2020 Vision for Tank Waste Cleanup (One System Integration) – 12506

Benton (Ben) Harp, Stacy Charboneau, Erik Olds
US DOE
Benton_J_Ben_Harp@orp.doe.gov, Stacy_L_Charboneau@orp.doe.gov, Theodore_E_Erik_Olds@orp.doe.gov

The mission of the Department of Energy's Office of River Protection (ORP) is to safely retrieve and treat the 56 million gallons of Hanford's tank waste and close the Tank Farms to protect the Columbia River. The millions of gallons of waste are a by-product of decades of plutonium production. After irradiated fuel rods were taken from the nuclear reactors to the processing facilities at Hanford they were exposed to a series of chemicals designed to dissolve away the rod, which enabled workers to retrieve the plutonium. Once those chemicals were exposed to the fuel rods they became radioactive and extremely hot. They also couldn't be used in this process more than once. Because the chemicals are caustic and extremely hazardous to humans and the environment, underground storage tanks were built to hold these chemicals until a more permanent solution could be found.

The Cleanup of Hanford's 56 million gallons of radioactive and chemical waste stored in 177 large underground tanks represents the Department's largest and most complex environmental remediation project. Sixty percent by volume of the nation's high-level radioactive waste is stored in the underground tanks grouped into 18 "tank farms" on Hanford's central plateau. Hanford's mission to safely remove, treat and dispose of this waste includes the construction of a first-of-its-kind Waste Treatment Plant (WTP), ongoing retrieval of waste from single-shell tanks, and building or upgrading the waste feed delivery infrastructure that will deliver the waste to and support operations of the WTP beginning in 2019.

Our discussion of the 2020 Vision for Hanford tank waste cleanup will address the significant progress made to date and ongoing activities to manage the operations of the tank farms and WTP as a single system capable of retrieving, delivering, treating and disposing Hanford's tank waste. The initiation of hot operations and subsequent full operations of the WTP are not only dependent upon the successful design and construction of the WTP, but also on appropriately preparing the tank farms and waste feed delivery infrastructure to reliably and consistently deliver waste feed to the WTP for many decades. The key components of the 2020 vision are: all WTP facilities are commissioned, turned-over and operational, achieving the earliest possible hot operations of completed WTP facilities, and supplying low-activity waste (LAW) feed directly to the LAW Facility using in-tank/near tank supplemental treatment technologies.

A One System Integrated Project Team (IPT) was recently formed to focus on developing and executing the programs that will be critical to successful waste feed

delivery and WTP startup. The team is comprised of members from Bechtel National, Inc. (BNI), Washington River Protection Solutions LLC (WRPS), and DOE-ORP and DOE-WTP. The IPT will combine WTP and WRPS capabilities in a mission-focused model that is clearly defined, empowered and cost efficient.

The genesis for this new team and much of the 2020 vision is based on the work of an earlier team that was tasked with identifying the optimum approach to startup, commissioning, and turnover of WTP facilities for operations. This team worked backwards from 2020 – a date when the project will be completed and steady-state operations will be underway – and identified success criteria to achieving safe and efficient operations of the WTP. The team was not constrained by any existing contract work scope, labor, or funding parameters. Several essential strategies were identified to effectively realize the one-system model of integrated feed stream delivery, WTP operations, and product delivery, and to accomplish the team's vision of hot operations beginning in 2016:

- Use a phased startup and turnover approach that will allow WTP facilities to be transitioned to an operational state on as short a timeline as credible.
- Align Tank Farm (TF) and WTP objectives such that feed can be supplied to the WTP when it is required for hot operations.
- Ensure immobilized waste and waste recycle streams can be received by the TF when required to support 2016 production of immobilized low-activity waste (ILAW).
- Ensure the required baseline and additional funding is provided beginning in fiscal year 2011.
- Modify TF and WTP contracts to adequately address this vision.

The 2020 Vision provides a summary of strategies and key actions that optimize the approach to startup, commissioning, and turnover of WTP facilities. This vision focuses on the legally enforceable requirement to achieve the Consent Decree milestones of starting radioactive operations in 2019, and achieving initial WTP operations in 2022.

The following principles form the foundation of the 2020 Vision:

- The opportunity to start immobilizing LAW in 2016 is possible and reduces the risk of trying to start all facilities simultaneously. Lessons learned from LAW operational startup can be applied to the more complex Pretreatment (PT) and High-Level Waste (HLW) Facilities, and experienced operational readiness review teams will be able to move from facility to facility.
- Producing LAW glass in 2016 provides a higher likelihood of the continuation of Hanford tank waste processing if the plan for PT and/or HLW Facility transition deviates from the current project baseline.
- Operational startup of the LAW Facility in 2016 introduces the possibility of transferring facilities to an operations contractor, which will reduce WTP Project costs and/or provide additional contingency to the WTP Project.

- It is assumed that the TF Interim Waste Feed Delivery and Pretreatment Systems can provide sufficient LAW feed to produce one canister of glass per day using one melter, until the permanent WTP feed delivery pathway is completed through the PT Facility. The acceleration of several existing TF projects is required to implement this 2020 Vision, which is technically achievable if sufficient funding is provided.
- The incremental costs above the current TF and WTP Project funding profiles for TF and LAW modifications to accommodate 2016 glass is reasonable and provides significant potential benefit to meeting Consent Decree milestone dates.

Other elements of the 2020 vision include, completing the facilities that will store the high-level vitrified glass and the low-activity vitrified glass, supplemental low-activity waste treatment and complete retrieval of 27 single-shell tanks in order to have ready over four million gallons of feed for the WTP.