

Epidemiologic Surveillance

Annual Summary for
EG&G
Rocky Flats Plant



Prepared by the Epidemiologic
Surveillance Data Center, a joint program
of the University of Washington and the
Fred Hutchinson Cancer Research Center

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This annual report was sponsored by and prepared for the U.S. Department of Energy. The views and opinions expressed in this report are those of its authors and do not necessarily reflect the views of the U.S. Department of Energy or its employees.

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Introduction

Epidemiologic surveillance consists of regular and systematic collection, analysis, and interpretation of data on illness and injury in the U.S. Department of Energy (DOE) work force at participating sites. These tasks are carried out by the Epidemiologic Surveillance Data Center, which is located at the University of Washington. Using these data, disease and injury rates are calculated and adjusted for factors, such as age, that independently affect the risk of disease. These rates are then analyzed and may be compared with the disease experience of different groups within the DOE work force and with populations who do not work for DOE. Risk estimates are calculated, time trends determined, and analyses undertaken of any apparent disease clusters. The results of epidemiologic surveillance will be combined with those of medical surveillance and exposure surveillance to form an integrated approach to worker health protection.

In this annual report, the 1992 morbidity data for EG&G Rocky Flats are summarized. These analyses focus on absences of 5 or more consecutive work days occurring among workers aged 16-69 years.

The data included in this report are supplemental to, but do not replace, those reported in other safety, industrial hygiene, and health physics reports prepared by DOE. There has been no attempt to validate diagnoses with external medical records, pathology, or other laboratory reports. Similarly, there has been no attempt to validate occupational information reported by the site.

Overview

The Rocky Flats Plant is located in northern Jefferson County, Colorado, approximately 16 air miles from Denver. In 1952, the Atomic Energy Commission selected the Rocky Flats site as one of seven production plants in the DOE's Weapons Complex. Rocky Flats manufactured components for nuclear weapons from materials, such as plutonium, beryllium, uranium, and various alloys of stainless steel, using varied metal fabrication technologies. This activity remained the primary mission of Rocky Flats until January 1992, when the mission was redirected to environmental cleanup. Rocky Flats is also involved in technology development to resolve critical waste management and environmental restoration issues.

Labor Force by Occupational Category

During 1992, there were 7,246 employees aged 16-69 identified by Rocky Flats as participants in epidemiologic surveillance. The composition of the work force in terms of salaried and hourly categories is given in Table 1. Approximately 64% of white collar workers were salaried, whereas one-third of blue collar workers were salaried.

There were 1,938 female and 5,308 male employees; women comprised 27% of the Rocky Flats work force. The average age of male employees was 42.9 years, and the average age of female employees was 39.0 years. Most of the women were classified in administration (44%), technical (21%), and professional (14%) occupations. The men were predominantly classified in technical (25%), crafts and manual laborers (24%), and professional (20%) occupations.

Table 1. Labor Force by Occupational Category

	Occupational Category	Number of Employees
White Collar	Administration	1,357
	Salaried	572
	Hourly	785
	Professional	1,359
	Salaried	1,143
	Hourly	216
	Technical	1,739
	Salaried	1,123
	Hourly	616
	Subtotal	4,455
Blue Collar	Service	274
	Salaried	128
	Hourly	146
	Craftsmen and Manual Laborers	1,412
	Salaried	329
	Hourly	1,083
	Nuclear	1,060
	Salaried	466
	Hourly	594
	Other	45
	Salaried	1
Hourly	44	
	Subtotal	2,791
	Total Number of Employees	7,246

Absences Among Work Force

Absences per Person

In 1992, 934 absences of 5 or more consecutive work days were reported (Table 2A). About 10.9% of the Rocky Flats work force (786 employees) were absent at least once for 5 or more continuous work days because of illness or injury. Approximately 15% of these workers had two or more absences resulting in an additional 148 absences. Women, who make up 27% of the work force, were twice as likely as men to have been absent at least once for 5 or more consecutive work days. They contributed 45% of all reported absences.

Table 2A. Absences per Person

Employee Categories	Number of Workers	Number of Absences (%)					Total Persons Absent at Least Once	Total Number of Absences
		0	1	2	3	4+		
Male	5,308	4,865 (91.6)	387 (7.3)	44 (0.8)	9 (0.2)	3 (0.1)	443	514
Female	1,938	1,595 (82.3)	279 (14.4)	57 (2.9)	5 (0.3)	2 (0.1)	343	420
TOTAL	7,246	6,460 (89.1)	666 (9.2)	101 (1.4)	14 (0.2)	5 (0.1)	786	934

Diagnoses per Absence

There were a total of 995 diagnoses recorded for the 934 reported absences (Table 2B). Multiple diagnoses were reported for 54 absences (6%). Women accounted for 46% (458/995) of the total diagnoses.

