PNNL-15222-SUM

Summary of the HANFORD SITE Environmental Report for Calendar Year 2004

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SEPTEMBER 2005

Prepared for the U.S. Department of Energy by
Pacific Northwest National Laboratory
under contract DE-AC05-76RL01830, with
contributions from Bechtel Hanford, Inc. and its
subcontractors; Bechtel National, Inc.; CH2M HILL
Hanford Group, Inc.; and Fluor Hanford, Inc. and its
subcontractors

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Pacific Northwest National Laboratory

Operated by Battelle for the U.S. Department of Energy

under Contract DE-AC05-76RL01830

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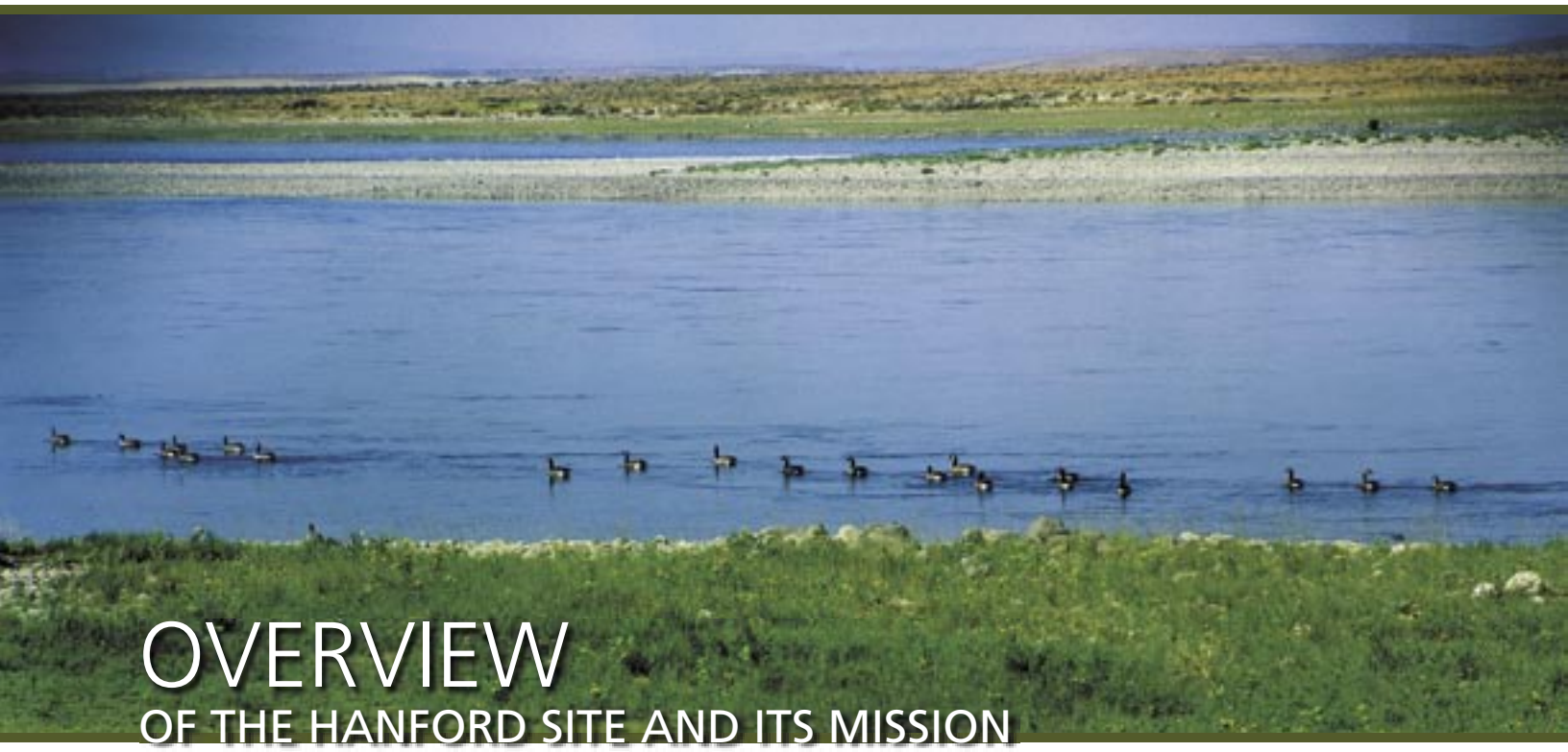
INTRODUCTION

Gable Mountain on the Hanford Site is in the distance; the Columbia River is in the foreground.

This booklet summarizes the *Hanford Site Environmental Report for Calendar Year 2004*. The Hanford Site environmental report, published annually since 1958, includes information and summary data that provide an overview of the activities at the U.S. Department of Energy's (DOE) Hanford Site.

Included in this booklet are brief descriptions of (1) the Hanford Site and its mission; (2) cleanup activities at the Hanford Site; (3) estimated radiological doses to the public and biota from 2004 Hanford Site activities; (4) the status of the site's compliance with environmental regulations; and (5) information on environmental monitoring and surveillance programs and activities. This booklet was written with a minimum of technical terminology. Readers interested in more detailed information can consult the 2004 report or the technical documents cited and listed in that report. This booklet and the report are available online at http://hanford-site.pnl.gov/envreport/.



OVERVIEW
OF THE HANFORD SITE AND ITS MISSION

The Columbia River flows through the northern part of the Hanford Site and forms part of the site's eastern boundary.

The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southeastern Washington State. The site occupies an area of approximately 586 square miles located north of the city of Richland. A former plutonium production complex with nine nuclear reactors and associated processing facilities, the Hanford Site played a pivotal role in the production of materials for the nation's defense for more than 40 years, beginning in the 1940s with the Manhattan Project. Today, under the direction of the DOE, Hanford contractors are engaged in one of the world's largest environmental cleanup projects.

Public access to the site is restricted, and its large land area provides a buffer for the smaller areas on the site that historically were used for production of nuclear materials, waste storage, and waste disposal. The Columbia River flows eastward through the northern part of the Hanford Site and then turns south, forming part of the eastern site boundary.

In June 2000, the 195,000-acre Hanford Reach National Monument was established on the site by a Presidential Proclamation to protect the nation's only unimpounded stretch of the Columbia River above Bonneville Dam in the U.S. and a remnant of the shrub-steppe ecosystem that once blanketed the Columbia River Basin.

In 2004, DOE, the U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife managed the monument. The U.S. Fish and Wildlife

Service administered three major management units of the monument totaling approximately 258 square miles. These included (1) the Fitzner/Eberhardt Arid Lands Ecology Reserve Unit, a 120-square-mile tract of land in the southwestern portion of the Hanford Site; (2) the Saddle Mountain Unit, a 50-square-mile tract of land located north-northwest of the Columbia River and generally south and east of State Highway 24; and (3) the Wahluke Unit, a 87-square-mile tract of land located north and east of both the Columbia River and the Saddle Mountain Unit.

The portion of the monument administered only by DOE included the McGee Ranch/Riverlands Unit (north and west of State Highway 24 and south of the Columbia River), the Columbia River islands in Benton County, the Columbia River corridor (one-quarter mile inland from the shoreline) on the Benton County side of the river, and the sand dunes area located along the Hanford side of the Columbia River north of Energy Northwest.

Approximately 400 acres along the north side of the Columbia River, west of the Vernita Bridge and south of State Highway 243, were managed by the Washington Department of Fish and Wildlife.

The Hanford Reach National Monument, established in 2000, protects the nation's only non-impounded stretch of the Columbia River in the U.S. above Bonneville Dam and a remnant of a shrub-steppe ecosystem that once blanketed the Columbia Basin.

