



OFFICE OF
RIVER PROTECTION
United States Department of Energy

Agency Update

Oregon Hanford Cleanup Board

Presented by: Brian Harkins, Deputy Assistant Manager, Tank Farms

July 17, 2018



Mission

To safely manage the waste in Hanford's underground tanks while delivering the waste treatment capability needed for waste immobilization and final disposition.

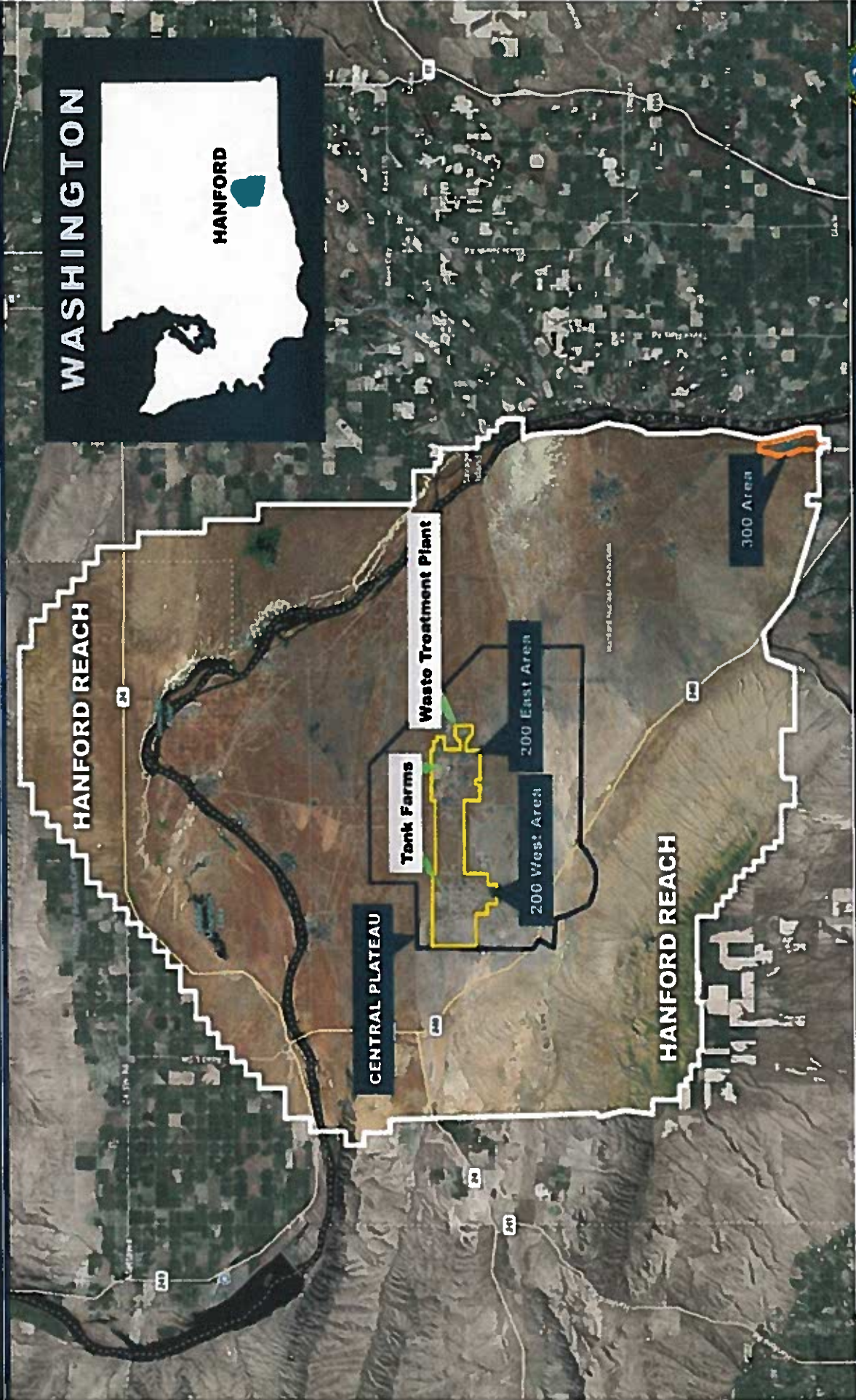
Vision

To be a high-performing and innovative organization that is safety conscious, employee-focused, and committed to successfully achieving our environmental mission safely and efficiently.





