



Summary

L. F. Morasch

Each year, the U.S. Department of Energy (DOE) publishes this integrated environmental report on the Hanford Site to summarize environmental data and information, describe environmental management performance, demonstrate the status of compliance with environmental regulations, and highlight major environmental programs and efforts. Individual sections of the report are designed to

- describe the Hanford Site and its mission
- summarize the status of compliance with environmental regulations
- describe the environmental programs at the Hanford Site

- discuss the estimated radiation exposure to the public from 2001 Hanford Site activities
- present effluent monitoring, environmental surveillance, and groundwater protection and monitoring information
- discuss activities to assure quality.

DOE's current primary mission at the Hanford Site includes cleaning up and shrinking the size of the site. It is the policy of DOE that all activities be carried out to comply with applicable federal, state, and local laws and regulations, DOE Orders, Secretary of Energy Notices, and directives, policies, and guidelines from DOE Headquarters and site operations.

Compliance with Environmental Regulations in 2001

A key element in Hanford's compliance program is the Tri-Party Agreement. The Tri-Party Agreement is an agreement among the Washington State Department of Ecology, U.S. Environmental Protection Agency (EPA), and 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). In 2001, 39 of 41 specific Tri-Party Agreement cleanup milestones were completed on or before their required due dates. One milestone was delayed because of unanticipated costs and contracting issues, and one is expected to be completed under an agreement between DOE and the Washington State Department of Ecology.

Cleanup activities on the Hanford Site generate radioactive, mixed, and hazardous waste (Section 2.5). Mixed waste has both radioactive and hazardous non-radioactive substances. Hazardous waste contains either dangerous waste or extremely hazardous waste or both. This waste is handled and prepared for safe storage on the site or shipped to offsite facilities for treatment and disposal. In 2001, cleanup activities

generated 328,500 kilograms (724,300 pounds) of solid mixed waste and 1.6 million kilograms (3.6 million pounds) of radioactive waste on the Hanford Site. There were 127,000 kilograms (280,000 pounds) of mixed waste and 4.7 million kilograms (10.4 million pounds) of radioactive waste received at Hanford from offsite. During 2001, a total of 59,000 kilograms (130,000 gallons) of hazardous waste was shipped off the Hanford Site. Liquid waste also was generated on the Hanford Site (Table 2.5.5). During 2001, there were 2.98 million liters (788,000 gallons) of waste added to the double-shell tanks; the total volume of liquid waste in the double-shell tanks at the end of 2001 was 79.98 million liters (21.1 million gallons).

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 several places awaiting cleanup and ultimate safe storage or disposal. Examples include high-level radioactive waste stored in single- and double-shell tanks and transuranic waste stored in vaults and on storage pads (see Section 2.5 for details).

The site's compliance with federal acts in 2001 is summarized in Table S.1. For a detailed discussion of the

site's compliance with environmental regulations during 2001, refer to Chapter 2 of this report.

Table S.1. Compliance with Federal Acts at the Hanford Site in 2001

Regulation	What it Covers	2001 Status
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	Sites already contaminated by hazardous materials.	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 chemicals in the community and establishes emergency planning procedures.	The Hanford Site met the reporting requirements contained in this act.
Resource Conservation and Recovery Act (RCRA)	Hazardous waste being generated, transported, stored, treated, or disposed. The act primarily covers ongoing waste management at active facilities.	The Washington State Department of Ecology identified two violations during 2001. Both violations were associated with chemical storage. DOE has implemented corrective action for one and has appealed the other. Resolution efforts are ongoing.
Clean Air Act	Air quality, including emissions from facilities and diffuse and unmonitored sources.	According to the Washington State Department of Health, air emissions from Hanford Site facilities were well below state and federal standards. However, Washington State Department of Health issued five notices of corrective action regarding stack emissions and corrective efforts are ongoing.
Clean Water Act	Discharges to U.S. waters.	The Hanford Site had two National Pollutant Discharge Elimination System Permits and seven State Wastewater Discharge Permits in 2001.
Safe Drinking Water Act	Drinking water supplies operated by DOE.	There were ten public water systems on the Hanford Site in 2001.
Toxic Substances Control Act	Primarily chemicals called polychlorinated biphenyls.	In 2001, DOE formed a team to resolve issues related to polychlorinated biphenyl issues on a sitewide basis at Hanford. The team created a users guide in 2001 to assure consistent interpretation and implementation of this act.
Federal Insecticide, Fungicide, and Rodenticide Act	Storage and use of pesticides.	At the Hanford Site, pesticides are applied by licensed commercial pesticide operators.
Endangered Species Act	Rare species of plants and animals.	Hanford activities followed the requirements of this act. The Hanford Site has eight plant species, two fish species, and five bird species on the federal or state list of threatened or endangered species.
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 fifty cultural resources reviews were conducted on the Hanford Site.
National Environmental Policy Act	Environmental impact statements for federal projects.	Environmental impact statements and environmental assessments were prepared or conducted as needed.
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.