HANFORD AT A GLANCE

Location	The U.S. Department of Energy's Hanford Site is located in southeastern Washington State near the city of Richland.
Dominant Feature	Rattlesnake Mountain on the ALE Reserve Unit of the Hanford Reach National Monument rises 3,525 feet above sea level.
Size	The site covers approximately 586 square miles.
Employees	DOE and its contractors employ 11,000 workers.
Mission	Hanford's mission is to safely clean up and manage the site's legacy wastes and reduce the size of the site.
Budget	The site's fiscal year 2004 budget was approximately $2 billion.
Site Management	DOE Richland Operations Office and DOE Office of River Protection.
Prime Contractors	Fluor Hanford, Inc. (management contractor), Battelle Memorial Institute operates Pacific Northwest National Laboratory (research and development), Bechtel Hanford, Inc. (environmental restoration contractor), AdvanceMed Corporation (occupational and environmental health services), CH2M HILL Hanford Group, Inc. (storing and retrieving waste stored in 177 underground tanks), and Bechtel National, Inc. (design, build, and commission a waste treatment plant to vitrify Hanford's tank waste).

SITE DESCRIPTION

The Hanford Site is a relatively undeveloped area of shrub-steppe (a drought-resistant, shrub and grassland ecosystem) that contains a rich diversity of plant and animal species. This area has been protected from disturbance, except for fire, over the past 60 years. This protection has allowed plant species and communities that have been displaced by agriculture and development in other parts of the Columbia Basin to thrive at Hanford.

Cusick's sunflower (yellow) and the surrounding lupine (purple) are both native to the Hanford Site and can be found on the lower slopes of Rattlesnake Mountain.

More than 100 rare plant populations of 47 different species are found on the Hanford Site. The U.S. Fish and Wildlife Service has designated 5 of these 47 as species of concern in the Columbia River Basin ecoregion. Two species (Umtanum buckwheat and White Bluffs bladderpod) are proposed as candidates for federal listing.

Deer and elk are the major large mammals found on the Hanford Site. A herd of Rocky Mountain elk has inhabited the site since 1972. Coyotes also are plentiful on the site, and waterfowl are numerous along the Columbia River. The Great Basin pocket mouse is the most abundant mammal on the site. Several species of fish and birds, occurring on the Hanford Site are listed as threatened or endangered under the *Endangered Species Act of 1973*.

There are two types of natural aquatic habitat on the Hanford Site. One is the Columbia River and associated wetlands, and the second is upland aquatic sites. The upland sites include small springs, streams, and seeps located mainly on or near Rattlesnake Mountain on the ALE Reserve Unit of the Hanford Reach National Monument (e.g., Rattlesnake Springs, Dry Creek, Snively Springs) and West Lake, a small, natural pond near the 200 Areas.

Chinook salmon spawn in the Hanford Reach of the Columbia River.

Salmon and steelhead are the local fish species of most interest to sport fishermen and are commonly consumed by local Native American tribes. Fall Chinook salmon spawn in the Hanford Reach of the Columbia River, the most important natural spawning area for this fish in the mainstem Columbia River. Surveys of the Hanford Reach during 2004 detected approximately 8,470 redds (salmon spawning nests); this is a slight decrease from the record count (9,400) in 2003.

OPERATIONAL AREAS

The major DOE operational, administrative, and research areas on and around the Hanford Site include the following locations:

- **100 Areas** – located along the south shore of the Columbia River. These are the sites of nine retired plutonium production reactors that occupy approximately 4 square miles.
- **200-West and 200-East Areas** – centrally located on the site's Central Plateau. These areas are approximately 5 and 7 miles south and west of the Columbia River and cover approximately 6 square miles.
- **300 Area** – located just north of Richland. From the early 1940s until the advent of the cleanup mission, most research and development activities at Hanford were carried out in the 300 Area. This area covers approximately 0.6 square mile.
- **400 Area** – located northwest of the 300 Area; covers approximately 0.23 square mile. The Fast Flux Test Facility (currently being decommissioned) is located in this area.
- **600 Area** – includes all of the Hanford Site not occupied by the 100, 200, 300, and 400 Areas.
- **Former 1100 Area** – located between the 300 Area and the city of Richland; the area covers 768 acres. In 1998, this area was transferred to the Port of Benton as part of DOE's Richland Operations Office economic diversification efforts and is no longer part of the Hanford Site. DOE contractors continue to lease facilities in this area.
- **Richland North Area (off the site)** – includes the Pacific Northwest National Laboratory and other DOE and contractor facilities, mostly office buildings in the northern part of the city of Richland.
- **Volpentest Hazardous Materials Management and Emergency Response Training and Education Center (also called HAMMER)** – a worker safety-training facility located on the site near the city of Richland. It consists of an 80-acre main site and a 10,000-acre law enforcement and security training site.

This map shows management units on the Hanford Reach National Monument and the operational areas of the Hanford Site.

Virtually all radioactive and chemical waste generated during Hanford operations, that will remain on the site, will be disposed on the Central Plateau.

CURRENT MISSION

The goal of DOE's strategies is to accelerate the completion of Hanford Site cleanup (excluding waste tanks) from 2070 to 2035, and possibly as soon as 2025, and to do so in a manner that protects public health and safety and the environment.

For more than 40 years, Hanford Site facilities were dedicated primarily to the production of plutonium for national defense and management of the resulting waste. Hanford was the first plutonium production site in the world. In recent years, efforts at the site have focused on developing new waste treatment and disposal technologies and characterizing and cleaning up contamination left from historical operations. Physical challenges at the Hanford Site include millions of gallons of highly radioactive liquid waste in 177 underground storage tanks, 2,300 tons of spent nuclear fuel, 20 tons of plutonium-bearing materials, about 25 million cubic feet of buried or stored solid waste, billions of gallons of groundwater spread over about 73 square miles, contaminated with chemicals and radionuclides above drinking water standards, more than 1,700 former waste disposal sites, and about 500 contaminated facilities.

Currently, DOE's primary mission is to accelerate completion of waste cleanup. The Performance Management Plan for the Accelerated Cleanup of the Hanford Site states that the cleanup mission includes six strategies:

- Restoring the Columbia River corridor by accelerating clean up Hanford Site sources of radiological and chemical contamination that threaten the air, groundwater, or Columbia River. It is expected that most river corridor projects will be completed by 2012.
- Ending the tank waste program by 2033 by accelerating waste retrieval, increasing the capacity of the Waste Treatment Plant (under construction), and starting the process of closing underground waste storage tanks.
- Accelerating the cleanup of Hanford's other urgent risks.
- Accelerating treatment and disposal of mixed low-level waste and the retrieval of transuranic waste and its shipment off the site.
- Accelerating cleanup of the Central Plateau (200-East and 200-West Areas).
- Accelerating cleanup and protection of groundwater beneath the Hanford Site.

The DOE Richland Operations Office and DOE Office of River Protection jointly manage the Hanford Site through several contractors and their subcontractors. The DOE Richland Operations Office manages legacy cleanup, research, and other programs at the Hanford Site. The DOE Office of River Protection was established by Congress in 1998 as a field office to manage DOE's largest, most complex environmental cleanup project – Hanford's tank waste retrieval, treatment, and disposal.

COMPLIANCE
WITH ENVIRONMENTAL REGULATIONS

Gable Mountain is near the 200 Areas in the center of the Hanford Site.

Environmental standards and regulations applicable at DOE facilities fall into three categories: (1) DOE directives; (2) federal legislation and executive orders; and (3) state and local statutes, regulations, and requirements.

