Overview and History of DOE's Hanford Site -12502

Karen Flynn, Matt McCormick
karen.flynn@rl.doe.gov
matthew.mccormick@rl.doe.gov
US DOE

Hanford's DOE offices are responsible for one of the largest nuclear cleanup efforts in the world, cleaning up the legacy of nearly five decades of nuclear weapons production. Nowhere in the DOE Complex is cleanup more challenging than at the Hanford Site in southeastern Washington. Hanford cleanup entails remediation of hundreds of large complex hazardous waste sites; disposition of nine production reactors and the preservation of one as a National Historic Landmark; demolition of hundreds of contaminated facilities including five enormous process canyons; remediation of billions of gallons of contaminated groundwater; disposition of millions of tons of low-level, mixed low-level, and transuranic waste; disposition of significant quantities of special nuclear material; storage and ultimate disposition of irradiated nuclear fuel; remediation of contamination deep in the soil that could impact groundwater; decontamination and decommissioning of hundreds of buildings and structures; and treatment of 56 million gallons of radioactive waste in 177 large underground tanks through the construction of a first-of-its-kind Waste Treatment Plant.

Cleanup of the Hanford Site is a complex and challenging undertaking. The DOE Richland Operations Office has a vision and a strategy for completing Hanford's cleanup including the transition to post-cleanup activities. Information on the strategy is outlined in the Hanford Site Completion Framework. The framework describes three major components of cleanup – River Corridor, Central Plateau, and Tank Waste. It provides the context for individual cleanup actions by describing the key challenges and approaches for the decisions needed to complete cleanup.

The U.S. Department of Energy (DOE), as regulated by the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology), is implementing a strategy to achieve final cleanup decisions for the River Corridor portion of the Hanford Site. The DOE Richland Operations Office (RL) and DOE Office of River Protection (ORP) have prepared this document to describe the strategy and to begin developing the approach for making cleanup decisions for the remainder of the Hanford Site.

DOE's intent is that the Completion Framework document will facilitate dialogue among the Tri-Parties and with Hanford's diverse interest groups, including Tribal Nations, State of Oregon, Hanford Advisory Board, Natural Resource Trustees, and the public. Future cleanup decisions will be enhanced by an improved understanding of the challenges facing cleanup and a common understanding of the goals and approaches for cleanup completion.

The overarching goals for cleanup are sevenfold.

- Goal 1: Protect the Columbia River.

- Goal 2: Restore groundwater to its beneficial use to protect human health, the environment, and the Columbia River.
- Goal 3: Clean up River Corridor waste sites and facilities to: Protect groundwater and the Columbia River. Shrink the active cleanup footprint to the Central Plateau, and support anticipated future uses of the land.
- Goal 4: Clean up Central Plateau waste sites, tank farms, and facilities to: Protect groundwater. Minimize the footprint of areas requiring long-term waste management activities. Support anticipated future uses of the land.
- Goal 5: Safely manage and transfer legacy materials scheduled for off-site disposition including special nuclear material (including plutonium), spent nuclear fuel, transuranic waste, and immobilized high-level waste.
- Goal 6: Consolidate waste treatment, storage, and disposal operations on the Central Plateau.
- Goal 7: Develop and implement institutional controls and long-term stewardship activities that protect human health, the environment, and Hanford's unique cultural, historical and ecological resources after cleanup activities are completed.

These goals embody more than 20 years of dialogue among the Tri-Party Agencies, Tribal Nations, State of Oregon, stakeholders, and the public. They carry forward key values captured in forums such as the Hanford Future Site Uses Working Group, Tank Waste Task Force, Hanford Summits, and Hanford Advisory Board Exposure Scenario Workshops, as well as more than 200 advice letters issued by the Hanford Advisory Board (http://www.hanford.gov/page.cfm/hab). These goals help guide all aspects of Hanford Site cleanup. Cleanup activities at various areas of the site support the achievement of one or more of these goals. These goals help set priorities to apply resources and sequence cleanup efforts for the greatest benefit.

These goals reflect DOE's recognition that the Columbia River is a critical resource for the people and ecology of the Pacific Northwest. The 50-mile stretch of the river known as the Hanford Reach is home to the last free-flowing section of the river in the U.S. As one of the largest rivers in North America, its waters support a multitude of uses that are vital to the economic and environmental well being of the region and it is particularly important in sustaining the culture of Native Americans. Cleanup actions must protect this river.

Hanford Cleanup Challenges

The United States Department of Energy's Hanford Site sits on 586-square-miles in the desert of southeastern Washington State. The area is home to nine former nuclear reactors and their associated processing facilities that were built beginning in 1943. The reactors were used to produce plutonium, a man-made, radioactive, chemical element which was needed for atomic weapons associated with America's defense program during World War II and throughout the Cold War. Plutonium from Hanford was used in the Fat Man bomb which was dropped on Nagasaki, Japan in August of 1945 and helped to end World War II.

Hanford reactors produced plutonium from 1944 until 1987. Today, Hanford workers are involved in an environmental cleanup project of immense proportions necessitated by the processes required to transform raw uranium into plutonium for bombs. These

processes generated billions of gallons of liquid waste and millions of tons of solid waste which must now be cleaned up, removed, or remediated.

In 1989, the Department of Energy joined with the Washington State Department of Ecology and the U.S. Environmental Protection Agency in signing the Hanford Federal Facility Agreement and Consent Order more commonly known as the Tri-Party Agreement. This document outlines legally enforceable milestones for Hanford cleanup over the next several decades. The Tri-Party Agreement, also referred to as the TPA, is a living document that is regularly reviewed to confirm completion of milestone requirements or to make adjustments in scheduled dates when milestones are to be completed.

