

Cleaning up Hanford's Nuclear Waste



The largest environmental cleanup program in the world is taking place along the banks of the Columbia River, just 35 miles north of the Oregon border.



Hazardous working conditions are common for Hanford workers

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Hanford played key role in America's nuclear defense

For more than 40 years, the federal government produced plutonium for America's nuclear weapons program at the Hanford nuclear site in southeastern Washington. That process created large amounts of radioactive and chemically hazardous waste. Since plutonium production ended in 1989, the focus at Hanford has shifted to waste cleanup.

Why Oregon is working to clean up Hanford

Oregon has a tremendous stake in ensuring the safe and timely cleanup of Hanford. The Oregon border is only 35 miles from the site. The Columbia River flows through Hanford and continues past prime Oregon farmlands and fisheries. Radioactive and chemical contamination poses a potential long-term threat to the river and species such as salmon and steelhead.

Though Oregon has no regulatory authority at Hanford, the federal government recognizes the Oregon Department of Energy (ODOE) as a critical, objective voice in technical reviews and policy discussions related to the cleanup. The Oregon Hanford Cleanup Board also provides input to the United States Department of Energy (USDOE) and its regulators on the cleanup. The Board is a 20-member advisory group, and includes 10 citizen members, six state legislators, and representatives from the Governor's Office, the Confederated Tribes of the Umatilla Indian Reservation, and two state agencies. ODOE staff and the Board keep key cleanup issues visible; hold the USDOE and its contractors accountable; bring Hanford issues to the public; and convey that the cleanup is a *regional* issue and that Oregon has a stake in the outcome. Oregon's primary role at Hanford is to ensure that cleanup decisions are protective of the Columbia River.

Extent of the problem

More than 1,900 distinct waste sites have been identified at Hanford, ranging from small areas of surface contamination to hundreds of solid waste burial grounds. There are hundreds of contaminated facilities, including nine nuclear production reactors, laboratories, and large chemical reprocessing plants. An estimated 444 billion gallons of contaminated liquid was dumped into the soil, causing extensive contamination of Hanford's groundwater. The most hazardous of the liquid waste was pumped to 177 underground storage tanks.

During Hanford's operating years, it was assumed that the disposal of most of the waste into the soil was permanent. However, the spread of contamination from the liquid waste disposal—and the need to remove solid waste near the Columbia River and elsewhere—necessitated the need to remove waste.

Hanford workers often deal with high levels of radioactivity or chemical contamination that requires them to use remote-handled equipment or robotics. Sometimes the workers must be completely covered with protective suits and breathing apparatus. In some cases, the waste is unique to Hanford and the methods and equipment necessary to deal with the waste have to be created before cleanup can occur.

Cleanup is progressing at Hanford

After somewhat of a slow start, there has been considerable progress with the Hanford cleanup – especially over the past decade. However, the extent of the contamination is so widespread, and some of the challenges so difficult, that USDOE expects cleanup to continue for another 40 years or more.

USDOE, which owns and operates the Hanford site, has made significant progress on several Oregon cleanup priorities. Work has focused in recent years along the Columbia River shoreline. The cleanup of burial grounds, waste sites and contaminated buildings along the river corridor should be nearly complete by 2015.

USDOE is expanding groundwater treatment programs along the river and elsewhere on site. Weapons-grade plutonium was stabilized for long-term storage and removed from the site. Progress continues on construction of the Waste Treatment Plant, a massive collection of facilities to immobilize Hanford's 53 million gallons of high-level waste stored in 177 aging underground storage tanks. At least 67 of the waste storage tanks have leaked an estimated one million gallons of highly radioactive waste into the soil. The tanks are beyond their life expectancy and become less able to contain waste as they age.

Dealing with the tank waste is the most complex and costly challenge at Hanford. The Waste Treatment Plant, once constructed and operating, will permanently immobilize the waste through a process called *vitrification*. In this process, plant workers add glass-forming materials to the waste under heat to form molten glass. The molten material will then be poured into stainless steel containers, where the glass would cool and harden. The waste will still be radioactive, but no longer mobile and able to easily spread into and through the environment. The most highly radioactive portion of the vitrified waste is intended to eventually be taken from Hanford and disposed in a deep geologic repository. The less radioactive portion of the vitrified waste will be buried at Hanford.

Vitrification is a proven technology that is being used elsewhere in the United States and Europe. The chemical complexity and massive quantity of waste at Hanford require Hanford's facilities to be larger and more complex than other facilities.

The Waste Treatment Plant is scheduled to begin start-up operations in 2019. It is expected to take until 2022 to reach full operations, and then take 25 years to vitrify all of Hanford's tank waste.



One of Hanford's nine plutonium production reactors