Environmental Occurrences

Environmental releases of radioactive and regulated materials from the Hanford Site are reported to 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.

During 2001, there were no environmentally significant emergency occurrence reports filed. There was one environmentally significant unusual occurrence report

filed in 2001. In May 2001, a subcontractor working at the 600-23 burial ground unearthed an unknown piece of equipment with a liquid reservoir. Approximately 38 liters (10 gallons) of an oily substance had leaked from this reservoir into the ground. Laboratory analysis revealed the presence of polychlorinated biphenyls in the spilled substance. The spill was entirely contained, and the equipment and contaminated soil were disposed of at the Environmental Restoration Disposal Facility.

Off-normal occurrences are discussed in Sections 2.2 and 2.4.

Environmental Monitoring

Environmental monitoring at the Hanford Site includes near-facility environmental monitoring, surface environmental surveillance, 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. Surface environmental surveillance consists of sampling and analyzing various media on and around the site (including the Columbia River) to detect potential contaminants and to assess their significance to environmental and human health. Groundwater sampling 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 migration (Section 6.0). Vadose monitoring was conducted to better understand and alleviate the spread of subsurface contamination (Section 7.2).

The overall objectives of these monitoring and surveillance programs are to demonstrate compliance with applicable federal, state, and local regulations; confirm adherence to DOE environmental protection policies; and support environmental management decisions.

Environmental monitoring and surveillance results for 2001 are summarized in Table S.2. For detailed discussions of results, refer to the appropriate sections of this report.

Facility Effluent Monitoring

Liquid and airborne effluents 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. Effluent 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.

In 2001, only facilities in the 200 Areas discharged radioactive liquid effluents to the ground, which went to

the State-Approved Land Disposal Site (Section 3.1.3). Radioactive air emissions usually come from a building stack or a vent. Radioactive emission discharge points are located in the 100, 200, 300, and 400 Areas. Table 3.1.1 of this document provides a summary of radionuclides discharged to the atmosphere at the Hanford Site in 2001. Non-radioactive air pollutants from such things as diesel-powered electrical generating plants were monitored. In 2001, the 200 Areas tank farms produced reportable ammonia emissions that are summarized in Table 3.1.2 of this document.