Table 2B. Diagnoses per Absence

Employee Categories	Number of Diagnoses per Absence			Total Number of Absences	Total Number of Diagnoses
	1	2	3		
Male	493	19	2	514	537
Female	387	28	5	420	458
TOTAL	880	47	7	934	995

Rate of Diagnoses

The 995 diagnoses noted for absences of 5 or more consecutive work days yielded an age-adjusted diagnoses rate of 129.9/1,000 (Table 2C). Women reported 2.6 times more diagnoses than men (232.9/1,000 versus 89.5/1,000) during 1992. These higher rates among women cannot be attributed to pregnancy or pregnancy-related events because these diagnoses account for only a small proportion (7.4%) of women's total diagnoses. Removing pregnancy diagnoses from the analysis decreased the age-adjusted diagnosis rate to 215.3/1,000.

Table 2C. Rate of Diagnoses

Employee Categories	Number of Workers	Number of Diagnoses*	Crude Rate per 1,000	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Male	5,308	537	101.2	89.5	81.2	98.6
Female	1,938	458	236.3	232.9	210.1	258.0
TOTAL	7,246	995	137.3	129.9	121.0	139.4

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Diseases and Injuries by Diagnostic Category

The age-adjusted diagnosis rates for each diagnostic category are given for all workers and separately for each gender in Tables 3, 4, and 5. Table 6 shows diagnoses associated with pregnancy, delivery, and conditions of the newborn.

Among men, diseases of the respiratory system accounted for over 27% of all diagnoses; the age-adjusted rate was 23.0/1,000 (Table 4). Pneumonia and bronchitis accounted for 67% (age-adjusted rate 10.1/1,000) and upper respiratory conditions accounted for 31% (age-adjusted rate 7.1/1,000) of all respiratory diseases. The second most frequent diagnostic category for men was external causes of injury; the age-adjusted rate was 17.2/1,000. Approximately 24% of these injuries were reported to be caused as accidental falls, and 14% were due to transportation accidents. Disorders of the musculoskeletal system ranked third; the age-adjusted rate is 13.4/1,000. Over half of these were dorsopathies, which included problems of the lumbar and cervical regions of the spine. The fourth most common diagnosis group was the digestive system with an age-adjusted rate of 9.4/1,000. Hernias and gall bladder disease accounted for 56% of these disorders, and problems of teeth or jaw followed at 22%. Absences due to circulatory system diagnoses and infections and parasitic diseases were the next most common diagnostic categories among men.

Among women, the leading cause of absence by diagnostic category was due to respiratory system problems that comprised 29% of their total diagnoses; the age-adjusted rate was 67.4/1,000 (Table 5). Pneumonia and bronchitis accounted for 60% (age-adjusted rate 27.6/1,000), and upper respiratory conditions accounted for 38% (age-adjusted rate 25.4/1,000) of all respiratory problems. The second most common diagnostic category among women associated with an absence was for the genitourinary system; the age-adjusted rate was 27.7/1,000. Over 16% of genitourinary diagnoses were associated with bladder disorders, 13% with kidney disorders, 11% with endometriosis, and 25% with disorders of the musculoskeletal system; the age-adjusted rate was 25.9/1,000. Approximately 46% of these diagnoses were dorsopathies. Disorders of the digestive system ranked fourth; the age-adjusted rate was 18.3/1,000. Gall bladder disorders were the most common diagnoses, followed by teeth or jaw problems, and hernias. Eight percent of absences were due to external causes of injury (age-adjusted rate 17.7/1,000) with 56% of the accidents reportedly caused by transportation accidents and falls.

The age-adjusted diagnosis rate for women was two to three times higher than that of men in 10 of the 15 major diagnosis categories. Women's and men's rates were similar for endocrine and metabolic diseases, mental disorders, nervous system diseases, and external causes of injury. There was no report of blood disease among women.

Six women and six men reported a malignancy in 1992. Among women, there were three breast cancers and one report each of bone cancer, connective tissue cancer, and melanoma. One woman sustained six absences associated with a cancer diagnosis and the remaining women reported one or two absences. Among men there were three neoplasms related to the skin and one diagnosis each of large intestine, pancreatic, and prostate cancer. All of these men reported one absence each.

