Transitioning from Construction to Startup for the Waste Treatment and Immobilization Plant's Low-Activity Waste Facility – 17284

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ABSTRACT

The original design of the Waste Treatment and Immobilization Plant (WTP) required all waste be processed through the Pretreatment (PT) Facility in order to separate the low-activity waste and high-level waste streams. The U.S. Department of Energy (DOE), Office of River Protection (ORP) has developed a sequenced approach to completing the WTP Project, beginning with delivering some liquid waste directly to the Low-Activity Waste (LAW) Facility, bypassing the PT Facility. This operating configuration is referred to as direct-feed LAW (DFLAW). The primary driver for the DFLAW approach is to enable startup and commissioning of the LAW Facility for low-activity waste processing prior to the completion and availability of the PT and High-Level Waste facilities. In March 2016, a federal judge amended the Consent Decree[1] between DOE and the State of Washington to require completion of hot commissioning for the LAW Facility no later than December 31, 2023. During the next few years ORP and the WTP contractor will transition the project from completion of construction to the startup and commissioning phase for the LAW Facility and the associated support facilities.

The WTP contractor has developed an integrated management process to successfully conduct facility startup testing for the WTP facilities required to support DFLAW. The WTP contractor will also develop a commissioning plan and facility transition plan. These plans will describe the strategy; schedule; and requirements for safe, efficient, and sequential startup, commissioning, and transfer of the WTP facilities to an operations contractor.

The WTP contractor has also established a strategy to achieve operational readiness for the facilities required to support DFLAW consistent with DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities* and DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

ORP has established a strategy for oversight of the WTP contractor's startup, commissioning, and readiness activities. The strategy also encompasses ORP's own activities to achieve readiness.

INTRODUCTION

ORP is proceeding with the plan to operate the WTP and immobilize low-activity waste prior to completion of the PT Facility. Operating the WTP in a DFLAW configuration will begin the process of treating Hanford's tank waste and provide

[1] State of Washington v. United States Department of Energy, case 2:08-cv-05085-RMP, March 11, 2016.

tank space to sustain single-shell tank retrieval. To support DFLAW operations the LAW Facility, Analytical Laboratory, and Balance of Facilities must be completed (collectively referred to as LBL). Integrated LBL facility operations will be initiated in 2020 using waste simulants followed by hot commissioning with radioactive waste. Figure 1 shows the system configuration for DFLAW as well as interfacing facilities.

