
Richland ♦ Kennewick ♦ Pasco ♦ West Richland ♦ Benton County ♦ Port of Benton

Background

The Hanford Site is a U.S. Department of Energy (USDOE) owned, contractor-operated facility located near Richland in the southeastern portion of Washington State. The 586-square-mile site supports programs in waste management, environmental restoration, science, technology and energy. Hanford was established during World War II to produce plutonium for America's defense program. After more than 40 years of nuclear materials production, approximately 450 billion gallons of liquids were released to the ground at the Hanford Site. Many contaminants carried by these liquids remain in the **vadose zone**, the area between the top of the water table and the surface of the ground. Some contaminants have reached groundwater and some have reached the Columbia River.

Sources of Groundwater Contamination

During operations, liquid wastes were disposed into the ground because it was assumed that the arid desert soil would trap most contaminants, preventing them from reaching the groundwater. Disposal sites include pits, burial trenches and landfills where wastes in barrels and boxes were buried and underground storage tanks where 67 single-shell tanks are known or suspected to have leaked about one million gallons of liquid wastes. Also, nuclear production facilities disposed of liquid wastes and cooling water directly to cribs, ponds and trenches.

Groundwater Management Plan

USDOE and state and federal regulators share a commitment to protect the continuing high quality of the Columbia River by completing Hanford cleanup. USDOE has developed an Integrated Groundwater and Vadose Zone Management Plan in consultation with state and federal regulators, stakeholders and local tribes. This plan calls for the achievement of four major objectives:

Stop Key Contaminants from Reaching the Columbia River

While USDOE recognizes it is not possible to stop all contamination from entering the river, its goal is to reduce the concentration of contaminants entering the river to below levels that can cause harm. Contaminants in groundwater adjacent to the river include chromium, strontium-90 and uranium.

Reduce Mass of Contaminants in Central Plateau Groundwater

Groundwater contaminants of concern beneath the Central Plateau (200 Area) include uranium, technetium-99 and carbon tetrachloride. Actions in these areas have been underway for more than 10 years to reduce the mass and contain the spread of these contaminants in the groundwater.

Reduce Recharge to Groundwater and Control Migration of Contaminant Sources

Water infiltrating into the vadose zone can carry contaminants deeper into the soil. Therefore, USDOE has taken extensive steps to eliminate on-site discharges of water and leaking water lines.

Monitor Groundwater

Groundwater monitoring is an integral part of the Groundwater Remediation Project. The objectives are to assess the nature and extent of contamination, identify any releases of contaminants from regulated units, and evaluate the performance of remedial actions. Additional monitoring wells continue to be installed to meet these objectives.

Groundwater Cleanup

Substantial progress was achieved in reducing contamination of the river during the past twelve years. Liquid discharge to the soil was stopped; high-risk waste sites were removed; irradiated fuel

at the K Basins was removed; and 6½ million tons of contaminated soil from along the river were moved to a lined landfill.

Some of the interim remedial actions used in the past were very successful in removing contaminants from the groundwater. USDOE has pump and treat facilities in place to remove chromium from the aquifer before it reaches the Columbia River. Also, a new treatment system being tested in the 100 K Area removes water contaminated with hexavalent chromium from the aquifer. The contaminated water is sent through ion-exchange resins, which absorb chromium from the water. The treated water can then be safely returned to the aquifer.

Some interim remedial actions were not as effective as expected. For example, in the 300 Area, it was anticipated that a process called monitored natural attenuation would restore the groundwater once contaminated materials were removed from the waste sites. When that did not work as well as expected, USDOE began steps to identify and propose a new treatment method to clean up uranium in the 300 Area groundwater.

Funding for New Technology

Enhanced and continued funding for technology development is critical for groundwater remediation. This year, in direct response to community involvement, Hanford Advisory Board and tribal input, Congress appropriated \$10 million in funding for technology development for the following groundwater cleanup projects:

- Hexavalent chromium in 100-D and 100-K
- Strontium-90 in the 100-N Area
- Carbon Tetrachloride in the 200 Area
- Uranium in the 300 Area

One of the new technologies being used in the 100-N Area to prevent strontium-90 from reaching the Columbia River is called an apatite sequestration barrier. Calcium and phosphate are pumped into the soil and the interaction between them creates a chemical barrier that binds the strontium-90 in the soil by switching strontium with calcium in the mineral apatite. Apatite prevents strontium from reaching the river until substantial radioactive decay has taken place.

Groundwater's Impact on the Columbia River

Much of the ongoing work at Hanford is focused specifically on minimizing the impact of Hanford groundwater to the Columbia River. Despite those efforts, some contaminated groundwater does discharge to the river. Areas along the shore and in the river bottom immediately adjacent to discharge sites are impacted. The Columbia River remains a Class A river that allows all uses—from recreation to drinking water for downstream communities. USDOE and state and federal regulators will continue to monitor the river to assure the river water's high standards.

Columbia River Monitoring

Routine samples of river shore soil, plants and wildlife, river water, bottom sediment and aquatic animal and plant life are collected and analyzed for radionuclides and hazardous chemicals. USDOE contracts with the Pacific Northwest National Laboratory (PNNL) to monitor radioactivity in the environment around the Hanford Site. The findings are presented in the Hanford Site Environmental Report. This report is available at the following website:

www.pnl.gov/main/publications/external/technical_reports/PNNL-15892sum.pdf.

The Washington State Department of Health (DOH) also does monitoring, meeting regularly with PNNL to select a subset of samples that both organizations will collect and independently analyze. The results are compared in a report published each year titled, "Hanford Environmental Oversight Program Data Summary Report." This report is available at:

<http://www.doh.wa.gov/ehp/rp/environmental/#hanfordover>

DOH also maintains 26 radiation monitoring stations along the Columbia River and performs studies of radioactivity in the environment. One study conducted with PNNL, the Washington Department of Ecology and the State of Oregon, addressed radioactivity on the shoreline and in sediment behind the dams on the Columbia River.

To find out how you can become more involved in this important regional issue, or to have a Hanford Communities speaker talk to your organization, contact the Hanford Communities at (509) 942-7348 or by fax at (509) 942-7379. Our website is www.ci.richland.wa.us/richland/hanford