There are two local Department of Energy offices associated with Hanford cleanup. The Richland Operations Office (RL) oversees the projects associated with cleaning up the reactors, the soil, the groundwater, and the solid waste burial sites. RL also manages the demolition of facilities, and the disposition of the remaining plutonium left on the Hanford Site. The Office of River Protection (ORP) is the agency tasked with managing the liquid and semi-solid nuclear and chemical waste that is currently stored in 177 underground tanks on the Site. ORP is also in charge of constructing the Waste Treatment Plant, a massive complex of structures located in central Hanford that will combine the wastes from these tanks with glass making materials in a process called vitrification. By vitrifying the waste, it makes the material more stable and allows for the waste to be safely stored in a permanent repository away from Hanford. Some of the vitrified waste may also be stored at the Integrated Disposal Facility on the Site.

While there are fewer than 500 federal government employees who staff the three Department of Energy offices at Hanford, there are thousands of other workers at the Site who are employed by contractors or subcontractors of the three DOE offices.

A fact sheet has been developed that talks about Hanford's challenges and progress at: http://www.hanford.gov/files.cfm/Fact_Sheet_Cleanup_Progress_at_Hanford_08_2011.pdf

Recovery Act Accomplishments

The Richland Operations Office received an allocation of $1.635 billion in funding through the American Recovery and Reinvestment Act. We were chosen to receive this money in large part due to the contract structure we have in place at the Hanford Site and the amount of environmental cleanup work we have to accomplish. In addition, we identified a number of projects that could be completed safely over a two-year span of time, used proven technologies, and would accelerate footprint reduction efforts at the site. We broke the efforts into our area-by-area structure already in place.

On the River Corridor work included facility demolition, waste site remediation, and the containment and treatment of contaminated groundwater. The projects supported completing cleanup along the Columbia River and shrinking the active area of cleanup to the center of the Hanford Site (the Central Plateau) by 2015.

On the Central Plateau projects selected included establishing a regulatory framework for cleanup of the Central Plateau Outer Zone, demolishing facilities, and cleaning up waste sites. These projects supported shrinking the active area of cleanup to an even smaller area in the center of the site, the Central Plateau Inner Zone. On the Central Plateau Inner Zone projects selected include demolishing facilities, expanding a major

treatment system for contaminated groundwater, retrieving and disposing of solid waste, and expanding operations of the site's mixed, low-level radioactive waste disposal facility to allow it to accommodate more trucks hauling cleanup debris from across the site. These projects supported containing contamination on the Central Plateau to keep it from moving toward the Columbia River, reducing long-term cleanup costs by demolishing facilities sooner, and increasing solid waste and disposal facility operations to support additional cleanup activities across the site.

Through September 2011, the Hanford Site reduced its environmental footprint by 66 percent, or 385 square miles, exceeding a goal of 49 percent, or 290 square miles.

In addition, 3,290 workers were hired and trained to do environmental cleanup work safely and efficiently.

These workers not only met the Recovery Act goals set out for them, but exceeded the cleanup goals in nearly every category, such as facilities demolished, waste sites remediated, and cubic meters of solid waste retrieved and shipped.

A fact sheet has been developed that details the accomplishments achieved at the Hanford Site using funds from the American Recovery and Reinvestment Act of 2009: **http://www.hanford.gov/files.cfm/ARRAHanford_Sept_11Update.pdf**

Implementing the 2015 Vision

Hanford officials have developed a road map for finishing the cleanup activities on the 220-square-mile River Corridor portion of the Site by the year 2015. Called the 2015 Vision, the cleanup projects extend along the shore of the Columbia River from north of Richland to the far boundary of the Site near Highway 240 and the Vernita Bridge. The work includes cleanup of the 300 Area (the manufacturing and laboratory parts of the Site) and the 100 Area (the reactors along the river).

The 2015 Vision reflects the desire shared between officials with the Department of Energy, the Environmental Protection Agency, and the Washington Department of Ecology to protect the Columbia River from Hanford contamination. As part of the plan, more than 235 facilities will be decommissioned, deactivated, decontaminated, and demolished. 300 waste sites will be remediated. More than 4.6 million tons of waste and debris will be sent to Hanford's landfill, the Environmental Restoration Disposal Facility.

Cleaning up these high priority facilities and burial grounds associated with the Vision will also mean that some adjacent, lower priority projects can be done at the same time. In doing so, Hanford's cleanup dollars can go further, resulting in cleanup work being done more effectively and efficiently.

As projects are completed along the River Corridor, there won't be as much of a need for utilities, roads to be maintained, or surveillance to be conducted in those areas. Put another way, it will free up money that can be used toward cleaning up other places at Hanford that are not associated with the River Corridor project.

When the River Corridor projects are cleaned up, workers can shift their attention to the Central Plateau region of Hanford. This part of the Site, consisting of the 200 East, 200

West, and 200 North Areas, is home to a majority of Hanford's solid waste burial grounds and underground liquid waste storage tanks. It makes up about 75 square miles of the Site, which will be the last area of Hanford that will be cleaned up.

Here's a link to the graphical version of the 2015 Vision:
http://www.hanford.gov/files.cfm/2015_Vision.pdf

The Hanford Story

Telling the Hanford Story is key part of how we involved the public. Hanford Site public tour programs have been extremely successful. The sitewide public tour program consistently fills up all 2,000 seats in the span of a few hours of registration being open. As a way to reach a public that might not be able to make the tour of Hanford and to further educate the public about the Hanford Site, the Hanford Story was developed. The Emmy award winning video called the "Hanford Story" describes the challenges that exist and the progress being made at Hanford. It can be found on the Hanford Site's YouTube Page at: http://www.youtube.com/watch?feature=player_popout&v=rbd-xaYd4rs