Table 3. Diseases and Injuries by Diagnostic Category - Males and Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	59	8.1	6.1	11.0
Malignant neoplasms	140-208, 230-234	18	2.5	1.5	4.0
Digestive organs	150-159	2	0.4	0.1	1.5
Respiratory system	160-165	0	0.0	0.0	0.0
Breast	174-175	4	0.6	0.2	1.6
Genitourinary	179-185	1	0.2	0.0	1.5
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	0	0.0	0.0	0.0
Benign neoplasms & other	210-229, 235-239	12	1.4	0.8	2.5
Endocrine & metabolic diseases	240-279	12	1.3	0.7	2.4
Blood & blood-forming organs	280-289	2	0.2	0.0	0.7
Mental disorders	290-319	13	1.7	0.9	3.2
Alcoholism	303	0	0.0	0.0	0.0
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	38	4.6	3.2	6.5
Circulatory system	390-459	53	7.2	5.4	9.7
Acute myocardial infarction	410	9	1.0	0.5	2.0
Ischemic disease, not M.I.	411-414	13	1.7	1.0	3.0
Cerebrovascular disease	430-438	1	0.2	0.0	1.5
Respiratory system	460-519	281	34.7	30.4	39.6
Upper respiratory	460-465, 470-478	104	12.5	10.1	15.6
Pneumonia/bronchitis	466, 480-487	109	13.7	11.1	17.0
Chronic respiratory conditions	490-496	61	7.5	5.6	10.0
Digestive system	520-579	92	12.1	9.6	15.3
Hernias	550-553	30	3.8	2.6	5.6
Gall bladder disease	574-575	18	2.2	1.3	3.8
Genitourinary system	580-629	80	11.2	8.7	14.4
Benign prostatic hypertrophy	600	1	0.1	0.0	1.0
Endometriosis	617	6	1.5	0.6	3.7
Ovarian cysts	620.0-620.2	3	0.3	0.1	0.8
Female genital pain/bleeding	625-626	2	0.2	0.0	0.8
Pregnancy & childbirth	630-676	34	6.5	4.4	9.8
Skin & subcutaneous tissue	680-709	12	1.2	0.7	2.2
Musculoskeletal system	710-739	129	16.3	13.4	19.7
Dorsopathies	720-724	63	8.2	6.2	10.9
Congenital anomalies**	740-759	0	0.0	0.0	0.0
Conditions in perinatal period**	760-779	0	0.0	0.0	0.0
Symptoms, signs & ill-defined cond.	780-799	29	4.0	2.7	6.0
External causes of injury	E800-999	131	16.8	13.8	20.4
Transport accidents	E800-849	22	2.6	1.6	4.1
Medical accidents	E870-879	0	0.0	0.0	0.0
Accidental falls	E880-888	33	3.7	2.6	5.4
Accidents-struck by objects	E916-918	2	0.2	0.1	1.0
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		961	123.3	114.8	132.5
TOTAL		995	129.9	121.0	139.4

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

Table 4. Diseases and Injuries by Diagnostic Category: Males

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	29	5.4	3.4	8.5
Malignant neoplasms	140-208, 230-234	6	1.1	0.5	2.4
Digestive organs	150-159	2	0.4	0.1	1.7
Respiratory system	160-165	0	0.0	0.0	0.0
Breast	174-175	0	0.0	0.0	0.0
Genitourinary	179-185	1	0.2	0.0	1.8
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	0	0.0	0.0	0.0
Benign neoplasms & other	210-229, 235-239	5	0.8	0.3	1.9
Endocrine & metabolic diseases	240-279	8	1.2	0.6	2.5
Blood & blood-forming organs	280-289	2	0.3	0.1	1.0
Mental disorders	290-319	8	1.3	0.6	2.7
Alcoholism	303	0	0.0	0.0	0.0
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	23	3.9	2.4	6.2
Circulatory system	390-459	35	5.5	4.0	7.8
Acute myocardial infarction	410	9	1.3	0.7	2.6
Ischemic disease, not M.I.	411-414	10	1.7	0.9	3.1
Cerebrovascular disease	430-438	1	0.2	0.0	1.8
Respiratory system	460-519	147	23.0	19.1	27.6
Upper respiratory	460-465, 470-478	50	7.1	5.3	9.4
Pneumonia/bronchitis	466, 480-487	58	10.1	7.4	13.8
Chronic respiratory conditions	490-496	36	5.3	3.7	7.7
Digestive system	520-579	55	9.4	7.0	12.6
Hernias	550-553	24	4.0	2.7	6.0
Gall bladder disease	574-575	7	1.1	0.5	2.2
Genitourinary system	580-629	25	3.8	2.5	5.6
Benign prostatic hypertrophy	600	1	0.2	0.0	1.2
Endometriosis	617	N/A	N/A	N/A	N/A
Ovarian cysts	620.0-620.2	N/A	N/A	N/A	N/A
Female genital pain/bleeding	625-626	N/A	N/A	N/A	N/A
Pregnancy & childbirth	630-676	N/A	N/A	N/A	N/A
Skin & subcutaneous tissue	680-709	6	0.8	0.4	1.9
Musculoskeletal system	710-739	81	13.4	10.4	17.3
Dorsopathies	720-724	41	6.8	4.7	9.7
Congenital anomalies**	740-759	N/A	N/A	N/A	N/A
Conditions in perinatal period**	760-779	N/A	N/A	N/A	N/A
Symptoms, signs & ill-defined cond.	780-799	14	2.5	1.4	4.2
External causes of injury	E800-999	93	17.2	13.4	22.1
Transport accidents	E800-849	13	1.8	1.0	3.2
Medical accidents	E870-879	0	0.0	0.0	0.0
Accidental falls	E880-888	22	3.1	2.0	4.7
Accidents-struck by objects	E916-918	1	0.2	0.0	1.2
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		N/A	N/A	N/A	N/A
TOTAL		537	89.5	81.2	98.6

