Managing the Interfaces for Successful Waste Treatment Operations at the River Protection Project – 15347

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ABSTRACT

The Department of Energy (DOE) is constructing the Waste Treatment and Immobilization Plant (WTP) at the Hanford site in Washington to treat and immobilize(vitrify) approximately 432 million liters (114 million gallons) of high level radioactive waste (after all single-shell retrievals are accomplished). The tank operating contractor (TOC) is charged with delivering feed, with preconditioning if required. Other Hanford contractors are charged with providing utilities and other services and waste disposal facilities. In all, four DOE contractors, two DOE offices along with DOE headquarters, and two Washington state regulators play essential roles in enabling successful treatment operations eliminate the radioactive and hazardous waste threats to the public and the environment. DOE has decided that the appropriate approach is to proceed with operations at the WTP's Low-Activity Waste (LAW) vitrification facility ahead of completing the WTP Pretreatment and High Level Waste (HLW) waste vitrification facilities, This paper outlines the approach that is being taken to ensure that all the functions, reviews, and approvals needed for radioactive operations are achieved to allow successful feed delivery, startup, and operations of the WTP in a direct feed to LAW mode. A massive effort is needed to be successful and a One System organization, jointly managed and staffed by WTP and TOC personnel is tasked with achieving the integration, coordination, tracking, and reporting necessary for the endeavor.

INTRODUCTION

The tank farms at DOE's Hanford site currently contain some 56 million gallons of waste created by plutonium production operations that began in the mid-40's. The waste is stored in 177 underground tanks, 28 newer double-shelled tanks (DSTs), and 149 single shelled tanks (SSTs). One DST and many SSTs have leaked. Ultimate disposal of this waste is by immobilization in glass, with low-activity glass product being stored permanently on site, and high-level waste glass canisters destined for a Federal geologic repository. The WTP is being designed and built by Bechtel National, Inc. to pretreat the waste and separate it into liquid (low-activity) and a high solids (high activity) streams for immobilization in LAW and HLW glass melters, respectively. The tank farms are operated by Washington River Protection Solutions, LLC, with principal responsibilities of retrieving waste from SSTs into safer DSTs, and delivering feed to WTP.

Resolution of technical issues has slowed the design and construction of the Pretreatment and HLW facilities. In light of this, DOE has developed a Framework document in 2013 [1] that outlines an approach to starting WTP operations in phases, with production of LAW glass being the first phase. DOE announced in 2014 its intent to proceed with the first phase [2] and has tasked the WTP and TOC contractors with activities to achieve this. The waste for direct feed to LAW (DF LAW) must undergo pre-conditioning by TOC to meet the waste acceptance criteria at LAW. During full WTP operations, effluents from LAW will be returned to Pretreatment. With Pretreatment unavailable, added functionality is needed at WTP to manage effluents. Figure 1 shows the overall WTP and Tank Farm complex needed for DF LAW along with WTP's Pretreatment and HLW facility that will come online later.