OFFICE OF
RIVER PROTECTION
United States Department of Energy





The Tank Farms

A 200 Area Aerial Overview

200 West Area

SY U AX IV I

200 East Area

AX AY B C

AV AW AX AY

AV AW

AV AW

Waste Treatment and Immobilization Plant

Single-Shell Tank Farm
Double-Shell Tank Farm





OFFICE OF
RIVER PROTECTION
United States Department of Energy

Direct Feed Low-Activity Waste (DFLAW) Update





DFLLAW

DIRECT FEED LOW-ACTIVITY WASTE

AP FARM TANKS:

AP-105 | AP-106 | AP-107 | AP-108
Feeds untreated tank waste to cesium removal systems and prepares waste for feed to the Low Activity Waste Facility

TSCR ION EXCHANGE COLUMN (IIC) STORAGE PAD

TANK SIDE CESIUM REMOVAL SYSTEM (TSCR)

An at-tank "first feed" pre-treatment technique to remove cesium and prepare LAW waste for immobilization

LOW-ACTIVITY WASTE (LAW) FACILITY

Mixes LAW feed with glass-forming materials, produces vitrified waste form in stainless steel containers for long-term storage

EFFLUENT MANAGEMENT FACILITY (EMF)

Evaporates liquid effluent from the Low-Activity Waste Facility

INTEGRATED DISPOSAL FACILITY (IDF)*

Accepts containers of vitrified low-activity waste for long-term disposal

EFFLUENT TREATMENT FACILITY (ETF)

LIQUID EFFLUENT RETENTION FACILITY (LERF)*
System providing storage and treatment for a variety of aqueous mixed waste

* A REVIEW OF THE TANK FARM PROCESS IS OUP

- ISOP Campaign
- Cesium Transport - TSCR to ISOP Storage Pad
- Integrated Tank Waste
- Pre-treated Low Activity Waste (LAW)
- Liquid Effluent Feed from LAW Facility

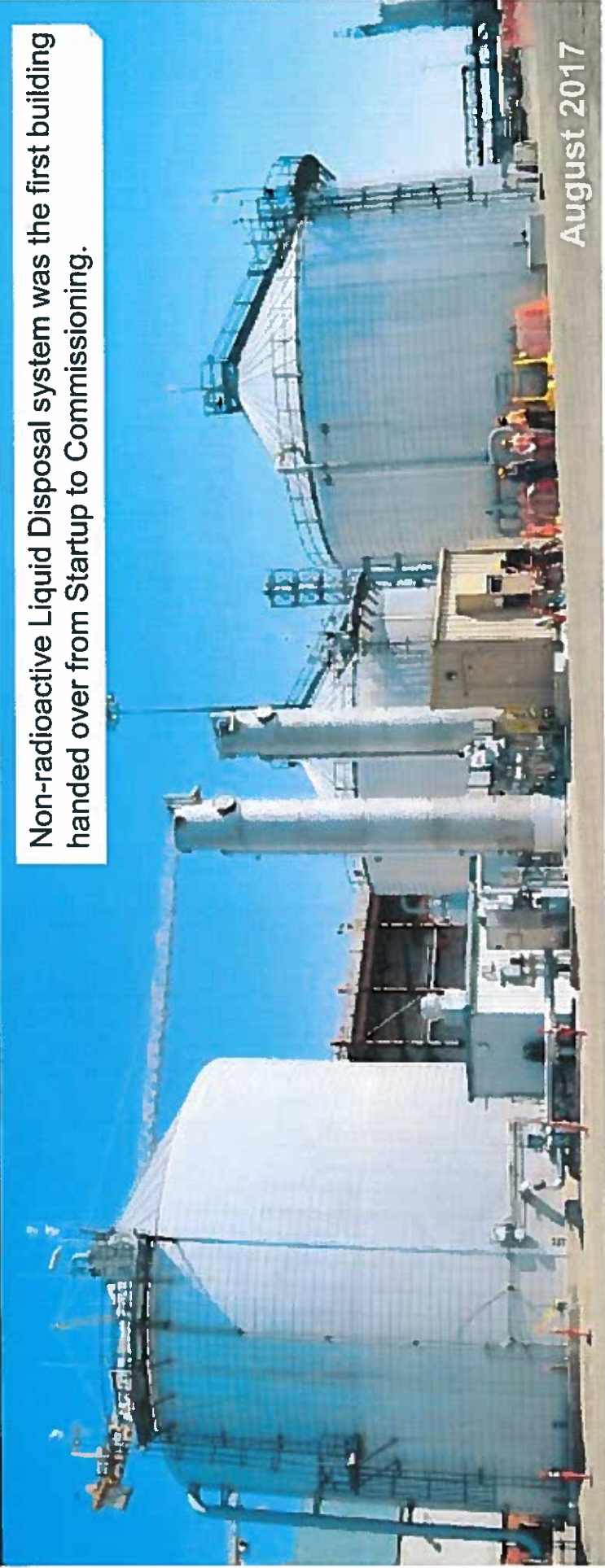


UPDATED 5-30-18





Non-radioactive Liquid Disposal system was the first building handed over from Startup to Commissioning.