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

Table 5. Diseases and Injuries by Diagnostic Category: Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	30	15.5	10.5	22.9
Malignant neoplasms	140-208, 230-234	12	8.6	4.7	15.9
Digestive organs	150-159	0	0.0	0.0	0.0
Respiratory system	160-165	0	0.0	0.0	0.0
Breast	174-175	4	3.1	1.0	9.7
Genitourinary	179-185	0	0.0	0.0	0.0
Nervous system	191-192	0	0.0	0.0	0.0
Leukemia, lymphoma	200-208	0	0.0	0.0	0.0
Benign neoplasms & other	210-229, 235-239	7	3.3	1.5	7.3
Endocrine & metabolic diseases	240-279	4	1.4	0.5	3.8
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	5	2.1	0.8	5.6
Alcoholism	303	0	0.0	0.0	0.0
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	15	6.2	3.6	10.7
Circulatory system	390-459	18	11.4	7.0	18.4
Acute myocardial infarction	410	0	0.0	0.0	0.0
Ischemic disease, not M.I.	411-414	3	1.9	0.6	6.1
Cerebrovascular disease	430-438	0	0.0	0.0	0.0
Respiratory system	460-519	134	67.4	55.7	81.6
Upper respiratory	460-465, 470-478	54	25.4	19.0	34.0
Pneumonia/bronchitis	466, 480-487	51	27.5	19.9	38.0
Chronic respiratory conditions	490-496	25	12.8	8.4	19.5
Digestive system	520-579	37	18.3	12.7	26.4
Hernias	550-553	6	2.7	1.1	6.6
Gall bladder disease	574-575	11	5.7	2.8	11.8
Genitourinary system	580-629	55	27.7	20.6	37.3
Benign prostatic hypertrophy	600	N/A	N/A	N/A	N/A
Endometriosis	617	6	3.9	1.6	9.1
Ovarian cysts	620.0-620.2	3	0.9	0.3	2.8
Female genital pain/bleeding	625-626	2	0.7	0.2	2.8
Pregnancy & childbirth	630-676	34	17.6	12.1	25.5
Skin & subcutaneous tissue	680-709	6	2.4	1.0	5.6
Musculoskeletal system	710-739	48	25.9	18.6	36.0
Dorsopathies	720-724	22	13.7	8.3	22.6
Congenital anomalies**	740-759	0	0.0	0.0	0.0
Conditions in perinatal period**	760-779	0	0.0	0.0	0.0
Symptoms, signs & ill-defined cond.	780-799	15	7.3	4.2	12.6
External causes of injury	E800-999	38	17.7	12.6	25.0
Transport accidents	E800-849	9	4.9	2.4	9.8
Medical accidents	E870-879	0	0.0	0.0	0.0
Accidental falls	E880-888	11	5.0	2.6	9.5
Accidents-struck by objects	E916-918	1	0.3	0.0	2.1
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		424	215.3	193.5	239.6
TOTAL		458	232.9	210.1	258.0

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

Thirty-two female employees reported a diagnosis related to pregnancy; of these, 19 reported normal deliveries (Table 6). Six women reported absences for which the pregnancy outcome is unknown. Among the complications of pregnancy, there were two ectopic pregnancies and one miscarriage. The complications of labor and delivery included two cesarean sections and one fetal death. There were also a premature delivery and an absence associated with excessive vomiting; both pregnancies resulted in a healthy baby.

Table 6. Diagnoses Associated with Pregnancy, Delivery, and Conditions of Newborn

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Complications of pregnancy	630-648	11	5.4	2.8	10.4
Normal delivery	650	19	9.9	6.0	16.4
Complications of labor/delivery/puerperium	651-676	4	2.2	0.8	6.6
Congenital anomalies**	740-759	0	0.0	0.0	0.0
Conditions in perinatal period**	760-779	0	0.0	0.0	0.0
TOTAL		34	17.6	12.1	25.5

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

‡Includes delivery by cesarean section.

**Occurring in infants born to female employees.

Diagnoses by Occupational Category

During 1992, the age-adjusted diagnosis rate for all employees was similar in white and blue collar workers, 132.2/1,000, compared with 125.9/1,000 (Table 7).