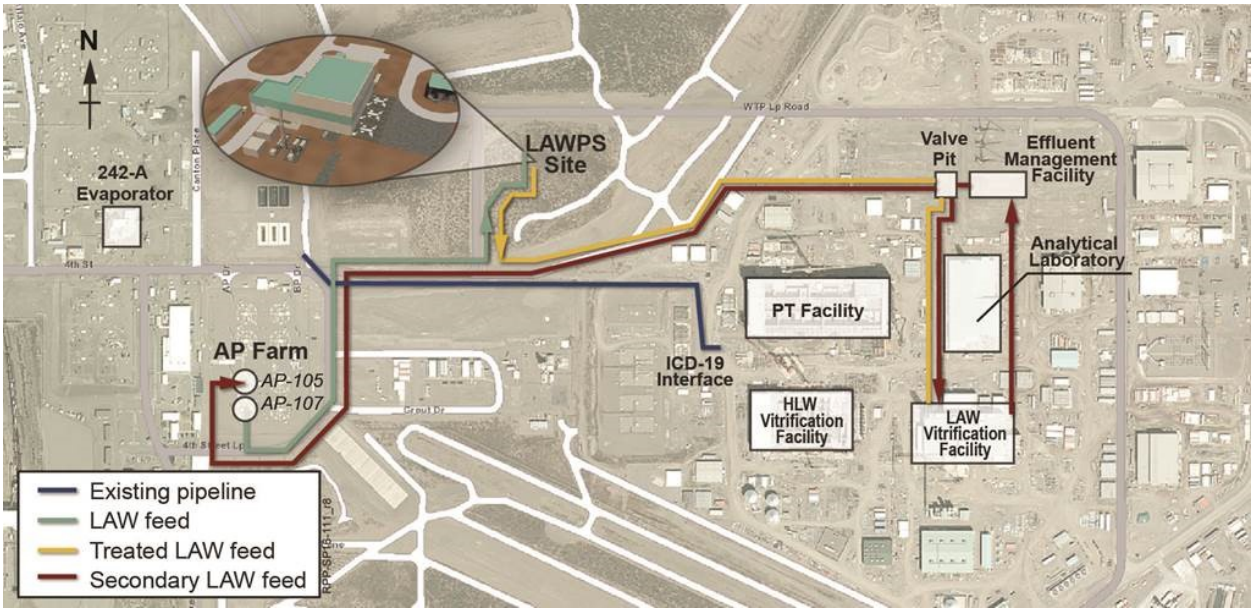

Fig. 1 WTP and Tank Farm Complex

Achieving DF LAW operations is not seen as a significant technical challenge; no new technologies are needed. The challenge is more in the programmatic areas with the various permits, approvals, and readiness evaluations required, along with a demanding schedule. Coordination of all the needed efforts along with planning, and reporting has been assigned to the One System organization in their ORP-approved charter [2]. One System is composed of WTP and TOC managers and staff. The following discussion largely reflects One System initiatives and activities. The following sections outline the efforts as follows:

- Establish the components that comprise DF LAW operations
- Assembling an integrated schedule of all the parties, departments, and agencies involved, and
- Identifying and acting on the major focus areas necessary to achieve success

DIRECT FEED TO LAW COMPONENTS

The initial step to manage and monitor the DF LAW effort is to identify all the physical components needed for DF LAW, and determine their status. There are 18 components needed for DF LAW.

The principal components needed for DF LAW are depicted in Figure 2. The components are discussed below.