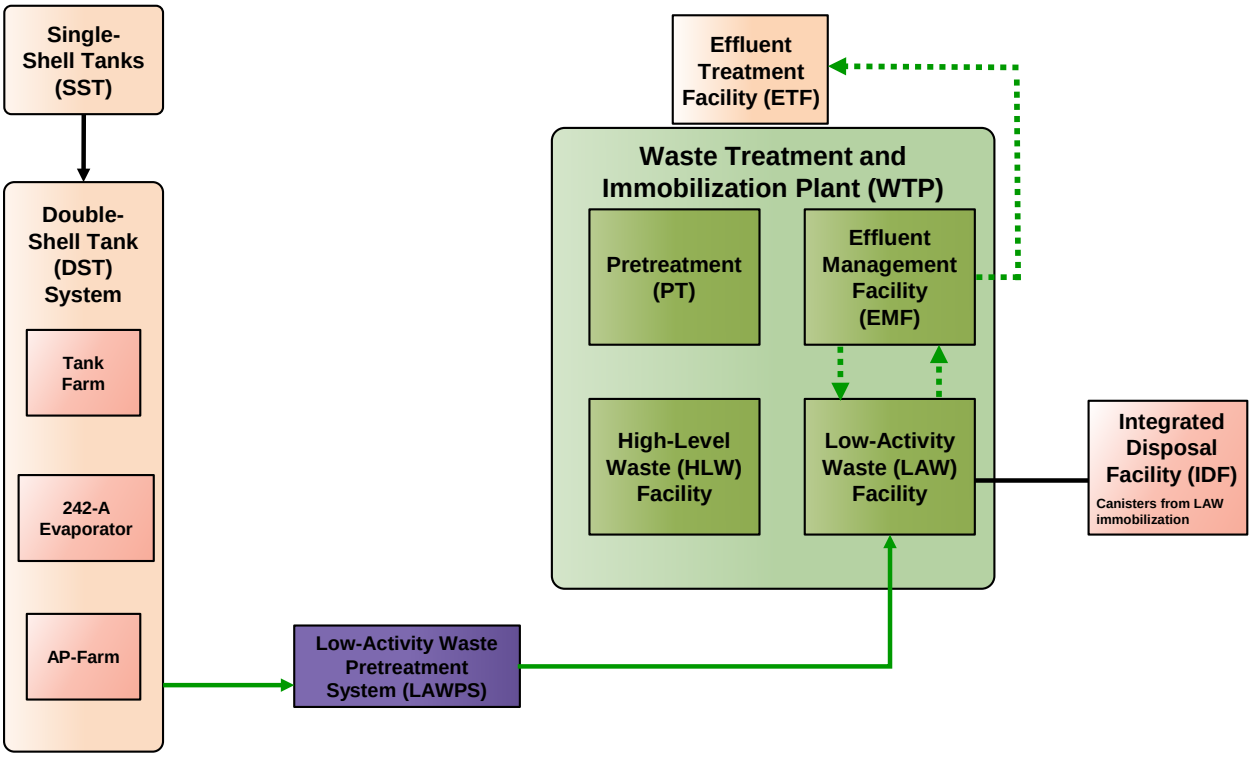

Fig. 1. Direct-Feed Low-Activity Waste Operations.

The WTP contractor has established integrated processes to perform startup, commissioning, and achieve readiness to operate as shown on Figure 2.

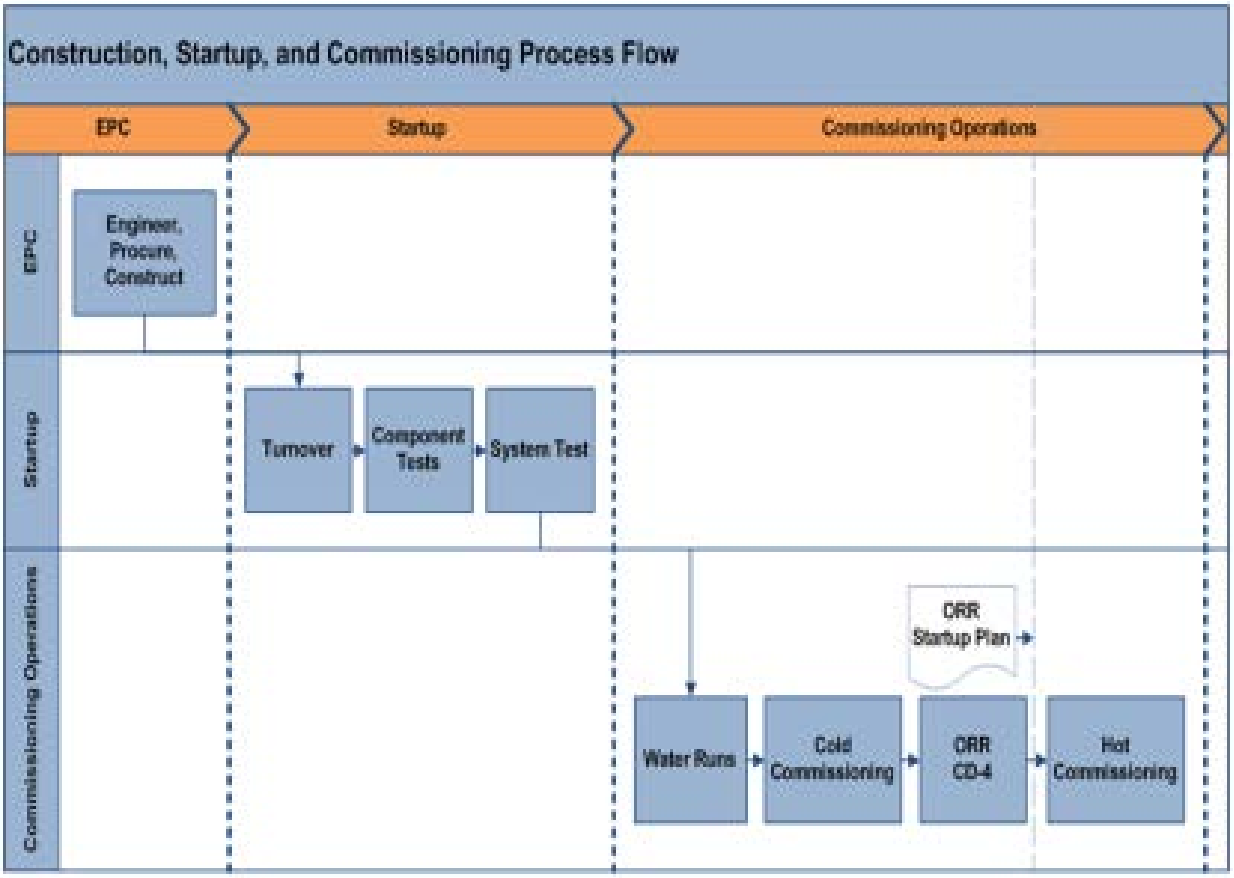

Fig. 2. Waste Treatment and Immobilization Plant Construction, Startup, and Commissioning Process Flow.

Following successful hot commissioning the LBL facilities will be transitioned to a future operations contractor.