When the diagnoses were examined for males and females separately, blue collar workers had higher diagnosis rates. Among males, the age-adjusted diagnosis rate for blue collar workers was 99.7/1,000 and 81.0/1,000 for white collar workers (Table 8). Among females, the age-adjusted diagnosis rate was 329.7/1,000 for blue collar workers compared with 217.3/1,000 for white collar workers (Table 9). This association is obscured when males and females are combined because women have a higher diagnosis rate and more women work in white collar positions. Among men, white collar workers were 79% of the total number of employees.

When individual occupational categories are considered, the diagnosis rates among females were higher than males in all categories. The largest difference was among nuclear workers; the age-adjusted diagnoses rate for men was 72.3/1,000 compared with 468.7/1,000 for women. It is notable that, among female nuclear workers, two women had a combined total of 13 diagnoses. The diagnosis rate fell from 468.7/1,000 to 382.0/1,000 when these two workers were excluded from the data. Although this age-adjusted rate for nuclear workers remains elevated compared with other occupational categories, the 18.5% decrease illustrates how a few workers with many diagnoses can increase the overall diagnosis rate.

Table 7. Diagnoses by Occupational Category: Males and Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	1,357	206	152.3	131.2	176.8
	Professional	1,359	139	94.1	78.1	113.5
	Technical	1,739	268	142.5	123.1	164.8
	Subtotal	4,455	613	132.2	120.9	144.6
Blue Collar	Service	274	28	87.2	57.7	131.8
	Craftsmen and Manual Laborers	1,412	197	139.9	114.1	171.6
	Nuclear	1,060	157	133.9	112.1	160.1
	Other	45	0	0.0	0.0	0.0
	Subtotal	2,791	382	125.9	112.1	141.3
TOTAL	7,246	995	129.9	121.0	139.4	

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Table 8. Diagnoses by Occupational Category: Males

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	504	35	64.7	44.7	93.6
	Professional	1,085	93	73.8	58.9	92.5
	Technical	1,326	145	97.8	80.1	119.4
	Subtotal	2,915	273	81.0	70.9	92.6
Blue Collar	Service	226	23	86.7	55.6	135.4
	Craftsmen and Manual Laborers	1,286	165	133.7	104.7	170.8
	Nuclear	853	76	72.8	56.0	93.3
	Other	28	0	0.0	0.0	0.0
	Subtotal	2,393	264	99.7	86.5	114.9
TOTAL	5,308	537	89.5	81.2	98.6	

*Includes all diagnoses reported with an absence of 5 or more days.

**Standardized to age distribution of 1970 U.S. population.

Table 9. Diagnoses by Occupational Category: Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	853	171	201.8	171.6	237.2
	Professional	274	46	157.5	113.9	217.7
	Technical	413	123	296.6	234.9	374.6
	Subtotal	1,540	340	217.3	192.7	244.9
Blue Collar	Service	48	5	93.1	35.7	242.9
	Craftsmen and Manual Laborers	126	32	291.4	190.3	446.2
	Nuclear	207	81	468.7	356.4	616.4
	Other	17	0	0.0	0.0	0.0
	Subtotal	398	118	329.7	266.5	408.0
TOTAL	1,938	458	232.9	210.1	258.0	

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Relative Risk for Selected Disease Categories by Occupation

In Tables 10A through 10O, the risk of at least one absence associated with selected diagnoses categories for specific occupational groups are compared with that for the entire Rocky Flats work force. This comparison takes into account the possible confounding effects of age and gender. In contrast to the previous series of tables, these analyses examine the risk of a worker having **one or more** absences in a diagnoses category during 1992 to minimize problems associated with one person having multiple absences for the same condition. Multiple absences for the same diagnoses category were counted only once in these analyses.

The statistical methods used to compare rates of absence are the relative risk and the 95% confidence interval. The relative risk is the rate of an absence in one group divided by the rate in a reference (comparison) group. A relative risk of *1.0* indicates that both groups have the same risk of absence. A relative risk of *2.0* indicates that a group has twice the risk of the reference group, whereas a relative risk of *0.5* implies that a group has one-half the risk of the reference group. The confidence interval represents the range of values for the relative risk that are consistent with the observed data. A 95% confidence interval implies that there is a 95% chance that the true relative risk lies within the interval. If the confidence interval includes the value *1.0*, then the observed difference in absence rates is likely to have occurred by chance; in other words, the relative risk is not statistically significant. For example, a relative risk with a confidence interval of *0.8 to 4.4* would not be considered statistically significantly different from a relative risk of *1.0*, whereas a relative risk with an interval of *1.7 to 4.2* is statistically significant.

