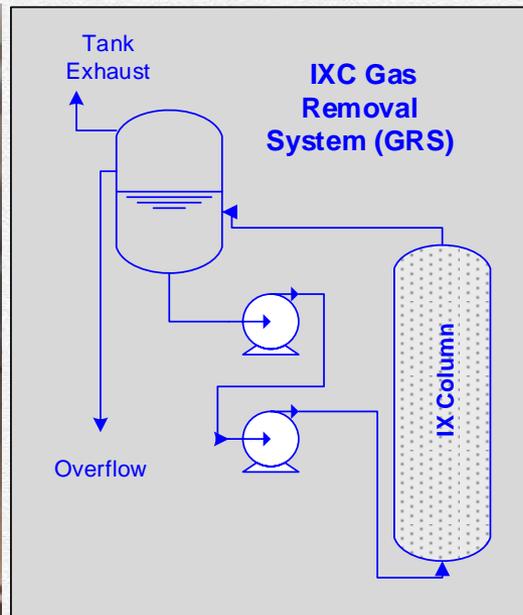
- LAWPS Supernate Feed Line & Solids Return Line
- LAWPS Cesium Return Line
- LAWPS DFLAW Feed Line
- WTP Effluent Return Line
- Existing 3"-SN-637, 700, 701 Transfer Lines
- Existing LERF/ETF Influent Transfer Lines





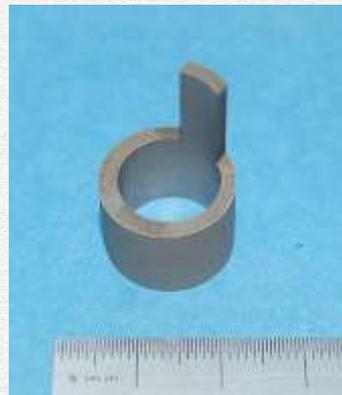
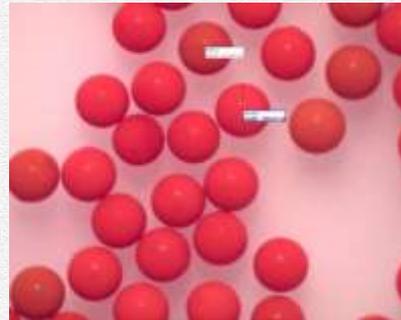


- Demonstrate column hydraulics
- Evaluate distributor performance
- Resin removal
- Gas removal system





- Gas generation with sRF (rad and non rad)
- Gas retention and release with sRF
- CFF operation, cleaning, and corrosion





- **Critical Decision (CD)-1 approved: May 2015**
  - Initiated Preliminary Design phase; currently between 60% and 90% checkpoints
  - Full scale column test and 1/9<sup>th</sup> scale integrated testing supporting design
  
- **Anticipate CD-3A approval by October 2017**
  - Long lead procurement and site prep activities
  
- **Anticipate CD-2/3 approval by February 2019**
  - Completion of 90% design phase; results of integrated engineering scale testing
  - Initiate final design and begin construction activities
  
- **Coordinating startup timing with WTP**
  
- **Supporting completion of Low-Activity Waste Facility hot commissioning by December 2023**





## Dangerous Waste Permitting Process

- DOE submitted the first permit application package for the LAWPS Facility to Ecology in July 2017
- Class 3 permit modification will require the following:
  - 60-day public comment period on permit application, including a public meeting (led by DOE)
    - Comment period is July 17-September 15, 2017
    - Meeting set for 5:30 p.m. August 21 @ Richland Library
  - 45-day public comment period on the permitting decision to be held by Ecology (schedule TBD)
- Public is informed of comment periods through the Hanford email and postal lists, newspaper ads, websites, HAB, etc.





# Questions?

The Hanford Reach  
White Bluffs Overlooking the Columbia River





**Provide a cesium and solids removal capability to support Direct Feed Low Activity Waste to WTP. The scope includes the following requirements:**

- 40-year facility design life
- Cross Flow Filtration (CFF) for solids removal
- Spherical Resorcinol Formaldehyde (sRF) ion exchange resin for cesium removal
- Underground vaults with an above-grade weather enclosure
- Three treated LAW lag storage tanks
- Centralized control at the Tank Farms operations center (274 AW) with field control capability at LAWPS site
- Building and process vessel ventilation system(s)
- Spent Resin Removal and Handling System
- Cold Chemical Reagent Storage
- Transfer Lines from the AP Tank Farm boundary to the WTP interface point





## Process Description

- Double-shell tank AP-107 will send liquids – roughly 90 gallons per minute – to the LAWPS filter feed tank
- The filter feed tank will return roughly 80 gallons per minute to AP-107
- The filter feed tank pump will send the tank waste liquids through the crossflow filter tubes (408 porous sintered metal tubes) at a rate of roughly 900 gallons per minute
- Filtrate (free of suspended solids) will flow from the crossflow filters to the ion exchange columns – 10 gallons per minute
- The IX columns (lead and lag) will undergo an elution cycle approximately every 7 days – cesium is stripped from the columns with dilute nitric acid
- The cesium and other miscellaneous small liquid waste streams (such as flushes) will be chemically adjusted and returned to the Tank Farm double-shell tanks
- LAW feed is collected in one of three lag storage tanks. At any given time, one tank will be filling with LAW feed, one will be undergoing confirmatory lab analysis, and one will be sending feed to the WTP LAW facility
- Each lag storage tank can hold roughly 7-10 days feed to the WTP LAW facility – feeding both melters at full capacity to produce 30 metric tons of glass per day, which is 5 of the ILAW containers (7.5 feet tall, 4.5 feet in diameter).



## Facility Infrastructure:

- Site footprint is approximately 4 acres
- Process facility footprint is approximately 20,000 sq. feet
- Multiple below-grade process cells, with depth of cells varying from 23-48 ft.
- Main process tanks:
  - Filter Feed Tank – 6100 gallons
  - Treated Waste Transfer Tank – 2300 gallons
  - Cesium Product Tank – 35,000 gallons
  - Lag Storage Tanks (3) – 124,000 gallons each
- Reagent tanks:
  - NaOH tanks: 19M – 6200 gallons, 1M – 2800 gallons, 0.1M – 2600 gallons
  - Dilute HNO<sub>3</sub> tanks (2): 12,300 gallons each
- Waste transfer piping – permanent underground pipe-in-pipe design
  - Between AP tank farm and LAWPS – Three 2-inch diameter lines, ~2110 ft. long
  - Between LAWPS and the WTP interface point – One 3-inch line, ~1300 ft. long
  - Between WTP interface point and AP Tank Farm – One 2-inch line, ~2400 ft. long



Milestones	2016 Consent Decree (Amended)
LAW Facility Construction Substantially Complete	12/31/2020
Start LAW Facility Cold Commissioning	12/31/2022
LAW Facility Hot Commissioning	12/31/2023
Pretreatment Facility Hot Commissioning	12/31/2033
HLW Facility Hot Commissioning	12/31/2033
WTP Hot Start	12/31/2033
WTP Begin Initial Operations	12/31/2036

