



2.5 Waste Management and Chemical Inventories

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2.5.1 Waste Management

Waste produced from Hanford Site cleanup operations is classified as either radioactive, nonradioactive, mixed, or toxic. Radioactive waste is categorized as transuranic, high level, and low level. Mixed waste contains both radioactive and hazardous nonradioactive substances. Hazardous waste contains either dangerous waste or extremely hazardous waste or both, as defined in WAC 173-303. Hanford's hazardous wastes are managed in accordance with WAC 173-303.

Radioactive and mixed wastes are handled in several ways. High-level waste is stored in single- and double-shell tanks. Low-level waste is stored in double-shell tanks, on storage pads, or is buried. The method used to manage low-level waste depends on the source, composition, and concentration of the waste. Transuranic waste is stored in vaults or on underground and aboveground storage pads from which it can be retrieved.

Approximately 200 Hanford Site facilities have the capacity to generate dangerous and toxic waste. An annual report lists the dangerous wastes and extremely hazardous wastes generated, treated, stored, and disposed of on and off the site (DOE/RL-99-10). Dangerous wastes are treated, stored, and prepared for disposal at several Hanford Site facilities. Dangerous wastes generated at the site are also shipped off the site for disposal, destruction, or recycling.

Nondangerous wastes generated at the Hanford Site have historically been buried in the Solid Waste Landfill near the 200 Areas. Beginning in December 1995, nondangerous wastes have been disposed of at

the Richland City Landfill, a municipal landfill located at the southern edge of the Hanford Site boundary. Since 1996, medical wastes have been shipped to Waste Management of Kennewick. Asbestos has been shipped to Basin Disposal, Inc. in Pasco and the onsite Environmental Restoration Disposal Facility. Since 1996, nonregulated drummed waste has been shipped to Waste Management of Kennewick.

These nondangerous wastes originate at a number of areas across the site. Examples of these wastes are construction debris, office trash, cafeteria waste, and packaging materials. Other materials and items classified as nondangerous waste include solidified filter backwash and sludge from the treatment of river water, failed and broken equipment and tools, air filters, uncontaminated used gloves and other clothing, and certain chemical precipitates such as oxalates. Demolition wastes from decommissioning projects in the 100 Areas are buried in situ or in designated sites in the 100 Areas.

Annual reports document the quantities and types of solid wastes generated on the site, received, shipped off the site, and disposed of at the Hanford Site (HNF-EP-0125-11). Solid waste program activities are regulated by RCRA and the Toxic Substances Control Act and are discussed in Section 2.2, "Compliance Status." Solid waste quantities generated on the site, received from off the site, shipped off the site, and disposed of at the site from 1993 through 1998 are shown in Tables 2.5.1 through 2.5.3. Table 2.5.4 provides a detailed summary of the radioactive solid wastes stored or disposed of in 1998.



Table 2.5.1. Quantities of Solid Wastes^(a) Generated on the Hanford Site, kg (lb)

Waste Category	1993	1994	1995	1996	1997	1998
Mixed	150,000 (331,000)	568,000 (1,250,000)	132,000 (291,000)	199,000 (439,000)	442,000 (975,000)	509,000 (1,120,000)
Radioactive	1,120,000 (2,470,000)	1,390,000 (3,070,000)	1,890,000 (4,170,000)	3,870,000 (8,530,000)	6,590,000 (14,500,000)	1,470,000 (3,240,000)

(a) Solid waste includes containerized liquid waste.

Table 2.5.2. Quantities of Solid Wastes^(a) Received from Offsite, kg (lb)

Waste Category	1993	1994	1995	1996	1997	1998
Mixed	208,000 (459,000)	96,000 (212,000)	52,800 (116,000)	2,070 (4,560)	3,560 (7,850)	267 (589)
Radioactive	1,590,000 (3,510,000)	1,360,000 (2,990,000)	1,310,000 (2,890,000)	1,670,000 (3,680,000)	1,430,000 (3,150,000)	2,870,000 (6,330,000)

(a) Solid waste includes containerized liquid waste. Solid waste quantities do not include United States Navy submarine reactor compartments.