Several federal, state, and local government agencies monitor and enforce compliance with applicable environmental regulations at the Hanford Site. Major agencies include the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology, Washington State Department of Health, and Benton Clean Air Authority. These agencies issue permits, review compliance reports, participate in joint monitoring programs, inspect facilities and operations, and/or oversee compliance with applicable regulations. There are specific requirements, actions, plans, and schedules identified in the Hanford Federal Facility Agreement and Consent Order (also known as the Tri-Party Agreement) and other compliance or consent agreements.

Both the DOE Richland Operations Office and the DOE Office of River Protection recognize the importance of maintaining a program of self-assessment and regulatory reporting to assure that environmental compliance is achieved and maintained at the Hanford Site.

The site's compliance with federal acts in 2004 is summarized in the table on the following page.

COMPLIANCE WITH FEDERAL ACTS AT THE HANFORD SITE IN 2004

Regulation	What it Covers	2004 Status
American Indian Religious Freedom Act, Antiquities Act, Archaeological and Historic Preservation Act, Archaeological Resources Protection Act, Historic Sites, Buildings, and Antiquities Act, National Historic Preservation Act, and Native American Graves Protection and Repatriation Act	Cultural resources.	One hundred sixty-six cultural resource reviews were conducted on the Hanford Site.
Clean Air Act	Air quality, including emissions from facilities and from unmonitored sources.	Washington State Department of Health issued four non-compliance documents regarding emissions at T Plant, B Plant, and the 209 E Criticality Laboratory and concerns about the Central Waste Complex Permacon Unit.
Clean Water Act	Discharges to U.S. waters.	The Hanford Site had one National Pollutant Discharge Elimination System Permit, one storm water permit, and ten State Wastewater Discharge Permits. There were no permit violations in 2004.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	Sites contaminated by hazardous materials.	Remediation work on these sites followed CERCLA requirements and met the schedules established by the Tri-Party Agreement.
Emergency Planning and Community Right-to-Know Act	The public's right to information about hazardous materials in the community and establishes emergency planning procedures.	The Hanford Site met the reporting requirements contained in this act.
Endangered Species Act	Rare species of plants and animals.	Hanford activities followed the requirements of this act. The Hanford Site has eleven plant species, three fish species, and five bird species on the federal or state lists of threatened or endangered species.
Federal Insecticide, Fungicide, and Rodenticide Act	Storage and use of pesticides.	At the Hanford Site, pesticides are applied by commercial pesticide operators licensed by the state.
Migratory Bird Treaty Act	Migratory birds or their feathers, eggs, or nests.	Hanford activities used the ecological review process as needed to minimize any adverse effects to migratory birds. There are over 100 species of birds that occur on the Hanford Site that are protected by this act.
National Environmental Policy Act	Environmental impact statements for federal projects.	Environmental impact statements and environmental assessments were prepared or conducted as needed. In 2004, DOE issued two environmental impact statements, one record of decision, and a supplemental analysis for the Hanford Site.
Resource Conservation and Recovery Act (RCRA)	Tracking hazardous waste from generator to treatment, storage, or disposal.	The Washington State Department of Ecology identified five non-compliance issues during 2004: (1) concerns about no wear plates installed beneath pulse-jet mixers at the Waste Treatment Plant; (2) concerns about corrosion allowances in piping design at the Waste Treatment Plant; (3 and 4) concerns related to receipt and management of sample residue from offsite; and (5) concerns about waste transfer lines that did not meet minimum slope requirements.
Safe Drinking Water Act	Drinking water systems operated by DOE at Hanford.	There were nine public water systems on the Hanford Site. The systems were monitored for radiological contaminants and all contaminant concentrations in 2004 met the requirements of the Washington State Department of Health.
Toxic Substances Control Act	Primarily regulation of chemicals called polychlorinated biphenyls (PCBs).	Non-radioactive waste and radioactive PCB waste in certain categories were disposed of in accordance with 40 CFR 761 or remained in storage onsite pending the development of adequate treatment and disposal technologies.

HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER

A key element in Hanford's compliance program is the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement). The Tri-Party Agreement is an agreement among the Washington State Department of Ecology, U.S. Environmental Protection Agency (EPA), and the DOE to achieve compliance with the remedial action provisions of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) and with treatment, storage, and disposal unit regulation and corrective action provisions of the *Resource Conservation and Recovery Act* (RCRA). During 2004, there were 49 specific Tri-Party Agreement cleanup milestones scheduled for completion: 48 were completed on or before their required due dates, and 1 was completed beyond its established due date.

Some Tri-Party Agreement milestones completed in 2004 were related to work on Hanford waste storage tanks.

ENVIRONMENTAL OCCURRENCES

Environmental releases of radioactive and regulated materials from the Hanford Site are reported to the DOE and other federal and state agencies as required by law. The specific agencies notified depend on the type, amount, and location of the individual occurrence. The Hanford Site Occurrence Notification Center maintains both a computer database and a hardcopy file of event descriptions and corrective actions. The significance categories are operational emergency, recurring, 1 (significant impact), 2 (moderate impact), 3 (minor impact), and 4 (some impact).

In 2004, there were no occurrences ranked as operational emergency, recurring, or category 1 on the Hanford Site. There was one category 2 (moderate impact) occurrence when small radiologically contaminated paint chips were discovered near the 233-S facility. The chips were collected, bagged, and disposed of. There was one category 3 (minor impact) event when a subcontractor employee's personal lapel air monitor showed a high level for uranium during work on the 300 Area Remediation Project. The elevated result was from airborne radioactivity in the area. Technicians underwent in-vivo chest counts and bioassays, which revealed no detectable intake.

In 2004, there were no occurrences ranked as operational emergencies on the Hanford Site.

There were four category 4 (some impact) events during 2004: (1) Radioactive wasps nests were discovered during cleanup at the 100-N Area; the nests were removed and disposed of following appropriate guidelines. (2) Beta emitting

The Hanford Site met the fiscal year 2004 Secretarial Goal requirements for low-level waste, mixed low-level waste, hazardous and sanitary routine waste generation, and recycling.

contaminants were discovered in the 200-East Area in two ant mounds. Biological control personnel applied a pesticide to the affected area. (3) Grass fires in the 600 Area were extinguished within 2 hours of being reported. Although the fires were not in contaminated areas, any fire on the Hanford Site is treated as though it has the potential to spread to areas that could be contaminated. (4) Contaminated tumbleweeds were discovered during surveys of contaminated areas. In most cases, the contaminated tumbleweeds were removed and disposed of; in some instances, the contamination area boundary was extended to encompass the tumbleweed growth.

POLLUTION PREVENTION AND WASTE MINIMIZATION

This program is a continuing effort to reduce the quantity and toxicity of hazardous, radioactive, mixed, and sanitary waste produced at Hanford. The program fosters the conservation of resources and energy, reduction in the use of hazardous substances, and prevention or minimization of pollutant releases to all environmental media from all operations and site cleanup activities. The purchase of environmentally preferable products containing recycled material achieved 100% of the 2004 goal at the Hanford Site .

The Hanford Site met the fiscal year 2004 Secretarial Goals for low-level waste, mixed low-level waste, hazardous and sanitary routine waste generation, and recycling. In 2004, the program reported recycling of 2,760 tons of sanitary and hazardous waste. This recycled waste included 341 tons of office and mixed paper, 424 tons of iron/steel, 114 tons of non-ferrous metal, and 118 tons of appliances and furniture.

Mortar lining, a new technology, is being used to refurbish ~28 miles of water lines.

The Hanford Site generated 36,000 cubic yards of cleanup and stabilization waste, and did not meet the 10% cleanup stabilization goal of 32,100 cubic yards. Not meeting this goal could be a reflection of additional cleanup and waste stabilization activities that were not anticipated in the fiscal year 2004 waste forecast.

