

**Figure 4.29.** Occupational Injury and Illness Total Recordable Case Rates at the Hanford Site Compared with the DOE Complex and Private Industry (DOE 2002)

Table 4.18 shows occupational injury, illness, and fatality incidence rates reported for the private sector by the BLS (Department of Labor), and throughout the DOE complex, including DOE’s Richland Operations and Office of River Protection. During the 5-year period from 1997 to 2001, Hanford Site TRC and LWC rates were somewhat lower than those for DOE, whereas the private sector was consistently higher. Average LWD rates for Richland Operations for the 1997 to 2001 period were higher than Hanford’s Office of River Protection and the entire DOE complex. There were no fatalities at the Hanford Site during the 1997 to 2001 period (DOE 2002).

#### 4.11 Occupational Radiation Exposure at the Hanford Site

DOE’s Office of Safety and Health reports occupational radiation exposure data for all monitored DOE employees, contractors, subcontractors, and members of the public associated with DOE facilities. The total number monitored for the 5-yr period, 1997-2001, at the Hanford Site was 53,888 individuals. Waste processing and management facility employees monitored for the same period was 7404, or approximately 14 percent of the site workforce (DOE 2003).

**Table 4.18.** Occupational Injury, Illness, and Fatality Incidence Rates for U.S. Department of Energy Facilities and Private Industry (DOE 2002)<sup>(a)</sup>

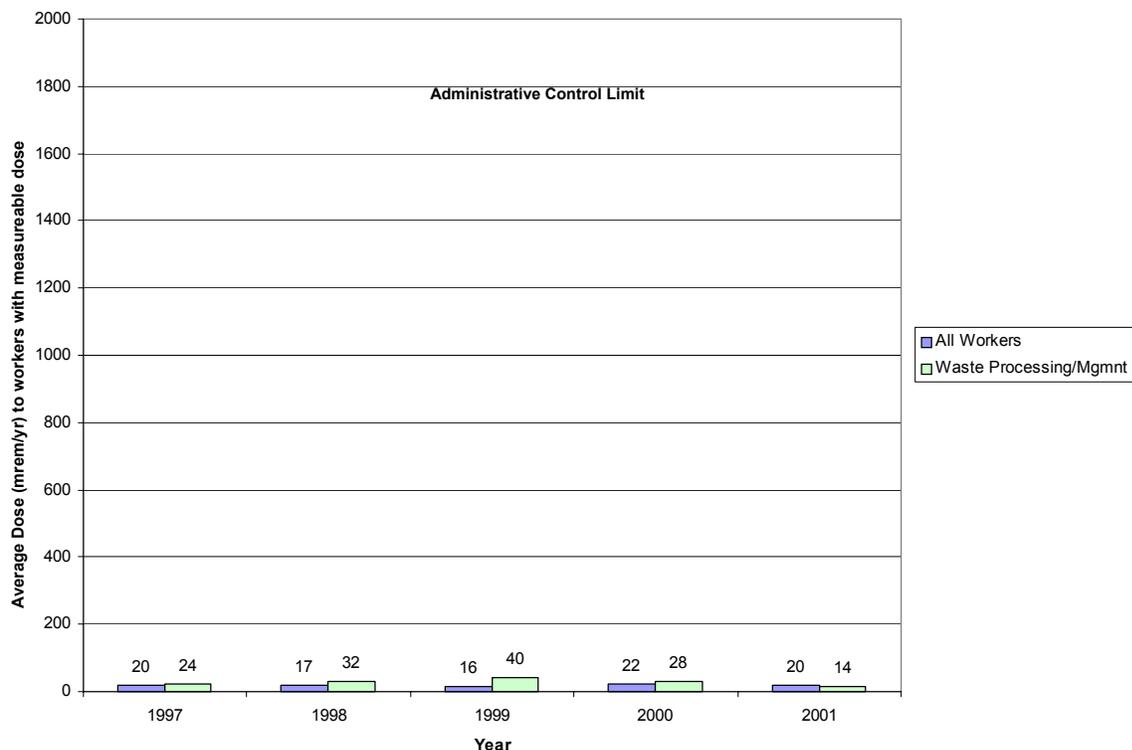
	Total Recordable Cases					Lost Work Cases					Lost Work Days					Fatalities
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001	Average
Bureau of Labor Statistics	7.1	6.7	6.1	6.3	NA	3.3	3.1	3.0	3.0	NA	NA	NA	NA	NA	NA	
1997-2000 Average	6.6					3.1										0.0046
U.S. Department of Energy	3.5	3.2	2.7	2.5	2.3	1.7	1.5	1.2	1.1	1.0	52.3	42.6	44.9	33.8	23.0	
1997-2001 Average	2.8					1.3					39.3					0.0012
DOE Office of River Protection, Hanford Site	3.0	3.1	2.6	2.6	1.7	1.0	1.4	1.1	1.1	0.4	34.0	32.8	66.9	51.5	9.5	
1997-2001 Average	2.6					1.0					38.9					0
DOE Richland Operations Office, Hanford Site	3.1	2.6	2.3	2.0	2.1	1.3	1.1	1.0	0.8	0.7	47.9	56.8	50.4	27.8	26.0	
1997-2001 Average	2.4					1.0					41.8					0

