



Plutonium Finishing Plant

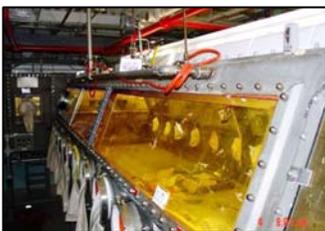
Restore the River Corridor - Transition the Central Plateau - Prepare for the Future



Unloading unirradiated fuel pins from storage container to load into configuration for shipping.



Disposition of SNM: Polycube (plutonium immobilized in polystyrene) source after removal from container (insert) followed by thermal stabilization to recover SNM from organic matrix.



Glove box HA-20MB in the 234-5Z Facility after cleanout



Robot used for legacy plutonium holdup removal in Plutonium Reclamation Facility Canyon

Background

Hanford's first plutonium processing facility (231-Z) produced the plutonium for the 1945 atomic bomb that ended World War II. From 1949 to 1989, U.S. Department of Energy (DOE) contractors operated the Plutonium Finishing Plant (PFP) to process plutonium nitrate solutions into a solid form (hockey puck-sized "buttons" or oxide powder) for shipment to the nation's weapons production facilities, producing more plutonium metal buttons than any other American facility.

At the end of the Cold War, many of the defense nuclear material production lines were shut down with material still in various stages of the production process. This left Hanford with a sizeable inventory of material in forms too unstable to be suitable for long-term storage. In addition to buttons and oxides, PFP facilities contained plutonium-bearing nitric acid solutions, polycubes (plutonium fixed in polystyrene cubes), and residues from various processes. If improperly handled, plutonium materials pose a health danger to workers through inhalation or ingestion in addition to the risk of an uncontrolled nuclear reaction (called a criticality). In March 2004, workers completed the stabilization and packaging of PFP's inventory of nearly 18 metric tons of plutonium-bearing materials three months ahead of the Defense Nuclear Facilities Safety Board (DNFSB) milestone and were fully prepared to begin shipment of the inventory offsite. Once PFP's plutonium-bearing materials were stabilized and packaged, workers began the process of dismantling the PFP complex -- essentially taking it down to slab-on-grade condition.

Scope

The scope of the PFP Closure Project includes ending the special nuclear material storage mission through plutonium and fuel deinventory, in addition to facility cleanout, deactivation, decontamination, and dismantlement (D&D) of the PFP complex to a clean slab-on-grade condition. Clean slab-on-grade is defined as a concrete slab (typically the first floor of a building) resting on grade (earth) that is free of dispersible radiological contamination. This requires breaking down and packaging for disposal about 250 hoods/glove boxes, 6,000 feet of ventilation ducting, miles of process, drain, and vacuum piping along with thousands of valves, pumps, tanks, and other equipment that supported plutonium finishing operations. In all, some 58 buildings/facilities will be cleaned out and leveled -- eliminating the threat posed by the PFP complex to Hanford workers and the surrounding environment. To date, all stabilization and closure project milestones have been met by the PFP Closure Project. The target date in the current baseline is to achieve clean slab-on-grade by September 30, 2016.

Progress

Special Nuclear Material Inventory Disposition:

February 2004 – DNFSB Recommendation 94-1/200-1: Stabilized and packaged nearly 18 metric tons of plutonium-bearing materials for long-term storage, thereby completing the last of the DNFSB milestones for PFP. This action facilitated the planned deinventory and closure of PFP.

April 2005 - International Atomic Energy Agency (IAEA) substituted material at Savannah River Site (SRS) K-Area Material Storage (KAMS) facility and de-selected more than 99 percent of Hanford's IAEA safeguarded inventory. This simplified the anticipated Hanford plutonium deinventory.

Plutonium Finishing Plant

July 2006 – Disposition of VIPAC fuel pins as waste to Waste Isolation Pilot Plant (WIPP) saved considerable handling shipment, storage, and disposition cost.

September 2006 – Dispositioned a wide variety of Special Nuclear Materials from five decades of plant laboratory and processing operations. This reduced the working inventory to the minimum set of sources and standards needed for deinventory and D&D material non-destructive assays.

March 2007 – Developed capability to leak test 9,975 containers used to ship plutonium inventory.

PFP Facility Decontamination and Demolition: Completed demolition of 20 of the 58 facilities within the PFP complex.

Highlights and milestones include:

December 2004 – TPA Milestone M-083-31, last transfer from 241-Z liquid waste facility to tank farms was completed six months ahead of the milestone date. This marked the final transfer from a Hanford operating facility to the tank farms.

Spring 2005 – First manned entry in 12 years into the Plutonium Reclamation Facility (PRF) canyon, supporting legacy plutonium holdup removal and decontamination and decommissioning activities.

June 2005 – TPA Milestone MX-83-12-T01, high risk legacy plutonium holdup removal was completed more than 15 months ahead of the milestone. Completion facilitated elimination of the Material Access Area in the major processing facility, 234-5Z, allowing decontamination and decommissioning work to be completed more efficiently.

July 2006 – TPA Milestone M-083-40, decontamination and demolition of 232-Z, the scrap incinerator building for the process of plutonium recovery from ash was completed nine weeks ahead of the milestone date.

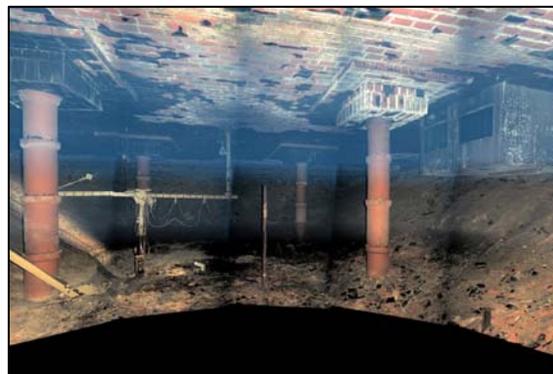
September 2006 – Completed cleanout, packaging and shipment of 230 plutonium nitrate solution containers (PR Cans) to the Central Waste Complex for final disposition at WIPP in New Mexico.

February 2007 – TPA Milestone M-83-32, closure of RCRA Treatment, Storage, and Disposal facility at 241-Z was completed more than four years ahead of the milestone date.

June 2007 – TPA Milestone M-83-42, decontamination and demolition to slab-on-grade of 241-Z liquid waste storage facility complex was completed four years and four months ahead of the September 30, 2011 milestone date. The project difficulty was increased due to difficult access to the below-grade tank enclosures with high airborne contamination.

Summer 2007 – Initiated characterization of 216-Z-9, a below-grade covered trench facility for direct disposal of liquid waste to the soil column. From 1955 to closure in 1962, the trench received about one million gallons of plutonium/uranium solvent-extraction waste effluent. The facility was modified to allow removal of the top layer of plutonium-contaminated soil in the late 1980s. Panoramic photographs of the enclosed cavern and the underside of the concrete slab roof were obtained via a robotic crawler-mounted camera.

August 2007 – Half of the gloveboxes/hoods in the major PFP processing facility (234-5Z) have been either removed or decontaminated to low-level waste criteria. Five gloveboxes/hoods have been removed, 63 have been decontaminated to low-level waste criteria, and 107 have had internal equipment removed.



216-Z-9 Liquid Waste Disposal Facility in 1976 (left) prior to soil removal and in 2007 (right) via composite digital image taken by a remote camera mounted on a crib crawler (note fallen roof tiles).

For more
information



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