One notable achievement in 2004 was the Mortar Lining Project for Water Distribution receiving the DOE Office of Environmental Management Pollution Prevention Best in Class Award for Innovative Technology. Mortar lining, an innovative, commercially available technology, is being used to refurbish 28.62 miles of degraded water lines, ensuring fire protection and a supply of drinking water during site closure activities. Pipelines are restored in place using minimal excavation, which reduces worker risk by decreasing exposure to possibly contaminated soil. Over the 10-year life of the project, cost avoidance of more than $19 million is anticipated, along with waste avoidance of 6,760 tons of replacement pipe.

HANFORD CLEANUP
OPERATIONS

The Waste Treatment Plant is being built near the 200-East Area.

A major focus of DOE's environmental management mission at Hanford is cleanup and management of the site's legacy waste from more than 45 years of nuclear materials production. The work involves safe storage, treatment, and final disposal of a large amount and variety of radioactive and chemical materials. It also involves remediating hundreds of inactive waste disposal sites and stabilizing inactive facilities and the material inside them to prevent leaks or limit radiation exposures. Environmental restoration and pollution prevention are key parts of the environmental management mission.

Waste from Hanford cleanup operations is classified as either radioactive, non-radioactive, mixed, or dangerous. Radioactive waste is categorized as transuranic, high-level, and low-level. Mixed waste has both radioactive and dangerous non-radioactive substances. Dangerous waste contains hazardous substances. Dangerous waste is treated, stored, and prepared for disposal at several Hanford Site facilities or is shipped offsite for disposal or destruction. Some types of waste, such as used lead-acid batteries and used aerosol products, are shipped offsite for recycling. Annual reports provide information about the dangerous waste generated, treated, stored, and disposed of on and off the Hanford Site.

Non-dangerous waste is waste that does not contain hazardous or radioactive substances. Non-dangerous waste generated at the Hanford Site historically was buried onsite. However, beginning in 1999, non-dangerous waste has been disposed of at an offsite landfill.

The 177 radioactive waste storage tanks were built at the Hanford Site between 1943 and 1985.

In addition to newly generated waste, significant quantities of legacy waste remain from years of nuclear material production and waste management activities. Most legacy waste from past operations at the Hanford Site resides in RCRA-compliant waste sites or is stored in places awaiting cleanup and ultimate safe storage or disposal. Examples include high-level radioactive waste stored in single-shell and double-shell underground waste storage tanks and transuranic waste stored in vaults and on storage pads.

Since cleanup activities began at Hanford in 1996, the primary focus has been on liquid effluent waste sites. After nearly 8 years of work, the number of liquid effluent waste sites requiring remediation has been reduced and cleanup activities now are turning to remediation of waste burial grounds. The volume of contamination in waste burial grounds is less than in liquid effluent waste sites; however, the burial grounds may contain unknown materials and additional time may be required to characterize the waste and dispose of it properly.

100 Areas Waste Sites. Full-scale remediation of waste sites began in the 100 Areas in 1996 and continued in 2004 at the 100-B/C, 100-K, 100-N, and 100-F Areas. A total of 518,006 tons of contaminated soil from 100 Areas remediation activities were disposed at the Environmental Restoration Disposal Facility (near the 200-West Area) during 2004. Pump-and-treat systems operated to help remove contamination from groundwater. A summary of 2004 pump-and-treat operations is described in the table on the following page.

During 2004, the Environmental Restoration Disposal Facility received contaminated soil and other waste from site cleanup operations.

K Basins Closure Activities. From February 1994 through 2004, work has continued to clean out the K Basins. The K Basins contained 2,300 tons of Hanford N Reactor spent fuel and a small quantity of irradiated single-pass reactor fuel (fuel from older Hanford reactors). In mid-2004, responsibility for K Basins cleanout passed to the new K Basins Closure Project, and the Spent Nuclear Fuel Project was phased out. During 2004, the Spent Nuclear Fuel Project, later the K Basins Closure Project, made the following progress in cleaning out the K Basins:

SUMMARY OF GROUNDWATER REMEDIATION

Location	Startup Date	Contaminant	Mass Removed 2004	Mass Removed – Since Startup
Groundwater Pump-and-Treat Systems				
100-D Area	1997	Chromium	30.1 kilograms (66.4 pounds)	199 kilograms (438.8 pounds)
100-H Area	1997	Chromium	3.5 kilograms (7.7 pounds)	38.6 kilograms (85.1 pounds)
100-K Area	1997	Chromium	29.6 kilograms (65.3 pounds)	257.6 kilograms (568 pounds)
100-N Area	1995	Strontium-90	1.63 curies	0.15 curies removed; ~12 curies decayed naturally
200-West Area (200-ZP-1) Operable Unit	1994	Carbon tetrachloride	898.3 kilograms (1,969.7 pounds)	8,764.4 kilograms (19,325.5 pounds)
200-West Area (200-UP-1) Operable Unit	1994	Carbon tetrachloride	6.67 kilograms (14.7 pounds)	32.71 kilograms (72.1 pounds)
	1994	Nitrate	5,401 kilograms (11,909 pounds)	32,744 kilograms (72,191 pounds)
	1994	Technetium-99	12.8 grams (0.41 ounces)	116.1 grams (3.73 ounces)
	1994	Uranium	25 kilograms (55.1 pounds)	206.8 kilograms (456 pounds)
200-West Area, Waste Management Area S-SX	2003	Technetium-99	0.033 grams (0.001 ounce)	0.00211 curies (78.07 MBq)
Soil-Vapor Extraction				
200-West Area	1991	Carbon tetrachloride	256 kilograms (564.5 pounds)	78,300 kilograms (172,651.5 pounds)

- Completed all shipments (370 shipments) of fuel from the K-East Basin to the K-West Basin.
- Removed and dried the last 93 multi-canister overpacks of fuel from the K-West Basin, completing a total of 386 shipments to achieve 100% completion, satisfying a major Tri-Party Agreement milestone (i.e., the removal of all spent fuel from the K Basins was completed in 2004). Over 4 million pounds of fuel, containing over 50 million curies of radioactivity, were removed from the K-West Basin.
- Welded 170 multi-canister overpacks with permanent, N-Stamped closure welds for a total of 290 multi-canister overpacks welded by year's end. This welding effort remained consistently ahead of schedule.
- Continued the washing and load-out of aged fuel canisters from the K Basins for disposal as low-level nuclear waste. By the end of 2004, 5,830 cans (78% of the total) had been washed and disposed. Also 100% of the contaminated, long-handled pole tools from the K-West Basin (212 tools) were removed, washed, and packaged as waste.

The removal of all spent fuel from the K Basins was completed in 2004.

- Began pumping sludge from two locations in the K-East Basin, with two pumping systems, in June and October 2004. By the year's end, nearly 25% of the total sludge volume in the K-East Basin had been transferred to containers.
- Sealed the discharge chute of the K-East Basin permanently closed by filling it with special cement called grout. Putting grout in the discharge chute resolved some key environmental issues because it sealed the construction joint between the K-East Basin and the K-East Reactor structure, a joint that had leaked contaminated water to the environment in the past. Also, placing grout in the discharge chute permanently removed approximately 105,000 gallons of contaminated water from the K-East Basin (about 10% of the total water volume).
- Successfully demonstrated an underwater hydrolasing technique that will remove and clean the contaminated outermost surface of the K Basins walls and floors. By the end of 2004, the K Basins Closure Project was actively procuring full-scale hydrolasing equipment, in preparation for beginning to hydrolase the K-East Basin walls in mid-2005.

200 Areas Waste Sites. Remedial investigations or feasibility studies continued on various facilities in the 200 Areas in preparation for cleanup and closure. Pump-and-treat and soil-vapor extraction systems operated to help remove contamination from groundwater.