(a) Per 200,000 worker hours (100 worker-years).

DOE has established dose limits in order to control radiation exposures. The primary DOE dose limit is 5000 mrem/yr (50 mSv/yr) to the whole body, expressed as the total effective dose equivalent (TEDE), which is the sum of dose due to radiation sources internal and external to the body (10 CFR 835).

A maximum DOE Administrative Control Level (ACL) of 2000 mrem/yr (20 mSv/yr) per person is recommended for all DOE activities. DOE organizations are encouraged to establish site and facility-specific ACLs below this 2000-mrem/yr (20-mSv/yr) value. An ACL of 500 mrem/yr (5 mSv/yr) has been established for the vast majority of Hanford workers. Higher ACLs than 500 mrem/yr (5 mSv/yr) have been necessary for only a very small number of Hanford workers. There were no individual worker doses in excess of the 2000-mrem/yr (20-mSv/yr) ACL or the 5000-mrem/yr (50-mSv/yr) TEDE regulatory limit doses at the Hanford Site during the period 1997-2001 (DOE 2003).

Nineteen percent of the total monitored Hanford Site employees and 27 percent of the waste processing and management facility employees had measurable dose during the 1997-2001 period. Figure 4.30 illustrates the average Hanford Site occupational dose (mrem/yr). The average occupational dose for all monitored waste processing and management facility employees decreased from 40 to 14 mrem/yr (400 to 140  $\mu$ Sv/yr) for the period 1999 to 2001, a decline of 65 percent. The average dose for all monitored Hanford workers for the same time period generally increased (from 16 mrem/yr [160  $\mu$ Sv/yr] in 1999 to 20 mrem/yr [200  $\mu$ Sv/yr] in 2001) (DOE 2003).



