



Annual Report for

EG&G

Rocky Flats

Epidemiologic
Surveillance

1993

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Foreword

The U.S. Department of Energy (DOE) is committed to assuring the health and safety of its workers through the development of epidemiologic surveillance activities. A pilot epidemiologic surveillance program has been implemented at selected DOE sites during the past several years. This approach has been expanded to include surveillance of all medical conditions that result in an absence of 5 or more consecutive workdays and deaths among active employees. This annual epidemiologic surveillance report provides the final summary for the Rocky Flats Plant for the 12-month period, January 1, 1993, through December 31, 1993.

Caution is required when comparing this information with that of other DOE facilities. Interpretation of these data must take into account the occupational medical program, health and safety practices, the composition of the work force, and potential occupational exposures unique to this facility; therefore, the data presented are pertinent only to the Rocky Flats Plant. Continuing surveillance and data examination may suggest emerging trends that change the preliminary interpretation of the data.

Plans for future annual reports include a discussion of important new findings and changes since previous reports and the incorporation of information from the National Center for Health Statistics and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program. This information will allow early recognition and investi-

gation of possible work-related problems, as well as an analysis of trends over time. In addition, the results of epidemiologic surveillance will be combined with those of medical and exposure surveillance to form an integrated approach to worker health protection.

Rocky Flats Plant at a Glance

- Between 1992 and 1993, the work force declined 11.7%. The largest proportional decreases were observed among service workers, those in crafts and manual labor, and workers in technical occupations.
- About 17% of the Rocky Flats work force experienced at least one absence of 5 or more days due to illness or injury during 1993.
- For both men and women, diagnosis rates were highest for respiratory diseases and external causes of injury. Respiratory diseases accounted for about 32% of all diagnoses reported during 1993; injuries, an additional 14%.
- No deaths were reported among active Rocky Flats workers during 1993.

Introduction

Epidemiologic surveillance at DOE facilities consists of regular and systematic collection, analysis, and interpretation of data on absences due to illness and injury in the work force. Its purpose is to provide an early warning system about health problems occurring among employees at participating sites. Data are collected by coordinators at each site and submitted to the Epidemiologic Surveillance Data Center, located at the Oak Ridge Institute for Science and Education, where quality control procedures and analyses are carried out. Rates of absences and rates of diagnoses associated with absences are analyzed by occupation and other relevant variables. They may be compared with the disease experience of different groups within the DOE work force and with populations that do not work for DOE to identify disease patterns or clusters that may be associated with work activities.

This annual report summarizes the 1993 morbidity data for the Rocky Flats Plant. The analyses focus on absences of 5 or more consecutive workdays occurring among workers aged 18-80 years. The results are arranged in five sets of tables that present: 1) the distribution of the labor force by occupational category

and pay status; 2) the absences per person, diagnoses per absence, and diagnosis rates for the whole work force; 3) diagnosis rates by type of disease or injury; 4) diagnosis rates by occupational category; and 5) relative risks for specific types of disease or injury by occupational category. Deaths occurring among active workers are listed separately; they are not included in any tables. All rates presented in this report are age-adjusted (see glossary) and represent the number of diagnoses reported per 1,000 persons in 1 year.

Throughout this report, the symbol "NA" means "not available" or "not applicable." An empty cell in a table indicates that the value of the cell is zero or that the value cannot be computed. The tables show the results of analyses of diagnoses resulting from *absences*. An absence is defined as a period of 5 or more consecutive workdays away from work due to some health problem, such as an illness or injury.

In tables presenting analyses of *diagnoses*, each diagnosis is counted because a diagnosis is for a specific illness or injury. A worker can have more than one diagnosis related to one absence from work. For example, a worker's single absence might involve both a back injury and pneumonia. Unlike analyses of absences, analyses of diagnoses focus on the rates of occurrence of specific

types of disease and injury. Thus the worker with one absence in which he had a back injury and pneumonia would be counted twice in the analysis of diagnoses because two separate diagnoses are recorded for this one absence.

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 medical records, pathology, or other laboratory reports. Also, there has been no attempt to validate occupational information reported by the site. For reporting purposes, occupational titles have been grouped into broad categories within which a great deal of diversity in tasks and exposures is likely to exist. Additional material outlining the methods used and explaining the diagnostic categories and frequently used terms can be found on the inside back cover.

Overview

The Rocky Flats Plant is located in northern Jefferson County, Colorado, approximately 16 miles from Denver. In 1952, the Atomic Energy Commission selected the Rocky Flats Plant 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, 1993

During 1993, there were 6,398 employees (aged 18-80) identified by Rocky Flats as participants in epidemiologic surveillance. Seventy-three percent (4,648 workers) were men, and 27% (1,750 workers) were women. Eighty-five percent (5,420 workers) of the work force was Caucasian. The remaining 15% included African Americans, Asians, Hispanics, and Native Americans.