Table 2.5.3. Quantities of Hazardous Wastes^(a) Shipped Offsite, kg (lb)

Waste Category	1993	1994	1995	1996	1997	1998
Containerized	124,000 (273,000)	267,000 (589,000)	224,000 (494,000)	590,000 (1,300,000)	110,000 (243,000)	65,700 (145,000)
Bulk Solids	250,000 (551,000)	2,870,000 (6,330,000)	478,000 (1,050,000)	0	335,000 (739,000)	47,500 (105,000)
Bulk Liquids	94,000 (207,000)	249,000 (549,000)	130,000 (287,000)	98,800 (218,000)	5,025,000 (11,100,000)	41,800 (92,200)
Total	468,000 ^(b) (1,032,000)	3,386,000 ^(c) (7,470,000)	832,000 (1,840,000)	689,000 (1,520,000)	5,470,000 (12,100,000)	155,000 (342,000)

(a) Does not include Toxic Substances Control Act wastes.

(b) Includes 250,000 kg (551,250 lb) from demolition of 190-B Building, 100-B Area.

(c) Includes 2,660,000 kg (5,865,300 lb) from Wahluke Slope cleanup and 161,000 kg (355,005 lb) from carbon tetrachloride soil extraction near the Plutonium Finishing Plant, 200-West Area.



Table 2.5.4. Radioactive Solid Wastes Stored or Disposed of on the Hanford Site, 1998

Constituent	Quantity, Ci	
	Low Level^(a)	Transuranic^(b)
Tritium	240	(c)
Carbon-14	9.1	0.000002
Iron-55	35,000	(c)
Cobalt-58	2,600	(c)
Cobalt-60	6,900	40
Nickel-63	82,000	(c)
Strontium-90	3,200	2,600
Yttrium-90	3,200	2,600
Technetium-99	0.17	0.035
Cesium-137	1,600	4,300
Barium-137m	1,500	4,100
Europium-154	29	(c)
Uranium-233	98,000	(c)
Uranium-234	0.29	0.0000016
Uranium-235	0.023	0.000000052
Uranium-236	0.0079	0.00000012
Uranium-238	1.7	0.00000094
Plutonium-238	0.98	8.0
Plutonium-239	4.0	22
Plutonium-240	1.6	7.3
Plutonium-241	68	380
Plutonium-242	0.00057	0.004
Americium-241	2.3	11
Curium-244	1.9	0.37

- (a) The quantities of low-level wastes include both radioactive and mixed waste totals.
 (b) Transuranic waste quantities (>100 nCi/g) also include both radioactive and mixed transuranic waste.
 (c) Not reported or trace quantity.

The quantities of liquid wastes generated in 1998 and stored in underground storage tanks are included in the annual dangerous waste report (DOE/

RL-99-10). Table 2.5.5 is a summary of the liquid wastes generated from 1993 through 1998, which are stored in underground storage tanks.

2.5.2 Chemical Inventories

Types, quantities, and locations of hazardous chemicals are tracked through compliance activities associated with the Emergency Planning and Community Right-To-Know Act (see community right-to-know activities discussed in Section 2.2.4). The 1998 tier two emergency and hazardous chemical

inventory (DOE/RL-99-16) was issued in February 1999 in compliance with Section 312 of the Act. Table 2.5.6 summarizes the information reported, listing the 10 chemicals stored in greatest quantity on the Hanford Site in 1998.



Table 2.5.5. Quantities of Bulk Liquid Wastes^(a) Generated and Stored on the Hanford Site in 1998 and in Each of the Previous 5 Years, L (gal)

<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>
22,200,000 (5,870,000)	10,700,000 (2,830,000)	18,200,000 (4,810,000)	2,420,000 (639,000)	865,000 ^(b) (229,000)	1,780,000 (470,000)

(a) Bulk liquid waste is defined as liquid waste sent to double-shell underground storage tanks. This does not include containerized waste (e.g., barreled) included in the solid waste category.

(b) Revised number. The number reported in PNNL-11795 was incorrect.

Table 2.5.6. Average Balance of 10 Hazardous Chemicals Stored in Greatest Quantity on the Hanford Site, 1998

<u>Hazardous Chemical</u>	<u>Average Quantity, kg (lb)</u>
Coal	5,300,000 (11,700,000)
Mineral oil	1,700,000 (3,750,000)
Sodium	1,000,000 (2,210,000)
Diesel fuel (Grades 1 and 2)	580,000 (1,280,000)
No. 6 fuel oil	540,000 (1,190,000)
Crystalline silica (quartz, cristobalite, tridymite)	480,000 (1,060,000)
Bentonite	270,000 (595,000)
Ethylene glycol	250,000 (551,000)
Nitrogen	86,000 (190,000)
Carbon	77,000 (170,000)