

4.8 Occupational Health and Safety

J.P. Duncan

This section describes worker health and safety experience at the Hanford Site, for use in comparing and estimating projected effects of proposed activities evaluated in NEPA documents. Information is presented on industrial accident and illness experience as well as worker exposure to radiation.

4.8.1 Industrial Illness and Injury Experience at the Hanford Site

Total occupational work hours at the Hanford Site for the 5-year period, 1999-2003, were 135,087,857 hours, or about 78,000 worker-years, based on 1735 hours of project-related labor per DOE worker-year. The DOE records occupational injuries and illnesses in four categories pertinent to National Environmental Policy Act analysis. Total Recordable Cases (TRC) are work-related deaths, illnesses, or injuries resulting in loss of consciousness, restriction of work or motion, transfer to another job, or requiring medical treatment beyond first aid. Lost Workday Cases (LWC) represent the number cases recorded resulting in days away from work or days of restricted work activity, or both, for affected employees. Lost Workdays (LWD) are the total number of workdays (consecutive or not), after the day of injury or onset of illness, during which employees were away from work or limited to restricted work activity because of an occupational injury or illness. Fatalities are the number of occupationally related deaths (DOE 2004a).

Occupational injury and illness incidence rates for the Hanford Site Office of River Protection showed an increase from 1999 through 2000, with rates ranging from 2.6 cases per 200,000 worker hours (100 worker years) during 1999 to 3.1 cases during 2000 (Figure 4.8-1). Rates dropped to 1.7 cases per 200,000 worker hours in 2001. Due to recordkeeping requirement changes, 2002 and 2003 data are not directly comparable to previous years (DOE 2004a). Data for 2002 and 2003 indicate the occupational injury and illness incidence rates for the Office of River Protection dropped from 1.7 to 1.1 cases per 200,000 worker hours.