Relative to the entire Rocky Flats work force, persons classified as working in nuclear occupations were found to have a statistically significant elevated risk of absence associated with malignant neoplasms (relative risk 3.0, 95% confidence interval 1.5-9.5) (Table 10B) and diseases of the nervous system (relative risk 2.0, 95% confidence interval 1.6-4.0) (Table 10F). Persons categorized in technical occupations were at an increased risk for absences associated with diseases of the circulatory system (relative risk 1.9, 95% confidence interval 1.1-3.2) (Table 10G) and at borderline risk for absences due to disease of the respiratory system (relative risk 1.2, 95% confidence interval 1.0-1.6) (Table 10H). Risks of absence were slightly elevated for craftsmen and manual laborers for diseases of the nervous system, skin and subcutaneous tissue disorders, musculoskeletal disorders, and external causes of injury; but the 95% confidence interval included 1.0.

The reasons for these patterns of elevated risk cannot be deduced from these statistics. The increased risk may be real; it may be an artifact of more complete reporting of absences for service workers, crafts workers, and other blue collar occupational groups; or it may be due to the broad range of diseases within each diagnostic category.

Table 10A. Infections

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	14	0.9	0.5	1.7
Professional	1,359	7	0.7	0.3	1.6
Technical	1,739	17	1.3	0.8	2.2
Service	274	1	0.5	0.1	3.7
Craftsmen and Manual Laborers	1,412	8	1.7	0.5	2.0
Nuclear	1,060	10	1.3	0.7	2.5
TOTAL (Reference Group)	7,201	57	1.0		

Table 10B. Malignant Neoplasms

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	0	0.0	0.0	0.0
Professional	1,359	4	2.0	0.6	6.1
Technical	1,739	1	0.4	0.1	2.7
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	3	1.5	0.4	5.6
Nuclear	1,060	4	3.0	1.5	9.5
TOTAL (Reference Group)	7,201	12	1.0		

Table 10C. Benign Neoplasms and Other

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	4	1.1	0.4	3.5
Professional	1,359	2	1.0	0.2	4.6
Technical	1,739	4	1.5	0.5	4.5
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	1	0.5	0.1	4.5
Nuclear	1,060	1	0.8	0.1	5.3
TOTAL (Reference Group)	7,201	12	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10D. Endocrine and Metabolic Diseases

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	3	1.2	0.3	5.2
Professional	1,359	1	0.5	0.1	4.0
Technical	1,739	5	1.8	0.6	5.2
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	0	0.0	0.0	0.0
Nuclear	1,060	2	1.4	0.3	6.3
TOTAL (Reference Group)	7,201	11	1.0		

Table 10E. Mental Disorders

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	5	1.8	0.6	5.6
Professional	1,359	2	0.8	0.2	3.7
Technical	1,739	1	0.3	0.0	2.4
Service	274	1	2.4	0.3	19.2
Craftsmen and Manual Laborers	1,412	2	0.9	0.2	3.7
Nuclear	1,060	2	1.1	0.3	5.0
TOTAL (Reference Group)	7,201	13	1.0		

Table 10F. Nervous System and Sense Organs

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	6	0.7	0.3	1.7
Professional	1,359	3	0.5	0.2	1.6
Technical	1,739	6	0.7	0.3	1.6
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	11	1.7	0.9	3.5
Nuclear	1,060	10	2.0	1.6	4.0
TOTAL (Reference Group)	7,201	36	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10G. Circulatory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	8	0.8	0.4	1.7
Professional	1,359	2	0.2	0.1	1.9
Technical	1,739	20	1.9	1.1	3.2
Service	274	1	0.6	0.1	4.7
Craftsmen and Manual Laborers	1,412	9	1.8	0.5	2.1
Nuclear	1,060	6	1.1	0.5	2.5
TOTAL (Reference Group)	7,201	46	1.0		

Table 10H. Respiratory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	60	0.9	0.7	1.2
Professional	1,359	35	0.8	0.6	1.1
Technical	1,739	75	1.2	1.0	1.6
Service	274	6	0.7	0.3	1.5
Craftsmen and Manual Laborers	1,412	47	1.1	0.8	1.6
Nuclear	1,060	35	1.0	0.7	1.4
TOTAL (Reference Group)	7,201	258	1.0		

Table 10I. Digestive System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	18	0.9	0.5	1.6
Professional	1,359	9	0.6	0.3	1.2
Technical	1,739	26	1.3	0.8	2.0
Service	274	4	1.4	0.5	3.7
Craftsmen and Manual Laborers	1,412	17	1.1	0.6	1.8
Nuclear	1,060	11	1.6	0.5	1.8
TOTAL (Reference Group)	7,201	85	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10J. Genitourinary System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	20	0.8	0.5	1.4
Professional	1,359	10	0.8	0.4	1.6
Technical	1,739	19	1.2	0.7	1.9
Service	274	3	1.4	0.4	4.4
Craftsmen and Manual Laborers	1,412	11	1.2	0.6	2.3
Nuclear	1,060	9	1.0	0.5	2.1
TOTAL (Reference Group)	7,201	72	1.0		