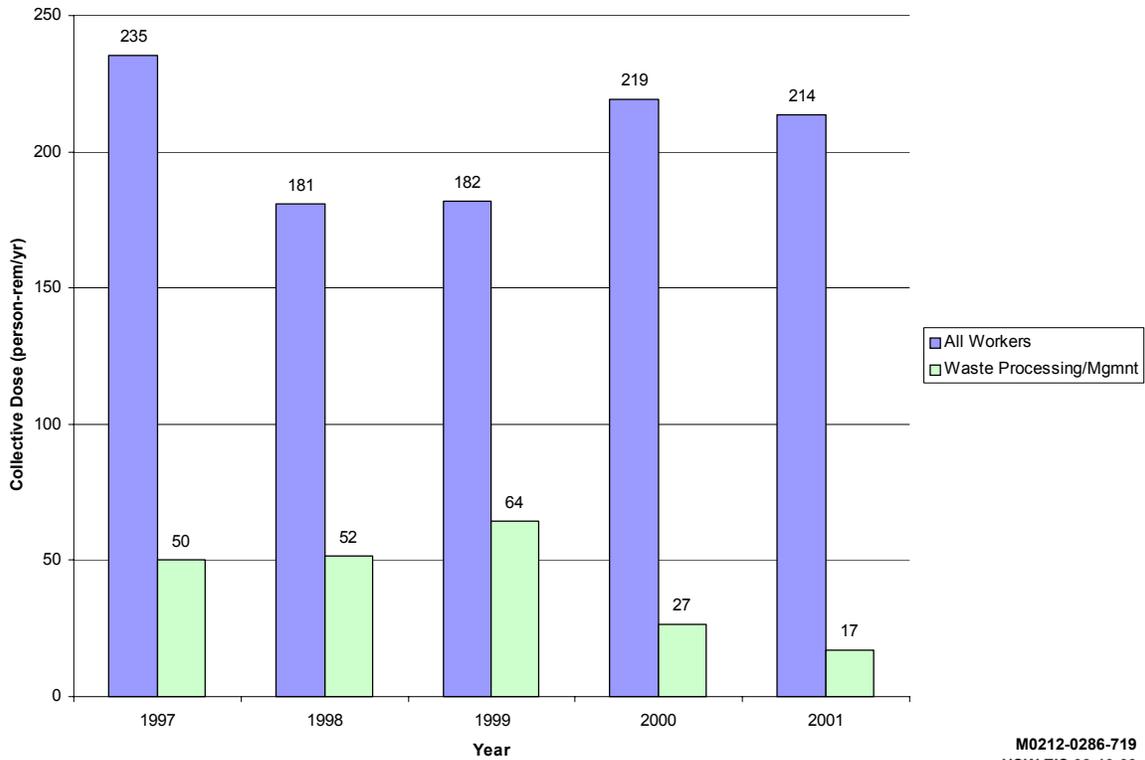
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**Figure 4.30.** Average Occupational Dose (mrem/yr) to Hanford Site Individuals with Measurable Dose, 1997-2001 (DOE 2003)

Collective dose is the sum of the dose received by all individuals with measurable dose and is measured in units of person-rem. (For example, a dose of 1 rem to 10 people would result in a collective dose of 10 person-rem.) Figure 4.31 shows the collective operational dose (person-rem/yr) at Hanford for the years 1997-2001.

The collective dose at the Hanford Site has decreased for the waste processing and management facility employees from 64 to 17 person-rem/yr for the period 1999 to 2001, a 73 percent decline. The collective dose for all workers for the same time period increased.

Table 4.19 shows the radiation exposure data for the Hanford Site (DOE 2003). For the period 1997-2001, the total number of individuals monitored has generally decreased, while the number of individuals with measurable dose has increased. The 5-year average occupational dose for workers with measurable dose was similar for all Hanford workers (103 mrem/yr [1 mSv/yr]) and waste management facility workers (107 mrem/yr [1.1 mSv/yr]), well below the typical Hanford ACL of 500 mrem/yr (5 mSv/yr).



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Figure 4.31. Collective Operational Dose (person-rem/yr) at the Hanford Site, 1997-2001 (DOE 2003)

Table 4.19. Radiation Exposure Data for the Hanford Site, 1997-2001 (DOE 2003)

Year	Total Number Monitored	Number with Meas. Dose	Percent with Dose >0	Total Collective Dose (TEDE)		Average Dose to Workers (mrem)	
				(Person-rem/yr)	(Person-mrem/yr)	All Monitored	All with Dose >0
<b>Hanford Site</b>							
2001	10,485	2218	21%	214	213,628	20	96
2000	10,048	1923	19%	219	219,032	22	114
1999	11,310	2013	18%	182	182,000	16	90
1998	10,441	1772	17%	181	180,927	17	102
1997	11,604	2058	18%	235	235,355	20	114
<b>Cumulative Totals</b>							
1997-2001	53,888	9984	19%	1031	1,030,942	19	103
<b>Waste Processing/Management Facility</b>							
2001	1216	294	24%	17	17,277	14	59
2000	938	234	25%	27	26,722	28	114
1999	1598	479	30%	64	64,258	40	134
1998	1609	419	26%	52	51,728	32	123
1997	2043	538	26%	50	50,033	24	93
<b>Cumulative Totals</b>							
1997-2001	7404	1964	27%	210	210,018	28	107