

Defense Waste Processing Facility

The largest radioactive waste glassification plant in the world, the Defense Waste Processing Facility (DWPF) converts the liquid nuclear waste currently stored at the Savannah River Site (SRS) into a solid glass form suitable for long-term storage and disposal.

Scientists have long considered this glassification process, called “vitrification,” as the preferred option for treating liquid nuclear waste. By immobilizing the radioactivity in glass, the DWPF reduces the risks associated with the continued storage of liquid nuclear waste at SRS and prepares the waste for ultimate disposal in a federal repository. About 36 million gallons of liquid nuclear wastes are now stored in 49 underground carbon-steel tanks at SRS. This waste has about 400 million curies of radioactivity, of which the vast majority will be vitrified at DWPF.



Construction of the DWPF began in late 1983, and it began radioactive operations in March 1996. To complete its waste vitrification mission, the DWPF is projected to produce approximately 6,000 canisters by the year 2019.

Waste Feed To DWPF

The liquid nuclear waste in tank storage exists in two forms: a sludge form and a salt form. DWPF is designed to treat the high-activity radionuclides from both forms of waste. The sludge form, while comprising only about 10 percent of the volume in the tanks, contains about half of the radioactivity. The salt form, which readily dissolves in water, comprises about 90 percent of the volume and contains the balance of the radioactivity. Before being sent to DWPF, the salt waste will be treated at the Salt Waste Processing Facility (SWPF), which is projected to become operational between 2013 and 2015. SWPF will process the majority of the salt waste inventory at SRS. Until SWPF is operational, interim salt waste processing will be conducted via the Modular Caustic Side Solvent Extraction (MCU) Unit and the Actinide Removal Process (ARP), both located in H Tank Farm.



DWPF Operations

DWPF presently is vitrifying sludge from the liquid nuclear waste currently in tank storage along with the cesium and strontium from the salt forms in the waste. In this process, a sand-like borosilicate glass (called “frit”) is mixed with the waste and sent to the plant’s 65-ton steel and ceramic melter. In the melter, electricity is used to heat the waste / frit mixture to nearly 2,100 degrees Fahrenheit until molten. This molten glass-waste mixture is poured, in a pencil-thin stream, into stainless steel canisters to cool and harden.

Each canister is 10 feet tall and 2 feet in diameter, and it typically takes a little over a day to fill one canister. A filled DWPF canister weighs about 5,000 pounds.

After filling, the exterior of each canister is blasted with a frit-water mixture to remove contamination. A stainless steel plug is fitted into the neck of each filled canister, and the canister is welded shut using an electrical current of 250,000 amps applied for 1.5 seconds, while 80,000 pounds of force simultaneously rams the plug into the neck of the canister. The resulting weld is as strong as the three-eighths-inch thick stainless steel canister itself.

Moving Canisters to Temporary Storage

A specially designed vehicle, called the Shielded Canister Transporter, moves each sealed canister, one at a time, from DWPF to one of two Glass Waste Storage Buildings adjacent to the facility. This transporter, more than 18 feet tall, 25 feet long and weighting 235,000 pounds, is a two-wheel drive vehicle powered by redundant diesel engines. It has a center module with a shielding cask, floor plug cavity and associated canister lifting equipment. At DWPF, the transporter draws canisters up into the shielded cask for the short trip to the storage building.

At the storage buildings, canisters are lowered by the transporter into an underground reinforced concrete vault. In these seismically qualified vaults, the Site has the capacity to safely store about 4,590 canisters. More storage buildings can be built, if necessary.

The canisters will be temporarily stored at SRS until a federal repository is established.

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