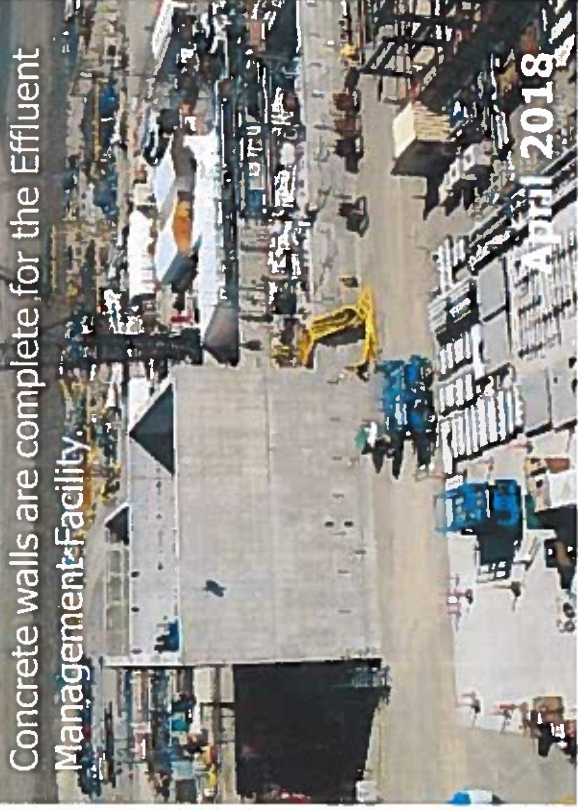
- Handover of first building to Commissioning
- 227 total DFLAW plant systems and areas
 - 104 turned over to Startup
 - 35 handed over to Plant Management

*Numbers current as of July 1, 2018

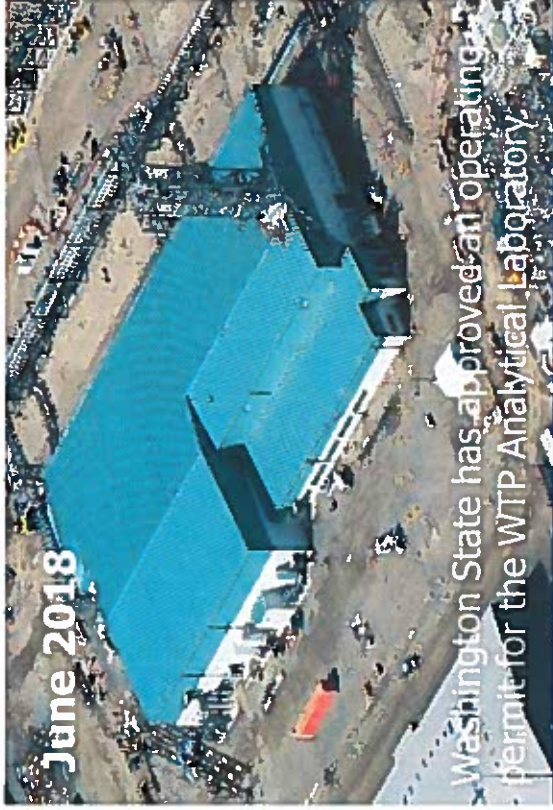




DFLAW Progress



Concrete walls are complete for the Effluent Management Facility.



Washington State has approved an operating permit for the WTP Analytical Laboratory.

- Completed concrete walls for the Effluent Management Facility
- Startup of permanent plant power to the Low-Activity Waste (LAW) Facility
- Ecology approves operating permit for Analytical Laboratory
- Working to complete LBL* Physical Plant Complete construction

*LBL = LAW Facility, Balance of Facilities, and Analytical Lab





Safety Basis Approved for LAW Facility

ORP and Bechtel participated in a DOE Safety Evaluation Report signing ceremony, which signified approval of the Low-Activity Waste Facility Documented Safety Analysis



DOE approves the LAW Documented Safety Analysis





DELTECH, INC.
www.deltech.com



Lab Demonstration Successfully Vitrifies Hanford Tank Waste

Scientists convert radioactive waste into glass in a test platform at the Pacific Northwest National Laboratory designed to mimic the Direct Feed Low-Activity Waste system being constructed at Hanford.





