

# Plutonium Finishing Plant passed halfway mark

**T**he Plutonium Finishing Plant complex, managed by the Fluor Hanford Nuclear Material Stabilization Project, reached a significant milestone this past year when it completed stabilizing more than half of its large collection of special nuclear material product items and leftovers from decades of nuclear weapons production. Stabilizing plutonium involves several processes — thermal treatment, removal of corrosion products and repackaging into sturdy containers approved for long-term storage or disposal.

Even as the project concentrated on important processing work, it developed an accelerated deactivation plan to complete cleaning out the 61 structures in the PFP complex seven years early. PFP's deactivation organization increased fieldwork, flushed and removed 21 chemical tanks and hundreds of feet of related piping, removed "held up" plutonium within plant systems and demolished unnecessary structures. Additional demolition work is now under way, along with expedited planning, to meet an accelerated goal to ready the complex for overall razing by September 2006.



Lead nuclear chemical operator Kathy Turner works at a glovebox where plutonium-bearing polycubes are being thermally stabilized.

The PFP Deactivation team also met a Tri-Party Agreement milestone when it submitted a PFP Residual Chemical Hazards Assessment to DOE and the Washington State Department of Ecology. Additionally, the team completed or advanced several other key pieces of environmental documentation.

Most importantly, PFP performed its work safely. In November, employees reached a million safe hours without a day lost to an injury. During fiscal year 2002, PFP reduced its restricted and recordable injury rates (as measured by Occupational Safety and Health Administration standards) by 20 percent from the previous fiscal year. PFP director Scott Sax is proudest of the fact that, although the plant quadrupled its plutonium stabilization rate twice between 2000 and 2002, the average radiation dose to workers actually went down.

## Plutonium solutions complete

In July 2002, PFP workers completed stabilizing about 4,500 liters of plutonium-bearing solutions (bearing 300-400 kilograms of plutonium) into dry oxide form, using an oxalate precipitation process followed by thermal treatment. Packaged into sturdy new cans and stored in vaults in the PFP complex, the oxides derived from higher-concentration solutions are now ready for shipment to the Savannah River Site. The solutions-stabilization campaign, one of the plant's most beneficial, completed a key commitment to the Defense Nuclear Facilities Safety Board. Stabilizing solutions is important because solutions are the form of plutonium most susceptible to accidents.

"The completion of the solutions-stabilization campaign improved the safety posture of the entire PFP complex," said George Jackson, Fluor Hanford vice president for the Nuclear Material Stabilization Project. "It also allowed us to clearly see that the work being done here at PFP has real, quantifiable, safety-related results."

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# Plutonium Finishing Plant passed halfway mark, cont.

## Residues

Stabilization of plutonium residues is more than 93 percent complete. In February 2002, PFP workers completed repackaging approximately 547 items of plutonium-laced ash from a historic Hanford incinerator. The ash was placed into slip-lid cans and packaged into pipe overpack containers, called POCs, through a “pipe-and-go” method.

The residues team also completed repackaging another large subgroup of residues, known as sand, slag and crucible, ahead of schedule. Workers expect to finish the remaining residue inventory in the spring.

## Metals, oxides and polycubes

After completing the stabilization and repackaging of plutonium metals at the plant in 2001, PFP workers turned to stabilizing the largest group of materials at the facility. Plutonium oxides, in various forms, constitute nearly half of the plutonium-bearing materials, by bulk, in the PFP complex. Following thermal stabilization, oxides are packaged into “3013” containers, which are triple-layered, robust stainless-steel cans designed for 50 years of safe storage. Workers have packaged about 35 percent of the oxide inventory and expect to finish in about a year. The welded cans are safely stored in the PFP vaults awaiting final disposition at the Savannah River Site or an alternate storage location.

Within certain oxides groups, some items contain high amounts of chloride salts. Because of the difficult challenges posed by these materials, PFP personnel have been carefully studying methods to drive off undesirable materials and process the chlorides safely. Stabilization of chloride-bearing items is expected to begin in March.

Also in 2002, PFP workers began stabilizing plutonium-laced polycubes — tiny cubes of polystyrene containing plutonium oxide that were once used for criticality experiments at Hanford. Stabilizing polycubes, which contain high-purity plutonium oxide, is unique to PFP. It involves a thermal process that is very delicate. Preliminary tests showed that if the polycubes were heated too quickly, they could burn. The burning would produce soot and flammable gases that could plug filters, resulting in costly filter replacements and system maintenance, leading to additional worker radiation exposure.

Early in the campaign, scientists at Pacific Northwest National Laboratory and workers at PFP’s Process Laboratory conducted extensive research before carefully revising the process, using Integrated Safety Management System principles. After the polycubes are thermally stabilized into an oxide form, they are packaged through a “bagless transfer system” into stainless-steel containers and placed in long-term storage cans. Polycube processing provides a real dose reduction in areas where they had been stored.

Polycube stabilization is now about 75 percent complete, and personnel expect to finish ahead of the April completion target.

In November 2002, DOE and Fluor Hanford signed a challenging new set of performance agreements for the Nuclear Material Stabilization Project. The agreements accelerate the final completion date for stabilizing all 17.8 metric tons of plutonium-bearing materials at PFP to February 2004. ■



A vented plastic bag containing a billet can packed with plutonium-bearing residues rests inside a pipe overpack container. Once the container is sealed, the material is ready for final disposition.