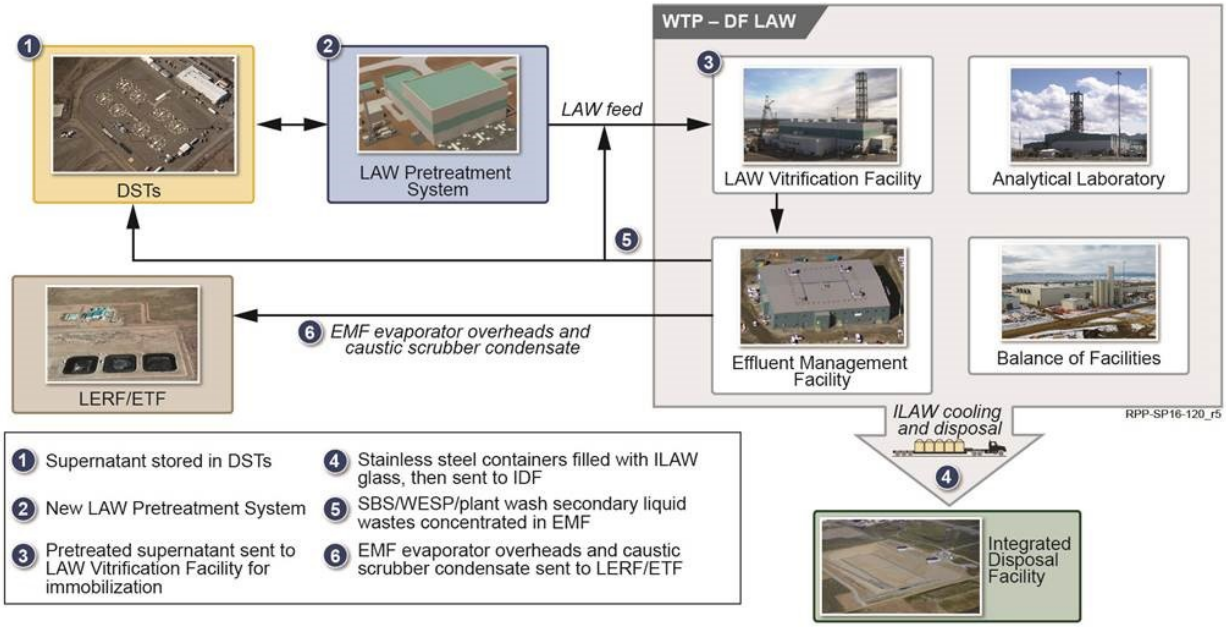

Fig. 2 Principal DF LAW Components

Waste Treatment Facilities/Functions

The WTP components DF LAW are:

- Low Activity Waste Vitrification – receives the feed and incorporates in glass-filled containers, the Effluent Management Facility (EMF) part of LAW -treats and disposes of LAW effluents in the DF LAW mode of operation
- Balance of Facility – provides services to LAW and the Laboratory facilities
- Laboratory – provides process analysis during LAW operations
- DF LAW Administration building – office space for LAW staff

Tank Farm Facilities/Functions

Tank Farm components for DF LAW are:

- Low Activity Waste Pretreatment System (LAWPS) – pre conditions feed to LAW by removing solids and cesium and supplies LAW with the treated feed.
- East Area Double-Shell Tank Farms AP 107 Upgrades – provides feed to LAWPS, and receives effluent from LAW
- 242-A Tank Waste Evaporator – concentrates waste in Tank AP-107
- 222-S Laboratory – performs analysis of waste feed to ensure the LAW waste acceptance criteria (WAC) are met
- Effluent Treatment Facility (ETF)/Liquid Effluent Retention Facility – Receives and disposes of effluents from LAW
- State Approved Land Disposal Site (SALDS) – receives liquid effluent from ETF

Facilities and Functions by Others

- Integrated Disposal Facility – (CH2 Plateau Remediation Company (CHPRC)) – receives LAW containers, spent melters, and secondary waste
- Clean Water Supply- (Mission Support Alliance (MSA)) – provides water to LAW, BOF, LAB and EMF, and LAWPS
- Electrical Substation – (MSA) – provides power to WTP facilities and PAWPS
- Sanitary Sewer – (MSA) – services LAW PS
- Roads – (MSA) – provides transportation routes to LAWPS and IDF

Assessing the Status of Facilities and Functions

Each of the facilities listed above is evaluated for its maturity to fulfil its function. Figure 3, shows an example of a project/facility status.

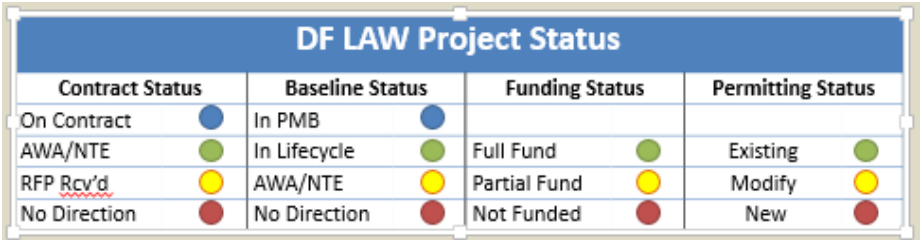

Fig. 3 DF LAW Facility/Program Status

Facility/project status is assessed in the following areas:

- Contract status
  - On contract – blue
  - Advance work authorization/not-to exceed (AWA/NTE)– green
  - Request for proposal received – yellow
  - No direction – red
- Baseline status
  - In performance management baseline – blue
  - In lifecycle - green
  - AWA/NTE – yellow
  - No direction – red
- Funding status
  - Full funding – green
  - Partial fund – yellow
  - Not funded – red
- Permitting status
  - Existing – green
  - Modify – yellow
  - New – red

Status is further indicated by the need for a readiness assessment or operational readiness review (ORR)

and whether DOE HQ approval is needed.

DIRECT FEED LAW INTEGRATED LOGIC AND SCHEDULE

With the scope defined in the flowsheet described above, a logic and schedule can be assembled and the critical path(s) determined.

