THE HANFORD SITE

Waste Treatment and Immobilization Plant

Fact Sheet – January 2022

The U.S. Department of Energy (DOE) and contractor Bechtel National, Inc. are safely and compliantly constructing the Waste Treatment and Immobilization Plant (WTP) and associated support facilities at the Hanford Site in southeastern Washington state, in preparation for immobilizing tank waste in glass for safe long-term storage.

Overview

As originally envisioned, the Hanford Waste Treatment and Immobilization Plant (WTP) would treat high-level and low-activity radioactive waste simultaneously. To begin treating waste as soon as practicable, DOE developed a sequenced approach that would treat low-activity waste first, by the end of 2023. DOE expects to begin treating high-level waste about a decade later.

The sequenced approach is called Direct-Feed Low-Activity Waste (DFLAW). This approach sends pretreated low-activity waste from Hanford's Tank Farms directly to Hanford's Low-Activity Waste (LAW) Facility.

In the LAW Facility, low-activity waste will be mixed with glass-forming materials and then fed into two 300-ton melters and heated to 2,100 degrees Fahrenheit. The melters are approximately 20 feet by 30 feet and 16 feet high. The glass mixture will then be poured into stainless steel containers, each of which holds 6.6 tons (6 metric tons) of waste.

Several WTP infrastructure facilities, collectively called the Balance of Facilities (BOF), have been modified to support the LAW Facility and Hanford's Effluent Management Facility (EMF), which will process liquid secondary waste, called effluent, generated by the LAW Facility.

When operational, the LAW Facility will produce up to five containers of waste each day. The resulting waste containers will be disposed of at Hanford's Integrated Disposal Facility.

Background

The Hanford Site, located in southeastern Washington state, was used to produce plutonium over a 40-year period, helping end World War II and playing a major role in the nation's defense efforts during the Cold War. As a result, 56 million gallons of radioactive and chemical wastes are now stored in 177 underground tanks on the Hanford Site. To address this challenge, DOE contracted Bechtel National, Inc. to design and build the world's largest radioactive-waste treatment plant.

The WTP will use vitrification to immobilize Hanford tank waste. Vitrification involves immobilizing the waste into a solid glass form that is stable and impervious to the environment. In this form, its radioactivity will dissipate over hundreds to thousands of years.

Construction Facts for Low-Activity Waste Facility

SIZE: 330 feet by 240 feet by 90 feet tall

CONCRETE: 28,500 cubic yards

STRUCTURAL STEEL: 6,200 tons

HVAC DUCTWORK: 943,500 pounds

PIPING: 103,000 linear feet

ELECTRICAL CABLE: 843,000 feet

CRAFT HOURS TO BUILD: 2,337,000 hours

Waste Treatment and Immobilization Plant (cont.)

LOW-ACTIVITY WASTE FACILITY CONTROL ROOM

Workers safely monitor WTP systems from inside a computerized control room in an annex completed in 2019 as part of the plant's LAW Facility. The control room is the heart of the DFLAW process. In the control room, trained and qualified workers monitor and control systems for the Analytical laboratory (LAB), LAW Facility, and BOF using sophisticated software. They will also conduct startup testing and commissioning activities for these facilities until the plant is approved to begin processing Hanford's radioactive waste – as early as 2023.

EFFLUENT MANAGEMENT FACILITY

The EMF will handle the liquid secondary waste, called effluent, generated by the LAW Facility melters treatment system. The EMF is the final major construction effort to support the DFLAW process.

During low-activity waste vitrification, effluent is generated from the melter offgas system and when transfer pipes are flushed. These liquids go to the EMF processing building, where excess water is evaporated, and the remaining concentrate is sent back into the vitrification process.

The EMF contains three structures: a main processing building, an electrical powerhouse, and a utility systems building.

BALANCE OF FACILITIES

The various support utilities needed to support WTP operations include systems for electrical power distribution, backup power, compressed air, steam, chilled water, fire water, and communication and control, among others.

To support DFLAW, certain BOF systems have been scaled down to levels appropriate to the program's lower operational demands, compared to capacities that will be needed during full plant operations. For example, the steam plant will use fewer boilers to support DFLAW, resulting in energy and cost efficiencies.

ANALYTICAL LABORATORY

The LAB's key function is to ensure glass produced by the LAW Facility meets all regulatory requirements and standards. During DFLAW operations, LAB technicians will analyze approximately 3,000 waste samples each year.

Analyses will confirm the correct glass-forming "recipe" needed to produce a consistent glass product. Samples will also be taken throughout the vitrification process to confirm a high-quality glass product and sound process controls. The WTP facilities can be viewed using the self-guided Hanford Virtual Tour.