Table S.2. Hanford Site Monitoring Results for 2001

	<u>What was Monitored?</u>	<u>The Bottom Line</u>
Air	Air sampling equipment collected particles and gases, which were analyzed for radioactive materials. Air was sampled at 24 locations on Hanford, 11 perimeter locations, 8 nearby communities, and 2 distant communities.	All measurements of radioactive materials in air were below recommended guidelines.
Columbia River Water	Columbia River water was collected from 56 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 all far below federal and state limits. During 2001, there was no indication of any deterioration of Columbia River water quality resulting from site operations along the Hanford Reach.
Columbia River Shoreline Springs	Groundwater discharges to the Columbia River via surface and subsurface locations. Discharges above the water level of the river are identified as riverbank springs. Samples of spring water were collected at 10 locations along the Columbia River shoreline.	Samples collected at the springs contained contaminants at levels above drinking water standards. However, concentrations in river water downstream of the shoreline springs remained far below federal and state limits.
Groundwater	Groundwater samples were collected from 694 wells to analyze water quality. Water levels were measured in several hundred wells on the site to map groundwater movement.	Groundwater monitoring is focused on preventing the spread of contamination. Samples show that groundwater contaminant plumes are moving slowly from beneath former waste sites toward the Columbia River. Contaminant concentrations are declining in the largest plumes because of spreading and radioactive decay.
Vadose Zone	The vadose zone is the region between the ground surface and the top of the water table. Vadose zone characterization and monitoring are conducted to better understand and alleviate the spread of subsurface contamination.	Vadose zone characterization was conducted at three sites in the 200 Areas, one site in the 100 Area, and one site in the 600 Area. Vadose zone monitoring occurred at four sites in 2001. Technical demonstrations are designed to result in new, innovative methods for environmental monitoring and cleanup on the Hanford Site. In 2001, six technical studies were conducted.
Drinking Water	The quality of the drinking water supplied by ten DOE-owned systems on the Hanford Site was analyzed.	All DOE-owned drinking water systems on the Hanford Site met Washington State and EPA regulations. The annual average concentrations of radiological contaminants in all samples were below state and federal standards.
Food and Farm Products	Samples of alfalfa, grapes, leafy vegetables, milk, potatoes, tomatoes, and wine were collected from 20 locations around the Hanford Site.	Radionuclide levels 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 six locations. Carcass, bone, and muscle samples were analyzed to evaluate radionuclide levels.	Samples of whitefish, rabbits, and Canada geese were collected and analyzed. Strontium-90 in the bones of rabbits onsite were above analytical detection limits. Radionuclide levels in edible tissues were all below analytical detection limits.
Effluent Monitoring	Liquid effluents and airborne emissions that may contain radioactive or hazardous constituents are continually monitored on the Hanford Site.	Some quantities of radionuclides were released to the environment at state and federally permitted release points. Tritium above natural background levels is released to the ground at the State-Approved Land Disposal facility in the 200 Areas under a state-approved discharge permit.
Soil and Vegetation	Samples of soil and perennial vegetation were collected at onsite, perimeter, and distant locations. Thirty-eight soil samples and 13 vegetation samples were collected.	Some radionuclides were detected, but the concentrations were below dose-based reporting levels.

Waste Site Remediation

Full-scale remediation of waste sites began in the 100 Areas in 1996 and continued in 2001 at several liquid waste disposal sites in the 100-B/C, 100-F, and 100-H Areas (Section 2.3.10.2). Remediation of the treatment, storage, and disposal units at the 100-N Area continued also. In 2001, the following activities were completed:

- 100-B/C Area – 110,000 metric tons (121,000 tons) of contaminated soil were removed and shipped to the Environmental Restoration Disposal Facility in 2001; a total of 732,000 metric tons (86,000 tons) has been removed since startup.
- 100-H Area – 136 metric tons (150 tons) of contaminated soil were removed and shipped to the Environmental Restoration Disposal Facility in 2001; a total of 413,000 metric tons (455,000 tons) has been removed since startup.
- 100-F Area – 321,000 metric tons (353,000 tons) of contaminated soil were removed and shipped to the Environmental Restoration Disposal Facility in 2001; a total of 470,000 metric tons (517,000 tons) has been removed since startup.
- 100-N Area – a total of 112,200 metric tons (123,500 tons) of contaminated soil have been removed and shipped to the Environmental Restoration Disposal Facility since startup.

In 2001, remedial design for nine burial sites in the 100-B/C began. Decontamination and decommissioning activities continued in 2001 at the 100-D/DR, 100-H, and 100-F Areas. These activities are conducted to support the interim safe storage of the four reactor buildings for up to 75 years. The interim safe storage minimizes the potential risk to the environment, employees, and the public and reduces surveillance and maintenance costs. These activities are conducted as non-time-critical actions under CERCLA.

The environmental restoration contractor completed the final feasibility study for the Canyon Disposition Initiative in September 2001 and was in the final planning phase of the CERCLA remedial investigation/feasibility study. The purpose of this initiative is to investigate the potential for using the five canyon buildings at the Hanford Site as disposal facilities for remediation waste, rather than demolishing the structures. This final feasibility study is a strategic document for decision-making affecting the future of the Hanford Site.

Remedial investigation/feasibility studies continued in 2001 at soil waste sites in the 200 Areas. The work at

these operable units included feasibility studies, characterization, work plans, geophysical logging, and monitoring of ongoing remediation efforts.