DISCUSSION

Startup

To support the transition from construction to operations, the WTP Project has developed a series of turnover activities aiding in communication and custody control as systems transition from completion of construction to initial startup testing. These activities include system walkdowns and construction completion verifications that support a formal turnover of system custody from the construction organization to the startup organization. Following the formal acceptance of system custody the startup organization begins component and system level tests in a planned sequence to validate system performance and readiness for operations. Within each facility individual systems are tested independently to support the integrated system operation testing performed during cold commissioning of the facility.

The WTP contractor has developed an integrated management process to successfully conduct facility startup testing for the LAW Facility and supporting infrastructure, which is described in a WTP startup plan. To support startup testing, the WTP startup program must ensure:

- Systems and facilities have been constructed in accordance with the design drawings, and processes are in place to accept these systems and facilities from construction
- Contractor processes and procedures are in place to conduct startup testing and perform maintenance
- The contractor has adequately trained and qualified staff to conduct startup testing.

Initial startup efforts at the WTP Project are focused on Balance of Facilities required to provide support services prior to startup of the more complex WTP facilities. As of November 2016, the nondangerous, nonradioactive liquid drains system, WTP switchgear building (Figure 3), Balance of Facilities switchgear building, and the WTP fire protection system have transitioned from construction to startup. In September 2016, the WTP Project accomplished a significant milestone with the safe energization of the WTP switchgear medium voltage system. This accomplishment represents the beginning of a waterfall of turnover and testing activities needed to successfully prepare the WTP facilities for commissioning.

Fig. 3. Waste Treatment and Immobilization Plant Switchgear Building.

Commissioning

WTP commissioning activities to support DFLAW will follow the completion of startup testing, and integrate systems at the facility level to demonstrate facility performance and capacity. The commissioning process is performed in accordance with a commissioning plan that describes the strategy, schedule, and requirements for safe, efficient, and sequential commissioning of WTP facilities to support DFLAW operations. The commissioning process begins with integrated system water tests, followed by cold commissioning, and concludes with hot commissioning using actual tank waste. The performance of integrated system water tests within each facility demonstrates integrated system operation, and verifies facility readiness to support cold commissioning. During cold commissioning WTP facilities will operate in an integrated manner using nonradioactive chemical simulants to demonstrate facility performance capacity and regulatory environmental performance for permitted treatment systems. Following cold commissioning the WTP contractor will undergo an operational readiness review (ORR) to demonstrate operational readiness prior to the introduction of radioactive materials during hot commissioning. Hot commissioning of the WTP will demonstrate the capability to process radioactive tank waste.

As commissioning of WTP progresses the WTP contractor will also develop a facility transition plan to efficiently and safely transfer operations of the WTP facilities to an operations contractor. An operations contractor will take responsibility for WTP facility operations after the current WTP contractor has completed hot commissioning.

Readiness

Following cold commissioning and before introduction of radioactive waste feed, operational readiness activities will be performed for nuclear facilities to demonstrate readiness in accordance with the requirements of DOE O 425.1D, through the completion of a DOE Headquarters operational readiness review. Readiness management assessments will be performed for non-nuclear facilities.

ORP is responsible for a broad range of oversight and certification activities to ensure the safe and effective startup and operations of WTP facilities. The LAW Facility and associated support facilities will undergo several discrete readiness activities:

- ***LAW Facility, Analytical Laboratory, and Balance of Facilities***: Full Integrated Safety Management System (ISMS) Phase 1 verification and two emergency preparedness drills
- ***Balance of Facilities***: ISMS Phase 2 assessment and readiness management assessment
- ***LAW Facility***: ISMS Phase 2 verification, a cold commissioning readiness management assessment, a documented safety analysis independent

verification review, a management self-assessment, contractor ORR, and DOE ORR

- ***Analytical Laboratory***: Chemical assessment, ISMS Phase 2 verification and a readiness assessment.

Office of River Protection Oversight

A Certification and Verification Plan has been prepared to document the planning and actions taken by the WTP Integrated Project Team to verify readiness to begin hot commissioning and support the ORR. The Certification and Verification Plan describes ORP's process to demonstrate ORP line management's knowledge of readiness based on the day-to-day involvement in the project as detailed in DOE O 425.1D. A Line Management Review Board has been formed to oversee both WTP contractor and ORP activities planned and executed to achieve and verify readiness.

CONCLUSIONS

ORP is proceeding with the plan to operate the WTP and immobilize low-activity waste prior to completion of the PT Facility. Operating the WTP in a DFLAW configuration will begin the process of treating Hanford's tank waste and provide tank space to sustain single-shell tank retrieval. Integrated facility operations will be initiated in 2020 using waste simulants followed by hot commissioning with radioactive waste. System turnover and startup testing has begun and the LBL facilities will continue startup and turnover to commissioning and operations staff over the next 4 years.