OFFICE OF
RIVER PROTECTION
United States Department of Energy

Tank Farms Update





OFFICE OF
RIVER PROTECTION
United States Department of Energy

A-AX Single-Shell Tank Farms



Pump removal from AX-102



Exhauster Retaining Wall



Electrical Infrastructure



Caustic/Water Line Install





- 242-A Evaporator campaign in May created about 166,000 gallons of double-shell tank space
- Met a Consent Decree milestone with delivery of new spare reboiler
- Since beginning operations in 1977, the evaporator has removed more than 84 million gallons of liquid from tank waste



New spare reboiler for 242-A Evaporator

May 2018





SX Farm Interim Barrier



SX Farm evapotranspiration basin was finished in April. It will collect evaporator water drained from new interim surface barriers to be installed later this spring over SX Tank Farm.

TANK FARMS | SX FARM

First Phase of Work Finished on Interim Barrier Project

SX Farm evapotranspiration basin, left, is roughly the size of two-and-a-half football fields.



- More than 9 million gallons of waste water has been processed at the Effluent Treatment Facility since the facility restarted in May 2016.
- Work is underway to replace the second* fabric cover for the Liquid Effluent Retention Facility's (LERF) three large storage basins (Basin 42).
- New LERF cover is expected to be installed by end of summer.
- Each of the LERF basins is permitted to hold ~7.8 million gallons of material.



Work to install a new cover for LERF Basin 42 is expected to be completed this summer.



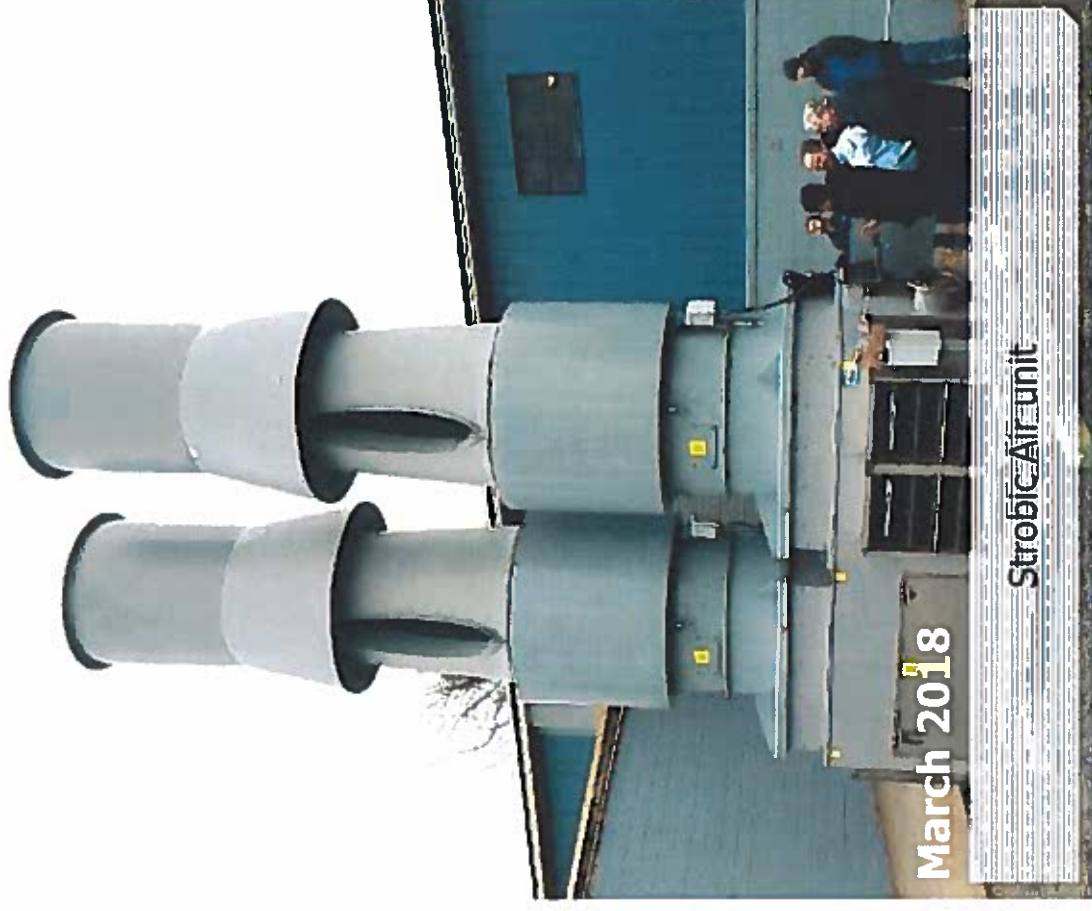
Liquid Effluent Retention Facility basins