300 Area Waste Sites. Remediation continued at the 300-FF-2 Operable Unit. In 2004, 23,800 tons of contaminated soil from 300 Area remediation were removed and disposed of at the Environmental Restoration Disposal Facility. The 300-FF-1 Operable Unit was replanted with various species of grasses; to help prevent erosion, the site was covered with straw mulch.

What is decommissioning?

When DOE declares a facility as surplus (no longer needed) it is shut down and prepared for decontamination and decommissioning (D&D). The process is the safe decontamination, dismantling, removal of contamination and structures, and/or the release for reuse of facilities that are no longer active. DOE conducts D&D activities on reactors, processing plants, storage tanks, laboratory facilities, and other structures. Decontamination and decommissioning presents many challenges. Work continues at the Hanford Site to decommission facilities in the operational areas.

Adapted From
http://www.web.em.doe.gov/emprimer/erdd.html

Interim safe storage of decommissioned reactors continued in 2004.

FACILITY DECOMMISSIONING

100 Areas Facilities. Decontamination and decommissioning activities continued during 2004 in the 100-D, 100-H, and 100-N Areas. The interim safe storage of the D Reactor was completed in 2004, while work on the H Reactor will continue through 2005. These activities are conducted as non-time-critical removal actions under CERCLA.

Facility demolition was conducted at the 100-N Area in 2004. Facilities and structures demolished included the 1304-N emergency

dump tank, 1300-N emergency dump basin, 11-N, 13-N, 1714-N, 1714-NA, and 1714-NB facilities. During 2004, work began on the demolition of the 190-DR pump house.

200 Areas Facilities. Decommissioning activities continued in the 200 Areas during 2004. Demolition began in June 2004 and was completed in September 2004 at the B Plant construction lay-down yard. It was conducted as a non-time-critical removal action under CERCLA and involved the safe demolition, waste packaging, and disposal of 23 contaminated structures, including mobile trailers and storage units.

233-S Plutonium Concentration Facility. Decontamination and demolition activities were completed in 2004 at the 233-S Plutonium Concentration Facility (233-S facility) located in the 200-West Area adjacent to the Reduction-Oxidation (REDOX) Plant. The 233-S facility and associated process equipment were used to concentrate plutonium produced at the REDOX Plant from 1955 to 1967. The activities were conducted as a non-time-critical removal action under CERCLA and involved the safe demolition, waste packaging, and disposal of the 233-S facility.

Nearly 19.8 tons of plutonium-bearing materials at the Plutonium Finishing Plant have been stabilized, immobilized, re-packaged and/or properly disposed of.

221-U Chemical Processing Facility. Removal of ancillary facilities at the 221-U Chemical Processing Facility began in November 2004 and demolition of at least 11 of the structures began in January 2005 . Demolition of the 224-U and 224-UA Buildings is expected to be deferred to coincide to the remedial action for the 221-U Canyon Facility.

Plutonium Finishing Plant. Workers at the Plutonium Finishing Plant complex stabilized, immobilized, repackaged, and/or properly disposed of nearly 19.8 tons of plutonium-bearing materials in the plant by February 2004. The workers then started decontaminating and deactivating the processing facilities while still providing for the safe and secure storage of nuclear materials until final disposition.

224-B Plutonium Concentration Facility. This facility was part of the B Plant complex. Past operations have resulted in contamination throughout some of the structures. The 224-B Facility Decommissioning Project was conducted as a non-time-critical removal action under CERCLA and involved the safe demolition, waste packaging, and disposal of 23 contaminated structures. Demolition began in June 2004 and was completed in September 2004.

The T Plant Complex operates under RCRA interim status. It provides waste treatment and storage and decontamination services for the Hanford Site.

Using the 200 Areas Chemical Separations Plants for Waste Disposal. The Canyon Disposition Initiative was created to investigate the potential for using the five canyon buildings (B Plant, T Plant, U Plant, PUREX Plant, and REDOX Plant) at the Hanford Site as disposal facilities for Hanford Site remediation

waste, rather than demolishing the structures. In December 2004, a feasibility study and proposed plan were released for public review. These documents examine five alternatives for the remediation of the 221-U facility; however, the 'close in place collapsed structure' alternative is the preferred alternative. Under this alternative, equipment already in the U Plant would be consolidated into the below-ground U Plant process cells, the cells would be backfilled with grout, the exterior walls and roof would be collapsed in place, and the site would be covered with a barrier. The final disposition path for the U Plant will be selected during the record of decision process.

Facilities in the 300 Area are being decommissioned.

300 Area Facilities. Decommissioning of the 324 and 327 Buildings continued during 2004. Preparations are underway for removal of the remaining waste items, and the buildings are being maintained in surveillance and maintenance mode in compliance with safety and regulatory requirements.

The 313 and 314 Buildings have been in surveillance and maintenance mode in recent years. These two facilities were turned over to Bechtel Hanford, Inc. in October 2004 to prepare for facility decommissioning.

The 309 Plutonium Recycle Test Reactor was shut down in 1969. The facility is being maintained in a surveillance and maintenance mode to comply with safety and regulatory requirements.

The Fast Flux Test Facility is being deactivated and decommissioned.

400 Area Facilities – Fast Flux Test Facility. Deactivation activities continued at the Fast Flux Test Facility in 2004. Liquid sodium was drained from the primary heat transport system loops and auxiliary systems, as well as the upper portion of the reactor vessel to sodium storage tanks, where approximately 150,000 gallons of liquid sodium metal are now stored pending future conversion to sodium hydroxide for use by the Waste Treatment Plant. The sodium potassium alloy systems containing approximately 900 gallons of sodium-potassium alloy were drained or flushed into associated sodium systems for disposition with the sodium. Eighty-four fuel components were washed and packaged into 12 interim storage casks. These interim storage casks and 22 filled interim storage casks previously stored in the 400 Area Interim Storage Area were transferred to the 200 Areas Interim Storage Area.

TransNuclear, Inc. began fabricating the remainder of the interim storage casks and the first nine were delivered. Work continued on design and fabrication of the reactor vessel drain pump. Three polychlorinated biphenyl (PCB) cooled

transformers were removed from service and shipped offsite for disposal; this leaves 10 of the original 19 PCB transformers in service. Additionally, selected process systems were deactivated that are no longer required since the secondary heat transport system sodium has been drained.

WASTE MANAGEMENT

A summary of liquid and solid waste treated, stored, or disposed of at Hanford in 2004 is provided in the table on page 18.

Solid Waste Management. Waste management at the Hanford Site in 2004 included the treatment, storage, and disposal of solid waste at many Hanford locations. Solid waste management includes the treatment, storage, and/or disposal of solid waste produced as a result of Hanford Site operations or received from offsite sources that are authorized by DOE to ship waste to the site. Onsite solid waste facilities include the Central Waste Complex, Waste Receiving and Processing Facility, T Plant Complex and Radioactive Mixed Waste Disposal Facility. Radioactive waste stored or disposed of on the Hanford Site in 2004 included 28,500 curies of low-level waste, 28,500 curies of mixed low-level waste, and 15,200 curies of transuranic waste.

The Central Waste Complex receives waste from Hanford Site cleanup activities and from other DOE and Defense Department facilities.

Two defueled reactor compartments from the U.S. Navy were received and disposed of in a trench in the 200-East Area in 2004; this brings the total number of Navy reactor compartments received to 114.

Waste destined for the Waste Receiving and Processing Facility includes stored waste as well as newly generated waste from current site cleanup activities. The waste consists primarily of contaminated cloth, paper, rubber, metal, and plastic. This facility, which began operating in 1997, dispositioned and shipped 5,440 cubic feet of waste during 2004.

Throughout 2004, approximately 624,719 tons of remediation waste were disposed at the Environmental Restoration Disposal Facility. A total of approximately 5.2 million tons of remediation waste have been placed in the Environmental Restoration Disposal Facility from initial operations start-up in July 1996 through 2004. The total available expansion area of the facility site was authorized in the 1995 record of decision to cover as much as 1.6 square miles.