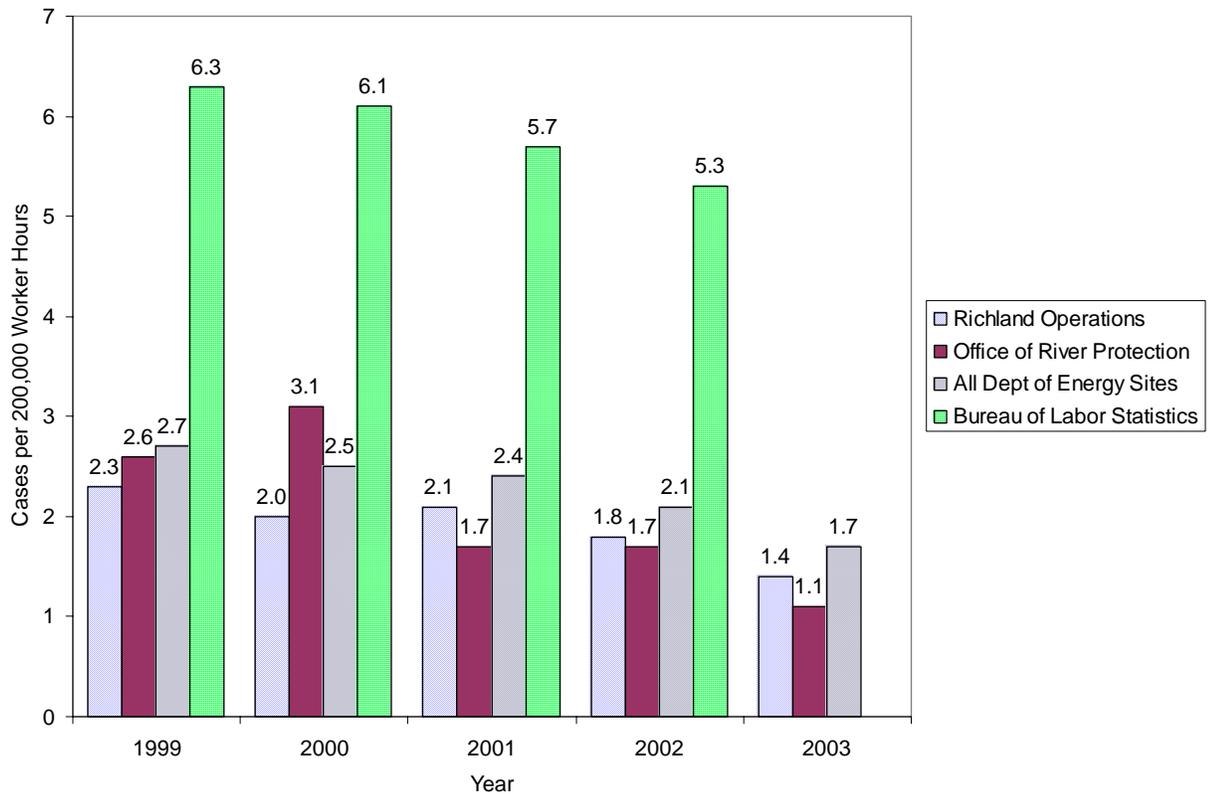


Figure 4.8-1. Occupational Injury and Illness Total Recordable Case Rates at the Hanford Site, Washington, Compared to Department of Energy and Private Industry (Note: Due to recordkeeping requirement changes, 2002 and 2003 data are not comparable to prior years) (DOE 2004a).

Occupational injury and illness incidence rates for Richland Operations declined from 2.3 cases per 200,000 worker hours during 1999 to 2.0 cases in 2000, increasing slightly during 2001 to 2.1 cases. Rates for 2002 and 2003 decreased from 1.8 to 1.4 cases per 200,000 worker hours (DOE 2004a).

Occupational injury and illness incidence rates for all DOE sites demonstrate similar annual decreases, ranging from 2.7 cases per 200,000 worker hours during 1999 to 2.4 cases in 2001. Data for 2002 and 2003 decreased from 2.1 to 1.7 cases per 200,000 worker hours (DOE 2004a).

Over the 5-yr period from 1999 to 2003 rates on the Hanford Site averaged 2.0 cases per 200,000 worker hours, whereas the incidence rate for all DOE sites averaged slightly higher, at 2.3 cases per 200,000 worker hours (DOE 2004a). Both the Hanford Site and DOE-wide average TRC rates were well below the Bureau of Labor Statistics (BLS) rates for U.S. private industry of 5.9 cases per 200,000 worker hours during the same period (BLS 2004).

During the 5-yr period from 1999-2003, Hanford Site TRC and LWC rates were somewhat lower than those for all DOE sites, whereas the private sector was consistently higher (Table 4.8-1). Average LWD rates for Hanford's Office of River Protection for the 1999 to 2003 period were higher than Richland Operations and DOE-wide rates. There were no fatalities at the Hanford Site during the 1999 to 2003 period (DOE 2004a).

Table 4.8-1. Occupational Injury and Illness Incidence Rates, and Fatality Counts for Department of Energy Facilities and Private Industry. ^(a)
 (Note: Due to recordkeeping requirement changes, 2002 and 2003 data are not comparable to prior years) (DOE 2004a and BLS 2004).

	Total Recordable Cases					Lost Work Cases					Lost Work Days					Fatalities				
	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
Bureau of Labor Statistics	6.3	6.1	5.7	5.3	NA	3.0	3.0	2.8	2.8	NA	NA	NA	NA	NA	NA	5488	5347	5281	4970	NA
1999-2002 average	5.9					2.9					NA					5272				
U.S. Department of Energy	2.7	2.5	2.4	2.1	1.7	1.2	1.1	1.0	1.0	0.7	45.1	36.0	27.5	40.4	25.6	1	4	0	1	0
1999-2003 average	2.3					1					34.9					1.2				
DOE Office of River Protection, Hanford Site	2.6	3.1	1.7	1.7	1.1	1.1	1.1	0.5	0.8	0.7	68.7	55.5	10.1	53.9	32.3	0	0	0	0	0
1999-2003 average	2.0					0.8					44.1					0				
DOE Richland Operations Office, Hanford Site	2.3	2.0	2.1	1.8	1.4	1.1	0.8	0.8	1.0	0.8	52.6	32.2	26.3	45.9	44.0	0	0	0	0	0
1999-2003 average	1.9					0.9					40.2					0				
(a) Per 200,000 worker hours. NA – data not available																				

4.8.2 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 number of workers monitored during the 5-yr period, 1999-2003, at the Hanford Site ranged from 10,048 to 11,310, for a total of 53,090 worker-years of monitored exposure. Waste processing and management facility employees on the Hanford Site, monitored for the same period, represented approximately 12 percent of the site's monitored workers, a total of 6180 worker-years of exposure (DOE 2004b).