Table 10K. Pregnancy and Childbirth

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	12	0.9	0.5	1.8
Professional	1,359	7	1.4	0.6	3.2
Technical	1,739	8	1.1	0.5	2.5
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	1	0.5	0.1	3.9
Nuclear	1,060	4	1.0	0.4	3.0
TOTAL (Reference Group)	7,201	32	1.0		

Table 10L. Skin and Subcutaneous Tissue

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	1	0.3	0.0	2.7
Professional	1,359	3	1.4	0.4	5.0
Technical	1,739	2	0.7	0.2	3.0
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	5	2.6	0.9	7.7
Nuclear	1,060	1	0.6	0.1	4.9
TOTAL (Reference Group)	7,201	12	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10M. Musculoskeletal System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	21	0.8	0.5	1.3
Professional	1,359	17	0.8	0.5	1.3
Technical	1,739	30	1.1	0.7	1.6
Service	274	4	0.9	0.3	2.5
Craftsmen and Manual Laborers	1,412	29	1.4	0.9	2.1
Nuclear	1,060	19	1.1	0.7	1.9
TOTAL (Reference Group)	7,201	120	1.0		

Table 10N. Symptoms, Signs, and Ill-Defined Conditions

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	9	1.2	0.5	2.6
Professional	1,359	3	0.6	0.2	2.0
Technical	1,739	9	1.4	0.6	2.9
Service	274	0	0.0	0.0	0.0
Craftsmen and Manual Laborers	1,412	4	0.8	0.3	2.4
Nuclear	1,060	3	0.9	0.3	3.0
TOTAL (Reference Group)	7,201	28	1.0		

Table 10O. External Causes of Injury

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,357	18	0.8	0.5	1.3
Professional	1,359	24	1.1	0.7	1.6
Technical	1,739	22	0.7	0.5	1.2
Service	274	5	1.1	0.4	2.6
Craftsmen and Manual Laborers	1,412	32	1.4	0.9	2.1
Nuclear	1,060	22	1.2	0.8	1.9
TOTAL (Reference Group)	7,201	123	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