Defueled reactor components from nuclear-powered submarines and cruisers are barged to the Hanford Site and placed in a trench in the 200-East Area.

HANFORD SITE WASTE SUMMARY 2004

Activity	Waste Type	Amount
Waste generated during onsite cleanup activities	Solid mixed waste	318,594 pounds
	Radioactive waste	1.9 million pounds
Waste received at Hanford from off the site	Solid mixed waste	563,699 pounds
	Radioactive waste	1.1 million pounds
Waste shipped off the Hanford Site	Hazardous waste	352,547 pounds
Waste volume pumped from underground single-shell waste storage tanks		734,000 gallons
Waste volume evaporated at the 242-A evaporator		194,000 gallons
Waste generated at Hanford and added to underground double-shell waste storage tanks	Liquid waste	876,000 gallons
Waste volume in underground double-shell waste storage tanks at the end of 2004	Liquid waste	25.16 million gallons

The Radioactive Mixed Waste Disposal Facility consists of two trenches in the 200-West Area. Disposal to the first trench began in September 1999 and the first layer of waste packages has been completed and covered with sand and gravel. The second waste layer has been started. There are currently approximately 106,600 cubic feet of waste in the first trench. There are approximately 2,825 cubic feet of waste stored in the second trench, which was opened for operations in July 2004.

The 242-A evaporator processes dilute liquid tank waste into a concentrate.

During 2004, there were 2,972 cubic yards of mixed low-level waste treated or disposed of at the Mixed Low-Level Waste Treatment and Disposal Facility.

Liquid Waste Management. Facilities are operated on the Hanford Site to store, treat, and dispose of various types of liquid waste generated by site cleanup activities. These facilities are operated and maintained in accordance with state and federal regulations and facility permits.

The 242-A evaporator in the 200-East Area concentrates dilute liquid tank waste by evaporation. This reduces the volume of liquid waste sent to the double-shell tanks for storage and reduces the potential need for more double-shell tanks. The 242-A evaporator completed one campaign during 2004. The volume of waste treated was 974,000 gallons, reducing the waste volume by 164,000 gallons, or approximately 17% of the total volume. The volume of process condensate transferred to the Liquid Effluent Retention Facility for subsequent treatment in the Effluent Treatment Facility was 360,000 gallons.

The Effluent Treatment Facility in the 200-East Area treats liquid effluent to remove toxic metals, radionuclides, and ammonia and to destroy organic compounds. The treated effluent is stored in tanks, sampled and analyzed, and discharged to the State-Approved Land Disposal Site (also known as the 616-A crib). The volume of wastewater treated and disposed of in 2004 was approximately 28.25 million gallons.

Approximately 12.38 million gallons of liquid waste were stored at the Liquid Effluent Retention Facility at the end of 2004. The volume of wastewater received for interim storage during 2004 was approximately 28.4 million gallons.

The 200 Area Treated Effluent Disposal Facility received 142.9 million gallons of unregulated effluent for disposal in 2004. The major source of this effluent was uncontaminated cooling water and steam condensate from the 242-A evaporator.

Industrial wastewater generated throughout the Hanford Site is collected and treated in the 300 Area Treated Effluent Disposal Facility. The wastewater consists of once-through cooling water, steam condensate, and other industrial wastewater. The volume of industrial wastewater treated and disposed of during 2004 was 33.13 million gallons.

Underground Waste Storage Tanks. The Office of River Protection manages the DOE's River Protection Project, which is responsible for storage, retrieval, treatment, and disposal of high-level tank waste and the closure of tank farms on the Hanford Site. Much of the waste stored at Hanford is contained in large underground single-shell (1 wall) and double-shell (2 walls) tanks. These tanks are located in the 200 Areas; a grouping of tanks is referred to as a tank farm. The single-shell tanks are older, and some are known to have leaked. Liquid in the single-shell tanks is being transferred to double-shell tanks to prevent additional environmental releases.

During the year, 160,100 gallons of waste were pumped from single-shell tanks into the double-shell tank system. At the end of 2004, there were 25.16 million gallons of waste in the double-shell tanks.

Hanford Waste Treatment and Immobilization Plant (Waste Treatment Plant). The Waste Treatment Plant is being built on 65 acres located on the Central Plateau outside

The three basins at the Liquid Effluent Retention Facility are lined with two, flexible, high-density polyethylene membranes.

This photograph shows construction of six double-shell tanks built on the Hanford Site. The tanks were later covered with 10 feet of sand and gravel.

Waste vitrification chemically processes heavy metals and radioactive elements into a durable, leach-resistant glass.

of 200-East Area to treat radioactive and hazardous waste currently stored in 177 underground waste storage tanks. At the end of 2004, engineering designs were 77% complete and construction was 37% complete for the pretreatment, high-level waste vitrification, and low-activity waste vitrification facilities. Site excavation for the Waste Treatment Plant analytical laboratory was completed and construction was approximately 10% complete at the end of 2004. A notable Waste Treatment Plant achievement in 2004 was installation of the pretreatment four-pack waste receipt vessels. Each 375,000-gallon stainless steel tank was fabricated onsite, then lifted over walls and set in place.

During 2004, workers at the Waste Treatment Plant installed more than 130,000 feet of piping and 23,000 tons of rebar and poured over 12,000 truckloads of concrete.

DOE has completed the final review of a report that presents revised seismic data for the design of the Waste Treatment Plant. As a result of the revised data, the seismic design specifications for the Waste Treatment Plant Pretreatment Building and High-Level Waste Building will be modified to withstand larger ground motions. The design changes do not impact other large facility structures within the Waste Treatment Plant complex. The principal impact of the revised specifications is additional expense for design re-analysis and probable project delays from equipment procurement and redesign of piping hangers. The design re-analysis is expected to take approximately 6 months, while the effects of the redesign on the construction schedule are still being determined. Preliminary analyses indicate that most of the existing construction has sufficient design margin to preclude physical modifications. DOE is performing an analysis of overall project costs and schedule impacts.

Throughout 2004, DOE and its contractor have worked closely with the Defense Nuclear Facilities Safety Board to resolve concerns about the presence of potentially flammable concentrations of hydrogen in the Waste Treatment Plant once the plant begins operating. The Waste Treatment Plant waste will generate hydrogen in quantities and at rates that may require controls in some of the pretreatment facility vessels and high-level radioactive waste vessels. Work has been done to systematically identify and evaluate locations throughout the Waste Treatment Plant beyond the primary process vessels (in pipes and ancillary vessels) where hydrogen could accumulate. A design guide to evaluate the potential of hydrogen buildup and apply preferred preventive and mitigative engineering controls has been proposed. Identification of areas where additional controls are needed has been completed, and recommended design solutions are currently being finalized. The final report is scheduled to be completed in April 2005.

SITE CLOSURE ACTIVITIES

The principal requirements for the control and release of property at Hanford containing residual radioactivity are given in DOE Order 5400.5, Radiation Protection of the Public and the Environment. These requirements are designed to be certain that property is evaluated, radiologically characterized, and decontaminated before release; the level of residual radioactivity in property to be released is as near background levels as is reasonably practicable and meets DOE authorized limits; and all property releases are appropriately certified, verified, documented, and reported. No property with detectable residual radioactivity was released from the Hanford Site in 2004.

No property with detectable residual radioactivity was released from the Hanford Site in 2004 .

Emergency Decontamination Facility. The Emergency Decontamination Facility maintained next to Kadlec Medical Center in Richland is no longer needed because other decontamination facilities have been constructed. During 2004, DOE and Kadlec Medical Center continued to work on closing the facility.