Level 1 Integrated Schedule

The integrated Level 1 DF LAW schedule is divided into "swim lanes" as follows:

- Key milestones
- WTP activities – BOF, LAB, LAW, EMF, and DF LAW mods
- TOC activities – LAWPS, DST upgrades, waste incidental to reprocessing determination, performance assessment for IDF
- CHPRC activities- IDF waste acceptance criteria, design safety analysis, and permits
- MSA activities – power system upgrades, utilities to LAW PS, etc.

The Level 1 DF LAW schedule is a Primavera P6 schedule that is fed from TOC and Level 2 P6 schedules that deal with LAW PS, WTP DF LAW conceptual design, integrated permitting, and commissioning.

Key milestones in the integrated schedule include the CD-1 to 4 series for LAWPS, tank AP-107 upgrades complete, first LAW transporter delivered, LAW, BOF, and LAB construction complete, LAW start and complete cold commissioning, and LAW start and complete hot commissioning.

MAJOR FOCUS AREAS

Approvals and Authorizations

An inventory of all the approvals required for the entire DF LAW flowsheet has been developed. These are summarized in Table 1. As can be seen, there is an extensive set of approvals required from a variety of parties. The compilation helps illuminate the magnitude of submittals and eventual approvals that are needed, helps the approval agencies plan their work, and helps ORP, WTP, and TOC better plan the coordination and flow of work.

Table 1. Compilation of Approvals for DF LAW

Approval/Authorization	Number
DOE HQ Authorizations (CDs series, PA, WIR)	21
Operational Readiness Review (ORR)/Readiness Assurance (RA)	7
New permits	8
Permit Modifications	20
Other Regulatory approvals	4
Total	60

Permitting

As can be seen in Table 1, 8 new permits and 20 permit modifications are needed to begin DF LAW operations. The TOC and WTP environmental permitting staff are working with the Washington State Departments of Ecology and Health to understand what will be submitted and when so the agencies can be prepared for a significant work load, and the durations of the reviews established. A Level 2 integrated permitting schedule has been developed and shows that when the various submittals are planned and permit issues expected.

Readiness

Achieving readiness to operate all the various facilities in the DF LAW flowsheet is seen as a very significant challenge. To better prepare for the multitude of readiness activities, the One System organization has authored a Operational Readiness Support Plan [3]. The One System team is responsible for facilitation and integration of the operational readiness (OR) strategy contained in the plan, with a focus on inter-project interfaces. One System will perform assessments of readiness at interfaces and facilitate collaborative assessments of readiness consisting of joint TOC and WTP Contractor teams at key interfaces.

Implementing an OR process for nuclear facilities at WTP and tank farms, with complex technologies and interfaces, is a major undertaking. Consequently the OR strategy relies on a comprehensive, and structured, readiness process that is led by management of WTP and TOC.

Waste Management

In addition to the disposal of the primary DF LAW product, there are multiple secondary waste streams associated with the DF LAW flowsheet that need to be accommodated for successful DF LAW operations. Figure 4 some of the secondary effluent streams associated with DF LAW.