DIAGNOSTIC CATEGORIES

Category of Diagnoses	ICD-9-CM Code	Types of Illness in Category
All conditions	001-V82	All reported health events.
Infectious and parasitic diseases	001-139	Diseases caused by bacteria, viruses, and parasites.
Malignant neoplasms	140-208, 230-234	All cancers, regardless of the part of the body affected.
Benign neoplasms and neoplasms of uncertain behavior and unspecified nature	210-229, 235-239	Tumors that are not cancerous or that do not exhibit clearly malignant behavior, regardless of the part of the body affected.
Endocrine, nutritional and metabolic diseases, and disorders of the immune system	240-279	Diseases and conditions affecting the hormone secreting glands and organs; nutritional disorders, such as vitamin deficiency; metabolic diseases, such as diabetes and gout; and problems affecting the antibody producing system.
Diseases of the blood and blood-forming organs	280-289	Includes anemia and hemophilia, but excludes leukemia.
Mental disorders	290-319	Psychiatric diagnoses, such as dementia, schizophrenia, depression, and anxiety disorders; alcoholism; drug dependence; and eating disorders, such as bulimia.
Diseases of the nervous system and sense organs	320-389	Diseases affecting the brain, spinal cord, and peripheral nerves. Examples include meningitis; encephalitis; hereditary diseases, such as Huntington's chorea; Alzheimer's and Parkinson's disease; epilepsy; multiple sclerosis; migraine; diseases of the eye, such as cataract and glaucoma; and diseases of the ear, such as conductive hearing loss and otitis.
Diseases of the circulatory system	390-459	Diseases involving the heart, arteries, veins, and lymphatic system. Examples include rheumatic fever, heart murmurs, heart attacks, angina, hardening of the arteries, varicose veins, hemorrhoids, and phlebitis.
Diseases of the respiratory system	460-519	Includes colds, sinusitis, laryngitis, pneumonia and influenza, chronic bronchitis, asthma, and emphysema.
Diseases of the digestive system	520-579	Diseases affecting the teeth and mouth, salivary glands, digestive tract, and the abdominal cavity. Examples include dental abscess, ulcers, appendicitis, hepatitis (excluding viral hepatitis), cirrhosis of the liver, gallstones, pancreatitis, abdominal hernia, and intestinal polyps.
Diseases of the genitourinary system	580-629	Diseases affecting the kidneys, the prostate, and testes; benign breast diseases; infertility (male and female); pelvic inflammatory disease; diseases of the ovary; and menstrual disorders.
Complications of pregnancy, childbirth, and puerperium	630-676	Includes miscarriage; complications of pregnancy, such as hemorrhage; pregnancy-related high blood pressure; pre-eclampsia; premature labor or other complications of labor.
Diseases of the skin and subcutaneous tissue	680-709	Includes acne, cellulitis, sunburn, psoriasis, and seborrhea.
Diseases of the musculoskeletal system and connective tissue	710-739	Includes arthritis, systemic lupus erythematosus, ankylosing spondylitis, herniated intervertebral disc ("slipped disc"), lumbago, sciatica, rheumatism, tendinitis, and osteoporosis.
Congenital anomalies	740-759	Abnormal anatomical development present at birth. Includes spina bifida, cleft palate, harelip, and various chromosomal anomalies, such as Klinefelter's syndrome.
Certain conditions originating in the perinatal period	760-779	Conditions or diseases of the mother that can produce perinatal illness or death of the fetus or newborn. Examples include maternal high blood pressure, maternal malnutrition, ectopic pregnancy, and breech birth. Also includes other conditions originating in the perinatal period, such as fetal malnutrition or slow growth, injuries related to birth trauma, and perinatal jaundice.
Symptoms, signs, and ill-defined conditions	780-799	Symptoms, signs, abnormal results of laboratory or other tests, and conditions for which no specific diagnosis has been made. Examples include blackout, chills, dizziness, fatigue, pallor, abnormal weight loss, undiagnosed chest pain, and heartburn.
Injury and poisoning	800-999	Dislocation of joints; sprains and strains of joints and associated muscles; concussions; bruises; cuts; internal injuries due to crushing, puncture, tearing, or blunt impact; burns; blisters; poisoning; frostbite; heat stroke; and complications of medical or surgical care.
Fractures, all sites	800-829	Cracks or breaks of any bone.
Dislocations	830-839	Separation of a bone from its normal socket or joint.
Sprains and strains of joints and adjacent muscles	840-848	Strains include injuries to muscle from overexertion or from stretching the muscle beyond its normal limit. Sprains include injuries involving tearing or overextending the ligaments of a joint.
Intracranial injuries excluding those with skull fractures	850-854	Includes concussions, internal bruises, and hemorrhages within the skull without a fracture of the bones of the skull.
Internal injuries of the chest, abdomen, and pelvis	860-869	Includes internal injuries to the chest, abdomen, and pelvis and the organs within these areas of the body that do not involve an open wound.
Open wounds	870-897	Includes animal bites, cuts, lacerations, punctures, and amputations, excluding the arteries and veins.
Other injuries and effects of external causes	900-999	Miscellaneous injuries, including injuries to the arteries and veins, problems that occur an extended period of time after the injury has taken place ("late effects"), superficial bruises and abrasions, burns, post-injury shock, poisoning, toxic side effects of chemicals, heat stroke, electrocution, and altitude sickness.
Motor vehicle traffic accidents (external)	E810-E819	Includes accidents involving motor vehicles alone or with other motor vehicles, pedestrians, or vehicles operated by pedals.
Other accidents (external)	E916-E928	Includes accidents involving falling objects or machinery; accidents related to explosions; and those related to electrical current, radiation, hot or corrosive substances, noise, and overexertion.
Supplementary classifications related to personal or family history of disease	V10-V19	Covers situations in which the person is not ill or injured but has a personal or family history of problems, such as cancer, mental illness, allergies, or arthritis, that may affect his or her risk of illness.
Supplementary classifications related to health care for reproduction and child development	V20-V28	Includes problems related to pregnancy, postpartum care, contraception, outcome of delivery, and physical development of child.
Contact with health services for reasons other than illness or injury	V50-V59	Includes care for workers who have been treated previously for an illness or injury that is no longer present but who receive care to complete treatment or prevent recurrence.

GLOSSARY

Adjustment - A mathematical procedure for rates in which the effects of differences (such as age) in groups have been removed. The purpose of adjustment is to allow comparisons between two or more groups.

Epidemiologic Surveillance - The regular and systematic collection of data and interpretation of the distribution of illness, injury, and death in the DOE labor force over time.

ICD-9-CM - The ICD-9-CM (International Classification of Diseases-9th Revision-Clinical Modification) is based on the ICD-9 originally published by the World Health Organization and widely accepted as a standard for the coding of cause of death. The ICD-9-CM is required for the reporting of morbidity to all U.S. Public Health Service programs.

Diagnoses Rate - The number of new, reported health events observed among DOE workers per thousand DOE workers at risk during a given period of time.

STATISTICAL NOTE

The age-adjusted rate was calculated using the 1970 U.S. population. The age-adjusted rate represents the hypothetical rate that would have been observed if the 1992 or 1990-1991 group had the same age distribution as the 1970 U.S. population. The age-adjusted rate is used to compare populations that differ in age. The 1970 U.S. population was selected because it is the standard most used for published morbidity data.

The illness and injury absence rate is defined as an absence due to illness or injury of 21 or more consecutive work days, divided by the total number of workers. OSHA-recordable events may or may not involve an absence from work.

The 95% confidence interval is based on the normal approximation to the binomial distribution where the calculated illness and injury absence rate falls within the interval. The true rate lies within this interval 95% of the time.