*Note: The cover for LERF Basin 43 was replaced last summer.



Testing additional engineered controls

- Nucon thermal oxidation
- Strobic Air technologies
- Full-face air-purifying respirators approved in SY and AP farms for non-waste-disturbing work
- Working with HAMTC and third-party experts to expand use of air-purifying respirators in other double-shell tank farms
- Planned stack extension for AW Farm





OFFICE OF
RIVER PROTECTION
United States Department of Energy

Tank Integrity Program Update





Tank Integrity Program Mission & Scope

Primary objectives of the DST Integrity Program include:

- Maintain DSTs to safely store and transfer mixed radioactive waste for treatment
- Monitor tank integrity to inform management decisions
- Monitor tank corrosion

DST Integrity Program scope includes:

- Primary tank wall and annulus floor inspected (video every ~3 years, ultrasonic every ~10 years)
- Waste chemistry corrosion control laboratory testing
- Waste chemistry sampling and adjustments for corrosion mitigation
- Periodic testing, evaluation, certification of ancillary equipment (e.g., valve pits, piping)
- Structural analysis and studies for thermal, operating, and seismic loads
- Periodic testing and integrity assessment of support facilities such as the 242-A Evaporator



PTZ Camera Systems



Visual Inspection
Crawler





- AY-101, AZ-101, and AZ-102 may have held waste with chemistry similar to AY-102
- The results of this study should not be interpreted as indicating that any of the DST's are currently leaking, or will leak, from the primary liner to the secondary liner, or from the tank to the environment

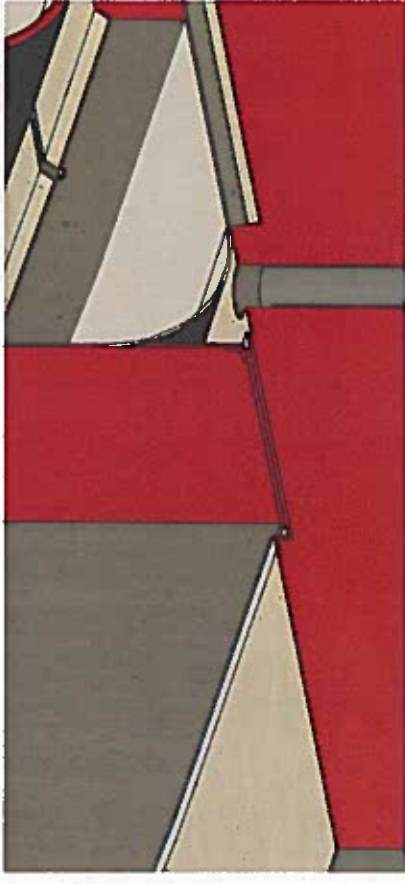
Current actions:

- Evaluating available information to assess possible implications for other tanks
- Performing core sampling of tank bottom layers to evaluate local conditions
- Revising chemistry control testing and program to improve protection against pitting corrosion
- Developing tank bottom inspection tool to provide visual and volumetric examination capability
- Identify additional characterization needs and to develop strategies to minimize the risk of leakage

