



U.S. Department of Energy  
Richland Operations Office  
and Office of River Protection

# Hanford Site



## Strategic Initiative 3:

# Accelerate Stabilization and De-Inventory of Nuclear Materials

At the end of the Cold War and Hanford's defense production mission, the site was left with a sizeable inventory of unstable materials for which ongoing safety and security measures cost us hundreds of millions of dollars each year. This inventory includes spent nuclear fuel, plutonium, and other materials in forms that are unstable or currently unsuitable for long-term storage or disposition.

This initiative is aimed at significantly reducing near-term risk by stabilizing these materials, packaging them into long-term storage containers, and either shipping them offsite for final disposal or consolidating them into facilities offering more protection through passive measures to greatly reduce the annual cost to manage the waste and maintain safety systems.

### Spent Nuclear Fuel

About 80% (2,100 metric tons) of DOE's spent nuclear fuel inventory is at Hanford. Stranded in water-filled, leak-prone pools at the K-East and K-West basins along the Columbia River when reprocessing was halted in the late 1980s, the fuel is deteriorating. In December 2000, we moved the first fuel out of the K-West basin and into an engineered canister, conditioned it for dry storage, and placed it into the Canister Storage Building on the Central Plateau for safe long-term storage until it can be shipped to a national geologic repository for disposal. As part of accelerated risk reduction, we have set a target completion date of September 2006 - 10 months early - and are incentivizing our contractor (Fluor Hanford) to meet or beat it by working basin transition activities in parallel with fuel and sludge removal, and looking for new approaches to basin decontamination and decommissioning. We will continue to ensure we maintain strict quality and safety controls. Beginning in 2018, we will retrieve the K-Basin spent nuclear fuel from its temporary storage in the Canister Storage Building and ship it to a national geologic repository for permanent disposal.



The annex building construction, adjacent to the north wall of the K-East Basin is part of the Spent Nuclear Fuel Project's fuel transfer system.

### Plutonium Finishing Plant

One of the greatest environmental and security risks at Hanford is the approximately 18 metric tons of plutonium-bearing materials in various forms, such as metal, oxides, solutions, polycubes, and residues, at the Plutonium Finishing Plant (PFP). These materials must be stabilized using different processes, appropriately repackaged into stainless steel containers designed for 50 years of safe storage, and shipped to other DOE sites for reuse, long-term storage, or final disposition. Currently, PFP is mid-way through a stabilization and packaging campaign, which is scheduled to be completed by May 2004. In addition to the



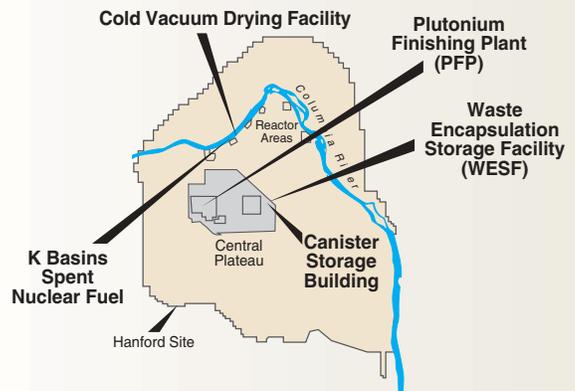
Billet cans are placed into pipe overpack containers for shipment to the Central Waste Complex.



Plutonium Finishing Plant personnel weigh the oxalic acid to be added the precipitator.

plutonium-bearing material stored in the vaults, there is plutonium material in hundreds of gloveboxes and miles of exhaust ventilation ducts that must be retrieved, packaged, and disposed. Accelerating the removal of plutonium allows us to accelerate the clean out and demolition of the 50 structures that make up the PFP complex.

## HIGHLIGHTS



To accelerate risk reduction we will:

- Accelerate from 2014 to 2005 shipments of Hanford's stabilized plutonium to DOE's Savannah River Site or an alternative secure location.
- Develop a contingency option to ensure the plutonium materials can be shipped from PFP on a schedule that will not impact the deactivation and removal of the facility structures.
- Characterize, remove, package, and disposition sufficient amounts of the plutonium held up in equipment, glove boxes, and ventilation systems to eliminate the security protected area at PFP by 2006.
- Accelerate deinventory of PFP, including shipping the slightly irradiated and non-irradiated plutonium/uranium oxide fuel currently stored at PFP.
- Accelerate from 2016 to 2009 the clean out and demolition of approximately 60 buildings/structures, saving over \$500 million in lifecycle costs, including a \$100 million annual mortgage cost.

## Cesium and Strontium Capsules

Hanford's 1,936 cesium and strontium capsules, with about 130 million curies of radioactivity (about 37% of the site's total radioactivity), contain stable cesium and strontium salts produced approximately 20 years ago from tank waste materials. The salts are sealed in stainless steel containers. The capsules are stored in water-cooled pool cells at the Waste Encapsulation and Storage Facility on the Central Plateau and have a high-thermal output and high-radiation dose rate. The water removes heat and provides radiation shielding.

A joint DOE, contractor, and regulator group evaluated a number of options for accelerating capsule disposition offsite and reducing lifecycle costs associated with the capsules. The group identified potentially viable alternatives to the current baseline including shipping the capsules directly to a national geologic repository, which eliminates the need for the capsules to be vitrified and saves hundreds of millions of dollars.



*Capsules in water-cooled pool cells at the Waste Encapsulation Storage Facility.*

We believe it will be possible to lower worker exposure, reduce security vulnerabilities, and achieve lifecycle cost savings by placing the capsules into dry storage by 2008 and subsequently disposing of them in a national geologic repository. The dry storage configuration will provide conductive or convective cooling, as well as adequate shielding to reduce radiation exposures and ensure safe, secure storage. However, we need to resolve a number of issues before we can pursue this approach with full confidence. Accordingly, we plan to conduct additional evaluations to determine possible merits of interim dry storage and concurrently work with regulators to establish capsule packaging and other protocols required for the material's non-vitrified offsite disposal. Our goal is to make a decision on better storage and a disposition pathway for the capsules by early 2004.