DOE has established dose limits in order to control radiation exposures. Doses are expressed as Total Effective Dose Equivalent (TEDE), which is defined as the sum of the dose from radiation sources internal and external to the body, reported in units of rem or mrem. The regulatory limit for an individual worker is 5000 mrem (50 mSv) per year TEDE (10 CFR 835). A DOE Administrative Control Level (ACL) of 2000 mrem (20 mSv) per year TEDE has been established for all DOE workers to maintain doses well below the regulatory limit (DOE 1999c). There were no individual worker doses in excess of the 2000 mrem (20 mSv) per year TEDE ACL or the 5000 mrem (50 mSv) per year TEDE regulatory limit at the Hanford Site during the period 1999-2003 (DOE 2004b).

Measurable dose is used to report the dose for individuals whose TEDE is statistically greater than background measurements. Twenty-one percent of the total monitored Hanford Site employees and 28% of the waste processing and management facility employees had measurable doses during the 1999-2003 period. The average measurable dose for all monitored waste processing and management facility employees decreased 44% from 134 to 59 mrem/yr (1.34 to 0.59 mSv/yr) TEDE for the period 1999 to 2001, but has increased to 93 mrem/yr (0.93 mSv/yr) TEDE in 2003, an increase of 58% from 2001 to 2003. The average dose for all monitored Hanford workers increased from 90 mrem/yr [0.90 mSv/yr] TEDE during 1999 to 107 mrem/yr [1.07 mSv/yr] TEDE in 2003, an increase of 19% (Figure 4.8-2)(DOE 2004b).

Collective dose, an indicator of the overall workforce radiation exposure, is the sum of the dose received by all individual workers with measurable dose and is expressed in units of person-rem. (For example, a dose of 1 rem to each of 10 workers would result in a collective dose of 10 person-rem.) The collective dose at the Hanford Site decreased for waste processing and management facility employees from 64 to 17 person-rem/yr for the period 1999 to 2001, a 77% decline; however, it increased to 34 person-rem/yr in 2003. The collective dose for all workers for the 1999-2003 time period increased 54%, from 182 person-rem/yr to 281 person-rem/yr.

Radiation exposure data for the period 1999-2003 indicate the total number of individuals monitored on the Hanford Site has generally decreased, while the number of individuals with measurable dose has increased (Table 4.8-2) (DOE 2004b). The 5-yr average occupational dose for workers with measurable dose was 103 mrem/yr (10.3 mSv/yr) for all Hanford workers and 96 mrem/yr (9.6 mSv/yr) for waste management facility workers, well below the established ACL of 2000 mrem/yr (20 mSv/yr).