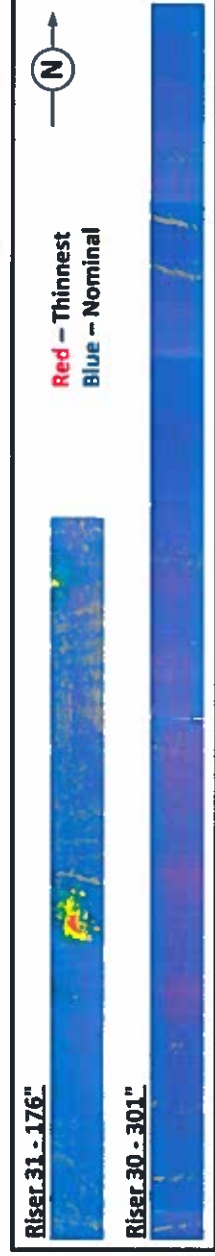
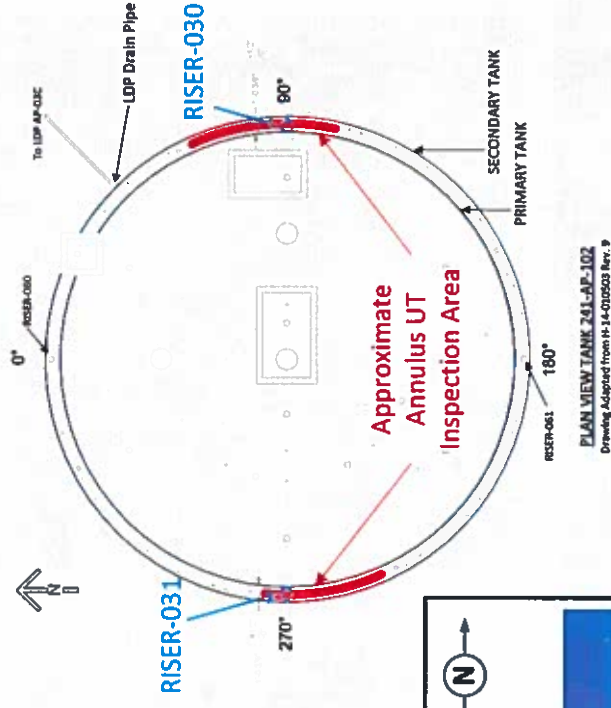


High definition visual of bottom of AY-102 indicated severe pitting – at least seven failure points have been identified

- UT scans of annulus floor began following AY-102 and as recommended by Tank Integrity Expert Panel (TIEP)
- 9 of 11 tanks tested show reduction from nominal
- Next steps include
 - Protecting DST secondary liner exteriors from water intrusion and humidity
 - Evaluating effectiveness of application of corrosion inhibitors
- Evaluation of potential tank repair techniques underway for localized areas of corrosion



Above: Close up of secondary liner



- Comprised of experts from a variety of private and government organizations, including national laboratories
- Meets at least once a year
- Provide independent advice and recommendations on existing and emerging tank integrity issues with focus on safety
- Last meeting was June 27-28



Tank Integrity Expert Panel met in June in Richland.

Current Members

- Andy Duncan, SRNL
- Brenda Garcia-Diaz, SRNL
- Russ Jones, GT Engineering
- Glenn Light, Southwest Research Institute
- Leon Stock
- Mike Rinker, PNNL
- Bob Sindelar, SRNL, Vice Chair
- Todd Martin, Chair/Facilitator



- Engaged in all facets of Hanford Tank Integrity including emerging technical findings
- In recent years, the Panel has assisted with decisions regarding the following major areas as well as many others:
 - Forensic examination of tank AY-102 failure mechanisms and repair/reuse decision
 - Chemistry control and treatment of AY-102 annulus waste
 - Expansion of secondary liner examinations and evaluation of mitigation options
 - Waste chemistry control program corrosion testing to understand and mitigate pitting corrosion of the DSTs
 - Primary tank bottom technology development of visual and volumetric solutions



- **Independent, Qualified, Registered Professional Engineer (IQRPE)**
Assessments are conducted on a periodic basis in addition to the ongoing integrity programs at Hanford
- Must be performed by IQRPE and “certified” that the “system will not collapse, rupture or fail”
- **DSTs**
 - 2016 final report issued - no findings, 24 recommendations
 - DST system is fit for use and reassessment recommended in 10 years (2026)
- **SSTs**
 - Structural assessment only
 - 2002 assessment found all SSTs structurally sound until 2018, but with no guarantee of leak integrity
 - Reassessment of structural integrity is in process with report to be issued this fiscal year (TPA Interim Milestone M-045-91I, due 9/30/2018)



OFFICE OF
RIVER PROTECTION
United States Department of Energy

Waste Treatment Plant Update





- High-Level Waste (HLW) Facility
 - Deliver active plant equipment procurements
 - Ramp up engineering design activities
- Working to resolve final three Pretreatment (PT) Facility technical issues by end of FY2018



The Pretreatment Facility (above) and the High-Level Waste Facility (below).

***"Protecting our workers,
the public, and the environment"***



The Hanford Reach
White Bluffs Overlooking the Columbia River