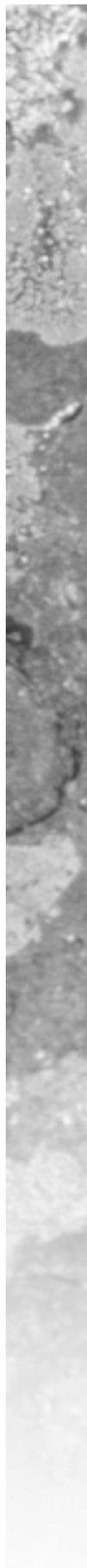
Remediation work at the 300-FF-1 Operable Unit continued. With the exception of the 618-4 burial ground, excavation of all 300-FF-1 Operable Unit waste sites has been completed and more than 482,000 metric tons (531,000 tons) of contaminated material and debris have been taken to the Environmental Restoration Disposal Facility. Excavation is scheduled to be completed in 2002.

During 2001, activities continued across the Hanford Site to clean up waste from past practices. The activities are guided by the Tri-Party Agreement, an agreement to achieve compliance with CERCLA remedial action provisions and with RCRA treatment, storage and disposal unit regulations and corrective action provisions. Many programs are an integral part of Hanford cleanup.

Pollution Prevention Program. This program (Section 2.3.1) focuses on conservation of resources and energy, reduction of hazardous substance use, and prevention or minimization of pollutant releases. In 2001, the efforts of the program reduced the quantity of disposed waste by recycling 32,405 cubic meters (1.1 million cubic feet) of radioactive and mixed waste, 33,387 metric tons (36,803 tons) of RCRA hazardous waste, and 3,428 metric tons (3,779 tons) of sanitary waste. The cost savings for waste disposal in 2001 exceeded \$23 million for these activities. During 2001, the Hanford Site also recycled 673 metric tons (742 tons) of paper products and 708 metric tons (780 tons) of various metals.

Spent Nuclear Fuel Project. This project (Section 2.3.2) provides safe, economic, and environmentally sound management of Hanford spent nuclear fuel and prepares the fuel for long-term storage. In 2001, the project installed two new underwater tables to increase productivity in the K-West Basin, fabricated ~330 fuel baskets to hold spent nuclear fuel prior to loading the fuel into canister overpacks, removed 38 overpacks from the K Basins to the Canister Storage Building, and started construction at the K Basins to make the modifications necessary to transfer the spent nuclear fuel in K-East Basin to the K-West Basin.

River Corridor Project. This project (Section 2.3.3) provides for deactivation of contaminated facilities in all areas of the Hanford Site and for safe storage of nuclear fuel until it can be transferred to



another facility, sold, or otherwise disposed. The River Corridor Project includes the Accelerated Deactivation Project, 324 and 327 Facilities Deactivation Project, 300 Area Liquid Effluent Facilities, Plutonium Finishing Plant, Waste Encapsulation and Storage and Facility Project, and the Equipment Disposition Project.

Advanced Reactors Transition Project. The mission of this project (Section 2.3.5) is to transition or convert the Plutonium Recycle Test Reactor facility, and facilities used for nuclear research, into structures that are in a safe and stable condition suitable for reuse or low cost surveillance and maintenance. The only facilities remaining to be cleaned up are in the southeastern part of the 300 Area, the high bay of the 337 Building, and the adjacent storage tank building, 3718M.

Office of River Protection. The Office of River Protection is responsible for managing DOE's River Protection Project, which is responsible for storage, retrieval, treatment, and disposal of high-level tank waste and closure of the tank farms on the Hanford Site (Section 2.3.6). The status of 177 waste tanks on the

Hanford Site was reported in *Waste Tank Summary Report for Month Ending December 31, 2001*.

Safety issues are of utmost concern, and Hanford tanks containing high-level waste were organized into categories in the 1990s to assure increased monitoring. Tanks that were assumed to be leaking were placed on a "Tank Watch List." There are 149 single-shell tanks and 28 double-shell tanks. The total estimated volume to date of radioactive waste leakage from single-shell tanks is <2.84 to 3.97 million liters (<749,760 to 1 million gallons). To date, 129 of the 149 single-shell tanks have been stabilized and the program is ahead of schedule. At the end of 2001, intrusion prevention work was completed on 108 single-shell tanks, and all the tanks were removed from the Tank Watch List.

