Overview

WASTE TREATMENT AND IMMOBILIZATION PLANT

BACKGROUND

The Hanford Site, located in southeastern Washington State, was the largest of three defense production sites in the U.S. Over the span of 40 years, it was used to produce 64-metric tons of plutonium, helping end World War II and playing a major role in military 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, the U.S. Department of Energy contracted Bechtel National, Inc., to design and build the world's largest radioactive waste treatment plant. The Hanford Waste Treatment and Immobilization Plant (WTP), also known as the “Vit Plant,” will use vitrification to immobilize most of Hanford's waste. Vitrification involves blending the waste with glass-forming materials, and heating it to high temperature to form molten glass, then pouring it into stainless steel canisters. In this glass form, its radioactivity will dissipate over hundreds to thousands of years.

THE WASTE TREATMENT TREATMENT AND IMMOBILIZATION PLANT

The WTP will cover 65 acres with four nuclear facilities – Pretreatment, High-Level Waste Facility, Low-Activity Waste Facility and an Analytical Laboratory – as well as operations and maintenance buildings, utilities, and office space. Site preparation began in October 2001, and the concrete for the first nuclear facility’s foundation was placed in July 2002.

CONSTRUCTION FACTS

» Concrete .................. 262,000 cu. yds.
   Enough to fill 26,200 Concrete Trucks!

» Structural Steel .............. 36,500 tons
   Equivalent of three Eiffel Towers!

» HVAC Ductwork .............. 2,100 tons

» Piping ...................... 1,017,000 linear ft
   More than 192 miles!

» Electrical Cable ............... 4,762,000 ft
   More than 900 miles!

FOR MORE INFORMATION PLEASE VISIT: www.hanfordvitplant.com | www.hanfordvitplantsafety.com

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WASTE TREATMENT PROCESS FLOW

PRETREATMENT FACILITY

The first treatment step in the waste treatment process is pumping the waste from the underground storage tanks through a buried pipeline to the Pretreatment Facility. Pretreatment separates the low-activity radioactive waste from the high-level radioactive waste.

Low-activity waste is the liquid portion of the tank waste. It contains a relatively small amount of radioactivity in a large volume of material.

High-level waste is primarily in the solids of the tank waste. It contains most of the radioactivity in a relatively small volume of material.

During pretreatment, the waste is concentrated by removing water in an evaporator. Solids are filtered out, and remaining soluble highly radioactive isotopes are removed by ion exchange.

LOW-ACTIVITY WASTE FACILITY

The pretreated wastes go to separate Low-Activity Waste and High-Level Waste Facilities. Handling the wastes separately speeds treatment because high volumes of low-activity waste can be processed faster than the high-level waste.

The waste goes into a melter preparation vessel where silica and other glass-forming materials are added and the mixture is fed into one of two melters. The mixture is heated to 2,100 degrees Fahrenheit by passing electricity through it, a process known as joule heating. The molten mixture is then poured into large stainless steel containers.

The filled low-activity waste containers are 4 feet in diameter, 7 feet tall, and weigh more than 7 tons. The containers will be stored at Hanford in permitted trenches covered with soil.

HIGH-LEVEL WASTE VITRIFICATION FACILITY

High-level waste from the Pretreatment Facility is mixed with glass-forming materials and vitrified in two melters of similar design to the low-activity waste melters.

High-level vitrified waste is poured into stainless steel canisters that are 2 feet in diameter and about 14 feet tall. The filled high-level waste canisters, each weighing more than 4 tons, will be temporarily stored at Hanford. Eventually, the high-level waste containers will be shipped to a federal geological repository deep underground for permanent disposal.