

Facts

from the **Savannah River Site**

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Defense Waste Processing Facility

The Defense Waste Processing Facility (DWPF) is the only operating radioactive waste glassification plant in the nation. This facility, which began radioactive operations in March 1996, uses a vitrification process to convert high-activity radioactive liquid waste stored at the Savannah River Site (SRS) into a solid glass form suitable for long-term storage and disposal.

Scientists have long considered vitrification as the preferred option for treating radioactive liquid waste. By immobilizing the radioactivity in glass, DWPF reduces the risks associated with the continued storage of liquid waste at SRS and prepares the waste for final disposal in a future federal repository. Approximately 34 million gallons of liquid waste is stored in the remaining 43 underground carbon-steel waste tanks at SRS. This waste contains approximately 230 million curies of radioactivity.

To complete its waste vitrification mission, DWPF is projected to produce approximately 8,000.

Waste Feed

Radioactive liquid waste in tank storage exists in essentially two forms: a sludge form and a salt form. DWPF is designed to treat the high-activity radionuclides from both forms of this waste. The sludge form, while comprising less than 10 percent of the volume in the tanks, contains slightly less than 50 percent of the radioactivity. The salt form comprises more than 90 percent of the volume and contains the balance of the radioactivity. Prior to the Salt Waste Processing Facility (SWPF) beginning operations in 2021, the Actinide Removal Process (ARP) and the Modular Caustic Side Solvent Extraction Unit (MCU) decontaminated the salt solution feed from the site's tank farms. The high-activity radionuclides were transferred to DWPF for vitrification, while the decontaminated salt solution was pumped to the Saltstone Production Facility. These facilities piloted the technology now used at SWPF.



DWPF began radioactive operations in March 1996.



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DWPF Operations

DWPF is vitrifying sludge from the radioactive liquid waste stored in waste tanks, along with actinides, cesium, and strontium removed from the salt forms in the waste. In this vitrification process, a sand-like borosilicate glass (called “frit”) is mixed with the waste and sent to the plant’s 75-ton steel and ceramic melter. The melter is a refractory-lined stainless-steel vessel surrounded by a water-cooled jacket. 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 weighs approximately 1,000 pounds when empty and approximately 5,000 pounds when filled. Filling one canister can take approximately one day.

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

Temporary Storage

The canisters containing vitrified high-activity waste produced at DWPF are currently stored onsite in one of two Glass Waste Storage Buildings (GWSB). GWSB 1 consists of a below-grade seismically qualified concrete vault containing support frames for

vertical storage of 2,262 standard canisters. Beginning in May 1996, canisters were stored in GWSB 1. In 2015, the existing design of GWSB 1 was reevaluated and determined through several studies that with some minor modifications to the shielded storage plug and removal of the canister support crossbars that a second canister could be safely stored on top of the first one. Subsequently, canisters were moved from GWSB 2 to the converted storage locations in GWSB 1. This innovation, which is recognized as Canister Double-Stack Project, increased the available storage capacity in GWSB 1 to 4,524 canisters.

GWSB 2, with a similar design to GWSB 1, has 2,340 canister storage locations. The first canister was placed in GWSB 2 on July 10, 2006. Double-stack modifications like GWSB1 are planned for GWSB 2 and will increase the capacity to 4,680 canisters. The canisters will be stored on site until a federal repository is identified.

A specially designed vehicle, called the Shielded Canister Transporter, moves each sealed canister, one at a time, from DWPF to the GWSBs. This transporter, more than 18 feet tall, 25 feet long and weighing 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 a GWSB. At the GWSB, the transporter lowers each canister into an underground, reinforced, seismically qualified concrete vault.

Please visit <https://www.youtube.com/watch?v=rESXUcSeQYU> for more information about DWPF.



Workers use a special forklift to move an empty canister for its inspection at DWPF. The canister will be filled with vitrified high-level waste.



The Shielded Canister Transporter is used to move filled canisters to storage inside the Glass Waste Storage Buildings.



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