The first 14 tanks that will deliver waste to the planned Waste Treatment Facility (i.e., vitrification plant) have been selected. Sampling has been performed in 12 of these tanks and characterization has been completed on 11 of them. This characterization information is being used to improve the design and future

Table S.3. Summary of Groundwater Pump-and-Treat Systems and a Soil-Vapor Extraction System

Location	Startup Date	Contaminant	Mass Removed (Groundwater Processed) in 2001	Mass Removed (Groundwater Processed) Since Startup
Groundwater Pump-and-Treat Systems				
100-D Area	1997	Hexavalent chromium	20.5 kilograms (96.7 million liters)	101.9 kilograms (550 million liters)
100-H Area	1997	Hexavalent chromium	5.8 kilograms (125.9 million liters)	27.5 kilograms (631.3 million liters)
100-K Area	1997	Hexavalent chromium	36.2 kilograms (338.8 million liters)	148.3 kilograms (1.24 billion liters)
100-N Area	1995	Strontium-90	0.18 curies (114.7 million liters)	1.1 curies (666.5 million liters)
200-West Area (200-ZP-1) Operable Unit	1994	Carbon tetrachloride	1,177 kilograms (326 million liters)	6,084 kilograms (1.67 billion liters)
200-West Area (200-UP-1) Operable Unit	1994	Carbon tetrachloride	2.41 kilograms (98.2 million liters)	20,615 grams (554.5 million liters)
	1994	Nitrate	3,540 kilograms (98.2 million liters)	20,487 kilograms (554.5 million liters)
	1994	Technetium-99	8.3 grams (98.2 million liters)	78.56 grams (554.5 million liters)
	1994	Uranium	15.5 kilograms (98.2 million liters)	136,740 grams (554.5 million liters)
Soil-Vapor Extraction				
200-West Area	1992	Carbon tetrachloride	710 kilograms	77,170 kilograms