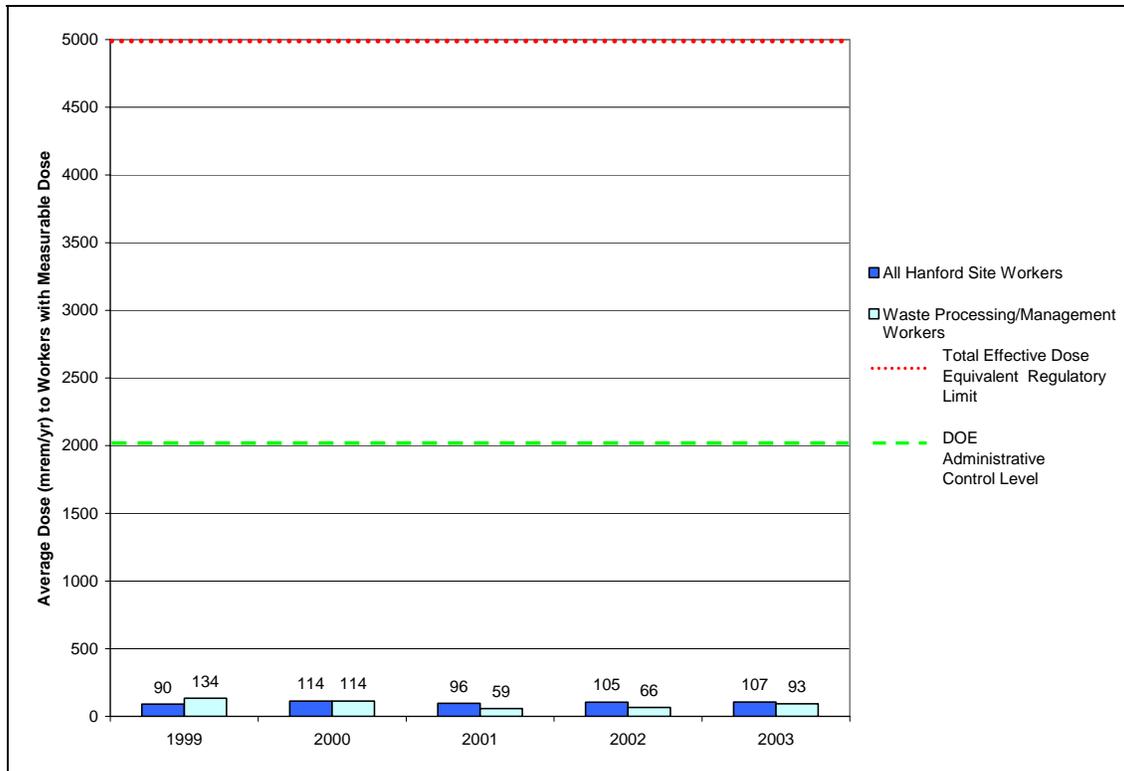


Figure 4.8-2. Average Measurable Dose (mrem/yr) to Hanford Site, Washington, 1999-2003 (DOE 2004b) (1 mrem = 0.01 mSv)

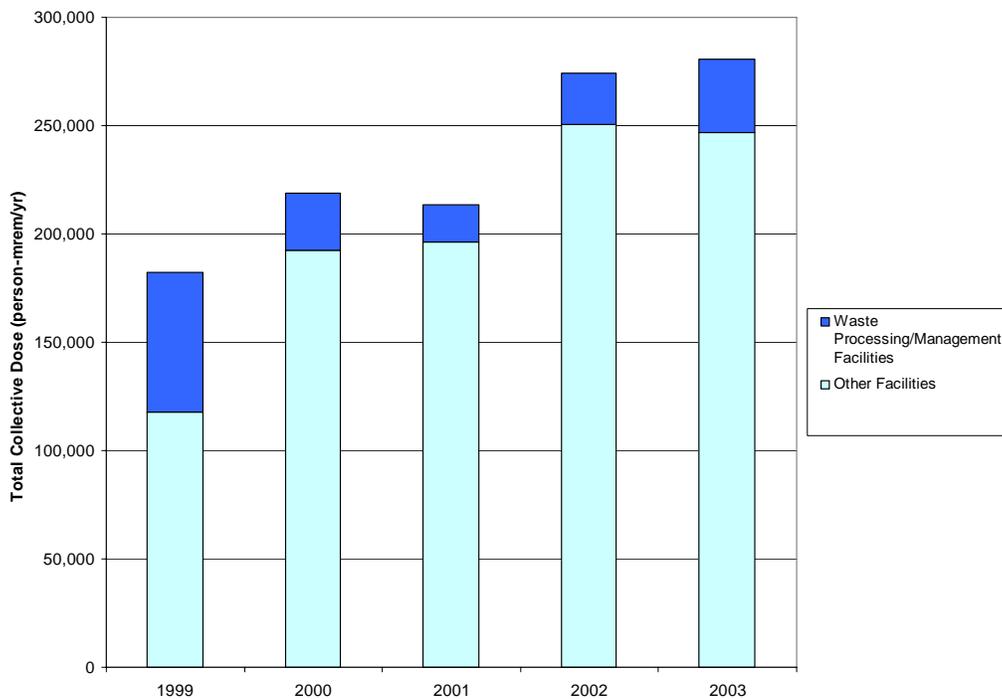


Figure 4.8-3. Collective Operational Dose (person-mrem/yr) at the Hanford Site, Washington, 1999-2003 (DOE 2004b). (1 mrem = 0.01 mSv)

Table 4.8-2. Radiation Exposure Data for the Hanford Site, Washington, 1999-2003 (DOE 2004b)
(1 mrem = 0.01 mSv)

Year	Total Number Monitored	Number with Measured Dose	Percent with Dose >0	Total Collective Dose (TEDE) (Person-mrem/yr)	Average Dose to Workers (mrem) (Dose >0)
Hanford Site					
2003	10,564	2,626	25%	280,781	107
2002	10,669	2,611	24%	274,384	105
2001	10,499	2,219	21%	213,630	96
2000	10,048	1,923	19%	219,032	114
1999	11,310	2,013	18%	182,000	90
Cumulative Totals					
1999-2003	53,090	11,392	21%	1,169,827	103
Waste Processing/Management Facility					
2003	1,203	366	30%	34,141	93
2002	1,225	360	29%	23,936	66
2001	1,216	294	24%	17,277	59
2000	938	234	25%	26,722	114
1999	1,598	479	30%	64,258	134
Cumulative Totals					
1999-2003	6,180	1,733	28%	166,334	96