Hanford Reach National Monument. The Hanford Reach National Monument lies within the boundaries of the Hanford Site. Although DOE maintains administrative control over the land within the monument, the U.S. Fish and Wildlife Service manages about 84% of the land. In 2001, the DOE Office of Inspector General concluded that 143,000 acres of land within the monument could be transferred to the U.S. Department of Interior without adversely affecting DOE operations on the Hanford Site. Subsequently, the DOE Richland Operations Office entered into negotiations with the U.S. Department of Interior regarding release and transfer of selected portions of the monument from DOE control to the jurisdiction of the U.S. Fish and Wildlife Service. The necessary processes and assessments to make that happen are currently underway.

Columbia River Corridor. Activities continued during 2004 to clean up the Columbia River Corridor. Although risk assessments are usually done prior to cleanup activities, the regulatory agencies have granted interim records of decision to initiate cleanup first and postpone conducting risk assessments until a later date. The River Corridor Baseline Risk Assessment Project has begun a pilot risk assessment in the 100-B/C Area that may be adapted for use at all 100 Areas and the 300 Area. The project has created a website to provide information about project activities. The site includes the dates of public involvement opportunities, documents available for review and comment, administrative information, and links to related projects. The website can be found at http://www.bhierc.com/Projects/risk/risk.htm.

EFFLUENT AND ENVIRONMENTAL MONITORING

In 2004, scientists evaluated potential radiological doses to the public and biota resulting from exposure to Hanford Site liquid effluents and airborne emissions.

Environmental monitoring at the Hanford Site includes near-facility, site-wide, and offsite environmental monitoring, groundwater monitoring, and vadose zone monitoring. Near-facility monitoring includes the analysis of environmental samples collected near major nuclear-related installations, waste storage and disposal units, and remediation sites. Site-wide and offsite monitoring consists of sampling and analyzing various media on and around the site to detect potential contaminants and to assess their significance to environmental and human health.

Groundwater monitoring is conducted on the site to determine the distribution of radiological and chemical constituents in groundwater. The strategy for managing and protecting groundwater resources at the Hanford Site focuses on protection of the Columbia River, human health, the environment, treatment of groundwater contamination, and limitation of groundwater contaminant migration. Vadose zone monitoring and characterization are conducted to better understand the physical and chemical properties of the vadose zone and vadose zone contamination. Environmental monitoring and surveillance results for 2004 are summarized in the following table.

EFFLUENT MONITORING

Effluent monitoring at Hanford has two elements: (1) liquid effluent and airborne emissions monitoring at site facilities and operations and (2) environmental monitoring near facilities and operations that have the potential to discharge, or have discharged, stored, or disposed of radioactive and hazardous materials.

Liquid effluent and airborne emissions that may contain radioactive or hazardous constituents are continually monitored when released to the environment at the Hanford Site. Facility operators perform the monitoring mainly through analyzing samples collected at points of release into the environment. Monitoring data are evaluated to determine the degree of regulatory compliance for each facility and/or the entire site. The evaluations are also useful to assess the effectiveness of effluent treatment and pollution-management practices.

Air samplers on the site were located primarily around major operational areas to maximize the ability to detect radiological contaminants resulting from site operations.

In 2004, only facilities in the 200 Areas discharged radioactive liquid effluent to the ground, which went to the State-Approved Land Disposal Site. Non-radioactive hazardous materials in liquid effluent were discharged to both the State-Approved Land Disposal Site and to the Columbia River at designated (permitted) discharge points. Monitoring indicated that no known releases of hazardous substances exceeding reportable quantities occurred at these discharge points in 2004.

Radioactive air emissions usually come from a building stack or vent. In 2004, monitored radioactive emission discharge points were located in the 100, 200, 300, 400, and 600 Areas.

All radionuclide concentrations in Columbia River water samples collected in 2004 were below regulatory limits and similar to those observed in the past.

ENVIRONMENTAL MONITORING

The early identification of, and appropriate response to, potentially adverse environmental and resource effects associated with DOE operations are assured by routinely conducting pre-operational environmental characterization and assessment activities; performing environmental monitoring; monitoring cultural resources; performing periodic sampling of Hanford Site drinking water; and monitoring and controlling contaminated and undesirable biota.

Soil samples were collected near waste disposal sites and from locations downwind and near or within the boundaries of operating facilities and remediation sites.

The primary environmental and resource monitoring programs and projects at Hanford include the Effluent Monitoring Program, conducted by Fluor Hanford, Inc.; the Public Safety and Resource Protection Project, managed by the Pacific Northwest National Laboratory; and the Groundwater Performance Assessment Project, also managed by Pacific Northwest National Laboratory. Pacific Northwest National Laboratory personnel through a contract with Fluor Hanford, Inc.monitor radiological contaminants in Hanford Site drinking water. The overall objectives of these monitoring programs are to demonstrate compliance with applicable federal, state, and local regulations; confirm adherence to DOE environmental, public health, and worker protection policies; and support environmental and waste management decisions.

Climate and Meteorology. The Hanford Meteorology Station is located on the Central Plateau between the 200-East and 200-West Areas. Hanford Site meteorologists provide weather forecasting to help manage weather-dependent

HANFORD SITE MONITORING RESULTS FOR 2004

	What was Monitored?	The Bottom Line
Air	Air particles and gases were analyzed for radioactive materials. Air was sampled at 23 site-wide locations on Hanford, 11 perimeter locations, 8 community locations, and in 2 distant communities. In addition, near-facility monitoring collected air samples at 85 locations near Hanford facilities.	All measurements of radioactive materials in air were below recommended guidelines. In general, radionuclide concentrations near facilities were at or near Hanford Site background levels, which are much less than DOE derived concentration guides but greater than concentrations measured off the site. The data also show that concentrations of certain radionuclides were higher and widely variable within different onsite operational areas.
Columbia River Water	Columbia River water was collected from multiple Hanford Reach sampling points throughout the year. Water samples were analyzed for radioactive and chemical materials. Water in the Columbia River continues to be designated Class A (Excellent) by the state of Washington. This designation means that the water is usable for substantially all needs.	As in past years, small amounts of radioactive materials were detected downriver from Hanford. However, the amounts were far below federal and state limits. During 2004, there was no indication of any deterioration of Columbia River water quality resulting from operations at Hanford.
Columbia River Shoreline Springs	Includes groundwater discharges to the Columbia River via surface and subsurface springs. Discharges above the water level of the river are identified as riverbank springs. Samples of spring water were collected at locations along the Columbia River shoreline.	Samples collected at the springs contained some contaminants at levels above those observed in near-shore river water but similar to local groundwater. However, concentrations in river water downstream of the shoreline springs remained far below federal and state limits.
Groundwater	Groundwater samples were collected from 727 wells and 154 shoreline aquifer tubes to monitor contaminant concentrations. Water levels were measured in several hundred wells on the site to map groundwater movement.	Samples showed that groundwater contaminant plumes are continuing to move from beneath former waste sites to the Columbia River. The total area of radiological and chemical contaminant plumes with contaminant concentrations exceeding drinking water standards was estimated to be approximately 66 square miles during 2004. This area occupies 11.2% of the total area of the Hanford Site. The tritium and iodine-129 plumes have the largest areas with concentrations exceeding drinking water standards.
Drinking Water	The quality of the drinking water supplied by nine DOE-owned systems on the Hanford Site was monitored.	All DOE-owned drinking water systems on the Hanford Site met Washington State and EPA standards.

operations and compile climatological data for environmental studies and to help assess the environmental effects of site operations.

Hourly observations of wind direction, wind speed, and air temperature are made at multiple levels on a 408-foot tower near the Hanford Meteorology Station.