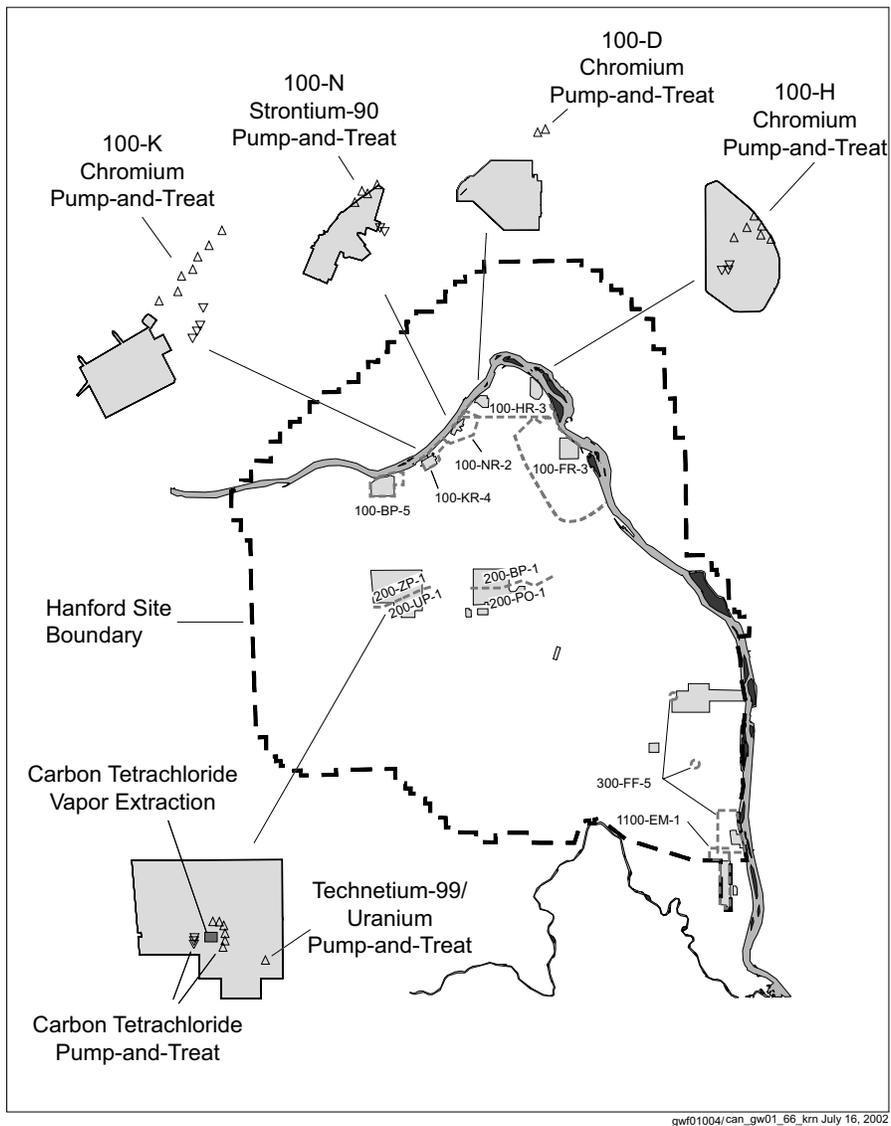


Figure S.1. DOE Pump-and-Treat Systems and Soil-Vapor Extraction System

operation of the Waste Treatment Facility. During 2001, an electrical substation, potable water services, effluent piping systems, and roads were completed for the Waste Treatment Plant. Construction of the plant as defined by the Tri-Party Agreement is scheduled to begin in 2002.

Solid Waste Management. Solid waste management at the Hanford Site included the treatment, storage, and disposal of solid waste at many Hanford locations (Section 2.3.7). During 2001, 460 cubic meters (16,245 cubic feet) of low-level mixed waste were treated and/or directly disposed onsite. Eight packages containing defueled reactor compartments from the U.S. Navy were received and disposed of at the 200-East Area in 2001.

Liquid Effluent Treatment. Liquid effluents are managed in facilities that comply with RCRA and state

regulations (Section 2.3.8). Approximately 32.7 million liters (8.6 million gallons) of liquid waste were stored at the Liquid Effluent Retention Facility and ~95 million liters (~25.1 million gallons) of liquid waste were treated at the 200 Area Effluent Treatment Facility in 2001. The 200 Area Treated Effluent Disposal Facility received ~484 million liters (~128 million gallons) of effluent in 2001.

Groundwater/Vadose Zone Integration Project. The Groundwater/Vadose Zone Integration Project (Section 2.3.11) brings together all activities that affect Hanford's subsurface. Restoring the condition of the groundwater under the Hanford Site is a major focus of the Groundwater/Vadose Zone Integration Project. The goal of groundwater restoration is to prevent contaminants from entering the Columbia River, reduce the contamination in areas of high concentration, prevent

the movement of contamination, and protect human health and the environment. Table S.3 lists a summary of the activities in 2001. Figure S.1 shows the location of groundwater remediation systems.

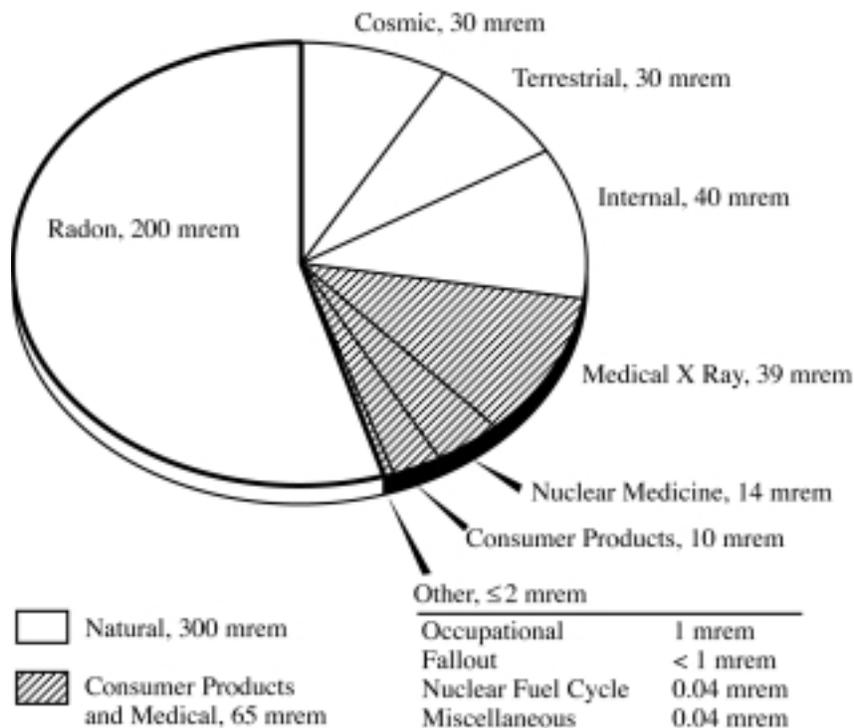
Revegetation and Mitigation Planning. During 2001, 50 hectares (123.5 acres) in the 100 Areas were planted with native grass and forb seed (Section 2.3.9). Following the seeding, 21,700 sagebrush seedlings were planted. In addition, the wetland habitat in the 100-B/C Area was planted to help restoration of the pit there. Two