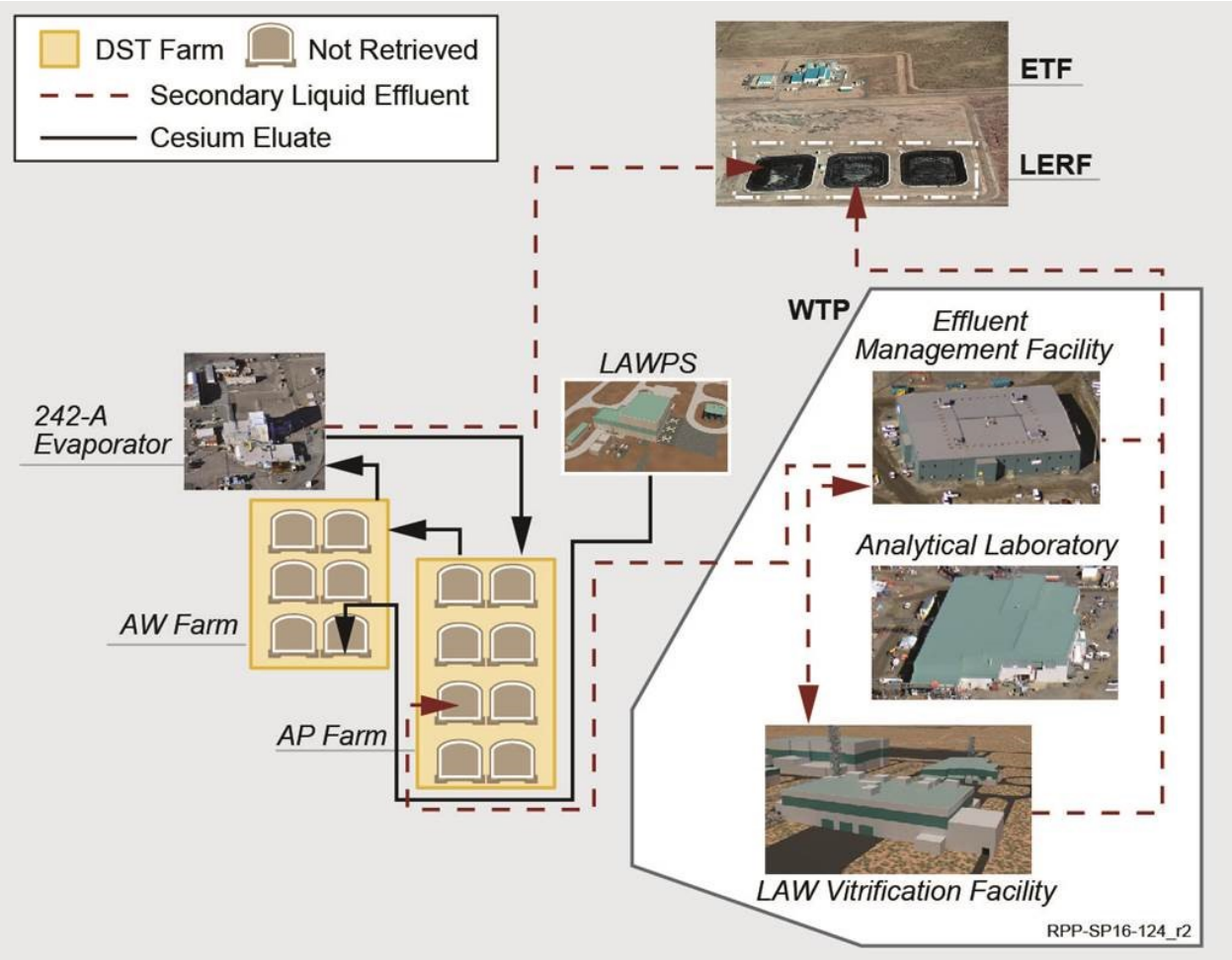

Fig. 4 DF LAW Effluent Streams

Understanding the waste streams, their characterization and quantities, and the allowable disposal location(s) for the stream is part of the overall effort to progress to successful DF LAW operation.

CONCLUSIONS

There are multiple facilities and multiple aspects of the enterprise to directly feed the WTP LAW facility. Getting a grasp of the entire picture and helping to assure that all the parts come together to make LAW glass is the responsibility of the One System organization. Important tools developed by One System to support the management of the effort are the annotated DF LAW flow diagram and the integrated Level 1 schedule that is supported by various subordinate schedules of the different aspects of the work. To help ensure success, attention must be paid to some key focus areas that include obtaining some 60 approvals from various sources, ensuring all parts of the flow sheet are ready and pass their reviews, and assuring that all secondary waste is accounted for and has a designated disposal location.

REFERENCES

1. U. S. Department of Energy, *Hanford Tank Waste Retrieval, Treatment, and Disposition Framework*, September 24, 2013.
2. U. S. Department of Energy, "Message from DOE on the Hanford Consent Decree", October 4, 2014
3. WRPS and BNI, *One System Charter*, RPP-51471, Rev. 5/24590-WTP-CH-MGT-11-008, Rev. 5
4. WRPS and BNI, *WTP Operational Readiness Support Plan*, RPP-52365/ 245990-WTP-PL-MGT-12-0006