In addition, data are acquired from the Hanford Meteorological Monitoring Network, which consists of 30 remote monitoring stations. Most of the stations are on the Hanford Site; however, eight are offsite. All stations provide meteorological data every 15 minutes to a central computer located at the Hanford Meteorology Station.

The average temperature was 54.6°F, which was 1.0°F above nomal (53.6°F). Seven months were warmer than normal; five months were cooler than normal. Precipitation totaled 7.96 inches, 114% of normal (6.98 inches). Snowfall totaled 22.9 inches, compared to an annual normal snowfall of 15.4 inches.

The average wind speed was 7.0 miles per hour, which was 0.6 mile per hour below normal. The peak gust for the year was 63 miles per hour on January 30.

Meteorological measurements are taken to support Hanford Site emergency preparedness and response, site operations, and atmospheric dispersion calculations for dose assessments.

HANFORD SITE MONITORING RESULTS FOR 2004

	What was Monitored?	The Bottom Line
Food and Farm Products	Samples of asparagus, grapes, leafy vegetables, milk, potatoes, tomatoes, and wine were collected from locations upwind and downwind of the Hanford Site.	Radionuclide concentrations in samples of food and farm products were at normal environmental levels.
Fish and Wildlife	Game animals on the site and along the Hanford Reach and fish from the Columbia River were monitored at 85 onsite locations and 6 reference locations. Carcass, bone, and muscle samples were analyzed to evaluate radionuclide levels.	Samples of carp, sculpin, quail, pheasant, clams, deer, and elk were collected and analyzed. Radionuclide levels in wildlife samples were well below levels that are estimated to cause adverse health effects to animals or to the people who may consume them.
Effluent and Emissions	Airborne emissions and liquid effluent that may contain radioactive or hazardous constituents are continually monitored on the Hanford Site.	Compliance with all applicable effluent and emissions monitoring requirements was achieved in 2004.
Soil	Soil samples were collected at 83 locations near facilities and at 42 site-wide and offsite locations; 19 investigative samples were also collected.	In general, radionuclide concentrations in soil samples collected from or adjacent to waste disposal facilities in 2004 were higher than the concentrations in samples collected farther away and were significantly higher than concentrations than concentrations measured offsite. The data also show, as expected, that concentrations of certain radionuclides in 2004 were higher within different operational areas when compared to concentrations measured in distant communities. There were 19 instances of radiological contamination in investigative soil samples. Of the 19 locations, 16 were cleaned up. At the remaining locations, the contamination levels did not exceed the radiological control limits for the sites and the soil was left in place.
Vegetation	Vegetation samples were collected near Hanford Site facilities and at 14 site-wide and offsite locations.	Concentrations of radionuclides were elevated near facilities when compared to distant communities. Some radionuclides were detected at low concentrations in site-wide samples. Concentrations is offsite samples were generally below detection limits.

Wagon tracks can still be seen today in the soil near the Hanford Site.

Built in 1907, the First Bank of White Bluffs building is the only surviving building from the pre-1943 White Bluffs town site.

There were no dust storms recorded at the Hanford Meteorology Station during 2004. There has been an average of five dust storms per year at the Hanford Meteorology Station during the entire period of record (1945-2003).

Cultural Resources. The DOE is responsible for managing and protecting the Hanford Site's cultural and historic resources. The Hanford Cultural and Historic Resources Program, which is maintained by DOE, assures that cultural and historic resources entrusted to DOE are managed responsibly and in accordance with applicable regulatory requirements.

Cultural resources reviews must be conducted before a federally funded, federally assisted, or federally licensed ground disturbance or building alteration/demolition project can take place. As such, cultural resource reviews are required at Hanford to identify properties within the proposed project area that may be eligible for, or listed in, the National Register of Historic Places and evaluate the project's potential to affect any such property. During 2004, 166 cultural resource reviews were requested and conducted.

During 2004, sites were also monitored to gather data about the characteristics of each site, processes adversely affecting the site, and changes at the site. Of the findings recorded at these monitored places, most were related to natural causes.

Places with cemeteries or known human remains include locations that are sacred to the Wanapum Band, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe. Overall, places with human remains were found to be stable during 2004. No violations were noted.

The historic First Bank of White bluffs building continues to deteriorate. Stabilization and planning for the rehabilitation of the bank building continued in 2004. Of the current walls, 50% to 60% will need to be reconstructed.

Identification and evaluation activities are performed to comply with National Historic Preservation Act Section 106 and Section 110. In 2004, approximately 3,300 acres were surveyed. Twenty-one historic period archaeological sites and 32 isolated finds, 25 of which date to the prehistoric period, were recorded in 2004.

Evaluation efforts in 2004 focused on generating information about the Hanford Site's pre-1943 agricultural landscape and White Bluffs town site in order for DOE to make its determination on the eligibility of these resources for listing in the National Register. DOE will make a final determination on their eligibility in 2005.

The application of the curation strategy for artifacts and records associated with the Hanford Site Manhattan Project and Cold War Era Historic District continued during 2004. Twenty assessments were conducted during 2004, in four buildings in the 300 Area, seven buildings in the 200 Areas, two facilities in the 700 Area (downtown Richland), and seven buildings in the 100-N Area.

DOE is making sure that significant cultural resources are managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values.

POTENTIAL RADIOLOGICAL DOSES FROM 2004 HANFORD OPERATIONS

During 2004, the potential radiological dose to the public from Hanford operations was evaluated to determine compliance with pertinent regulations and limits. The potential dose to the offsite maximally exposed individual in 2004 was 0.14 microsievert per year. The national average dose from background sources, according to the National Council on Radiation Protection, is approximately 3 millisievert per year, and the current DOE radiological dose limit for a member of the public is 1 millisievert per year.

QUALITY ASSURANCE

Comprehensive quality assurance programs, which include various quality control practices and methods to verify data, are maintained by monitoring and surveillance projects to assure data quality. The programs are implementedthrough quality assurance plans designed to meet requirements of the American National Standards Institute/American Society of Mechanical Engineers and DOE Orders. Quality assurance plans are maintained for all activities, and auditors verify conformance. Quality control methods used in 2004 included replicate sampling and analysis, analysis of field blanks and blind reference standards, participation in interlaboratory crosscheck studies, and splitting samples with other laboratories.

Quality assurance and quality control practices are incorporated into all aspects of site environmental monitoring and surveillance programs.

In 2004, sample collection and laboratory analyses were conducted using documented and approved procedures. When sample results were received, they were screened for anomalous values by comparing them to recent results and historical data. Analytical laboratory performance on the submitted double blind samples, the EPA Laboratory Intercomparison Studies Program, and the national DOE Quality Assessment Program indicated that laboratory performance was adequate overall, was excellent in some areas, and needed improvement in others.

REPORT INQUIRIES

Inquiries about this booklet or comments and suggestions about its content may be directed to Mr. D. C. (Dana) Ward, U.S. Department of Energy, Richland Operations Office, P.O. Box 550, Richland, Washington 99352 (Dana_C_Ward@rl.gov) or to Mr. T. M. (Ted) Poston, K6-75, Pacific Northwest National Laboratory, P.O. Box 999, Richland, Washington 99352 (ted.poston@pnl.gov).

Copies of this summary booklet and the 2004 report have been provided to many public libraries in communities around the Hanford Site and to several university libraries in Washington and Oregon. Copies also can be found at DOE's Public Reading Room located in the Consolidated Information Center, Room 101L, in Richland, Washington. Copies of the 2004 report can be obtained from Mr. R. W. (Bill) Hanf, K6-75, Pacific Northwest National Laboratory, P.O. Box 999, Richland, Washington 99352 (bill.hanf@pnl.gov) while supplies last. The reports can be accessed on the Internet at http://hanford-site.pnl.gov/envreport.