sites in the 600 Area were revegetated; 900 sagebrush seedlings were planted on the Wahluke North Slope; 50 bitterbrush seedlings were planted at the 618-4 burial ground; and the area around the electrical line towers in the 200-East Area was revegetated. Monitoring the sagebrush seedlings that were planted in December 2000 on the Fitzner/Eberhardt Arid Lands Ecology Reserve continued in 2001; this monitoring will continue through 2004.

Potential Radiological Doses from 2001 Hanford Operations

During 2001, potential radiological doses to the public and biota from Hanford operations were evaluated to determine compliance with pertinent regulations and limits (Section 5.0). These doses were calculated using reported effluent releases and environmental surveillance data using version 1.485 GENII computer code and Hanford-specific parameters. The potential dose to the maximally exposed individual in 2001

from site operations was 0.009 mrem (9×10^{-5} mSv/yr). To put this value into perspective, the national average dose from background sources (Figure S.2), according to the National Council on Radiation Protection, is ~300 mrem/yr (3 mSv/yr), and the current DOE radiological dose limit for a member of the public is 100 mrem/yr (1 mSv/yr).



G01020114.97

Figure S.2. National Annual Average Radiological Doses from Various Sources (National Council on Radiation Protection and Measurements 1987)

Other Hanford Environmental Programs

Climate and Meteorology

Meteorological measurements are taken to support Hanford Site emergency preparedness, site operations, and atmospheric dispersion calculations. Weather forecasting and maintenance and distribution of climatological data are provided. The data are provided by the Hanford Meteorology Station, which is located on the Central Plateau. A complete report of climatological data for calendar year 2001 is contained in *Hanford Site Climatological Data Summary 2001 with Historical Data*.

Cultural Resources

Management of archaeological, historical, and traditional cultural resources at the Hanford Site complies with the requirements of various federal laws. During 2001, 150 cultural resource reviews were requested and conducted on the Hanford Site to comply with Section 106 of the *National Historic Preservation Act*.

Monitoring conducted during 2001 focused on four sites: Locke Island erosion, archaeological sites affected by visitors or nature, historic buildings, and places with Native American burials. A total of 86 archaeological sites, 3 buildings, and cemetery or burial locations were monitoring during 2001.

Public involvement is an important component of cultural resource management. To accomplish this goal, DOE developed mechanisms that allow the public access to cultural resources information and the ability to comment and make recommendations concerning the management of cultural resources on the Hanford Site. Native American involvement included the completion of several surveys, construction monitoring, and monthly meetings on cultural resource issues.

Community Operated Surveillance Program

This program was initiated in 1990 to increase the public's involvement in and awareness of Hanford's surveillance program. During 2001, nine radiological air sampling stations were operated by local teachers at selected locations around the site perimeter.

Quality Assurance

Comprehensive quality assurance programs, which include various quality control practices and methods to verify data, are maintained to ensure data quality. The programs are implemented through 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 include, but are not limited to, replicate sampling and analysis, analysis of field blanks and blind reference standards, participation in interlaboratory crosscheck studies, and splitting samples with other laboratories. Sample collection and laboratory analyses are conducted using documented and approved procedures. When sample results are received, they are 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.