The composition of the work force by occupational category and salary status is given in Table 1. The occupational categories used in the table are based on the occupation and industry codes created by the Bureau of the Census in 1980. Because workers can change occupational

categories over the course of a year, workers were counted in the occupational category in which they were located on January 1, 1993.

A small percentage of the workers were placed in the "other" hourly category (1%). Three of these workers had no job title. The remainder were summer or co-op students.

Sixty-five percent of the workers were salaried, whereas 35% were hourly. The occupational categories with the largest number of employees were administration (25%), technical (21%), and professional (19%).

Compared with the work force in 1992, the work force in 1993 decreased by 848 employees, a 11.7% reduction. The biggest reduction was among hourly service workers whose numbers decreased 37.6%. The only occupational categories in which the work force increased from 1992 to 1993 were administration and "other" workers. In the administration category, there were 236 more workers, a 17.4% increase over 1992. "Other" hourly workers increased from 45 to 50 workers in 1993, an 11.1% increase.

	Occupational Category	Number of Workers in 1993	Number of Workers in 1992	% Change from Last Year
Salaried	Administration	1,593	1,357	+17.4%
	Professional	1,219	1,359	-10.3%
	Technical	1,363	1,739	-21.6%
	Subtotal	4,175	4,455	-6.3%
Hourly	Service	171	274	-37.6%
	Craftsmen & Manual Laborers	1,066	1,412	-24.5%
	Nuclear	936	1,060	-11.7%
	Other	50	45	+11.1%
	Subtotal	2,223	2,791	-20.4%
TOTAL		6,398	7,246	-11.7%

Table 1.
Labor Force by Occupational Category, 1993

Absences Among Work Force, 1993

Absences per Person. In 1993, 1,114 Rocky Flats employees reported an absence of 5 or more consecutive workdays because of illness or injury. Of these workers, 243 (21.8%) had two or more absences. A total of 1,443 absences were reported by the employees (Table 2.A).

Diagnoses per Absence. A total of 1,663 diagnoses were associated with the 1,443 absences of 5 or more consecutive workdays. Multiple diagnoses were reported for 200 (13.9%) absences (Table 2.B).

Diagnosis Rates. In 1993, 1,663 diagnoses noted for absences of 5 or more consecutive workdays yielded an age-adjusted rate of 260.4

diagnoses per 1,000 persons. The diagnosis rate for women (442.4 per 1,000) was more than double the rate for men (184.5 per 1,000) (Table 2.C).

Employee Category	Number of Workers	Number of Absences						Total Persons Absent at Least Once	Total Number of Absences	
		0	1	2	3	4	5			6
Male	4,648	4,031	494	98	17	6	1	1	617	776
Female	1,750	1,253	377	81	31	6	1	1	497	667
TOTAL	6,398	5,284	871	179	48	12	2	2	1,114	1,443

Table 2.A.
Absences per Person

Employee Category	Number of Diagnoses per Absence				Total Number of Absences	Total Number of Diagnoses
	1	2	3	4		
Male	679	88	9	0	776	882
Female	564	94	7	2	667	781
TOTAL	1,243	182	16	2	1,443	1,663

Table 2.B.
Diagnoses per Absence

Employee Category	Number of Workers	Number of Diagnoses†	Crude Rate per 1,000	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Male	4,648	882	189.8	184.5	169.3	201.0
Female	1,750	781	446.3	442.4	405.2	482.9
TOTAL	6,398	1,663	259.9	260.4	244.9	276.9

Table 2.C.
Rate of Diagnoses

† 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, 1993

The age-adjusted diagnosis rate for each diagnostic category is given for all workers in Table 3. Because the patterns of diagnoses reported among men and women differ, Tables 4 and 5 show the diagnosis rates by gender to further describe the disease and injury patterns in the work force. Diagnoses associated with pregnancy, labor, and delivery are described in Table 6.

For all workers, the three diagnostic categories with the highest rates were diseases of the respiratory system (78.4 per 1,000), external causes of injury (32.7 per 1,000), and diseases of the musculoskeletal system (27.1 per 1,000). Together, these three categories accounted for 56% of all diagnoses.

The diagnostic category with the highest rate among men was diseases of the respiratory system (52.4 per 1,000), with 270 diagnoses reported among 232 men. This category accounted for 31% of all diagnoses among the men. Of these diagnoses, 104 were related to pneumonia/bronchitis, 99 to upper respiratory disease, and 58 to chronic respiratory conditions. The diagnostic category with the second highest rate was external causes of injury

(31.5 per 1,000), with 139 men reporting 158 diagnoses. Of these diagnoses, 46 were from injuries or accidents of an other/unspecified nature, 35 were from overexertion and strenuous movement, and 30 were from accidental falls. The category of musculoskeletal diseases (24.6 per 1,000) had the next highest rate, with 106 diagnoses reported among 98 men. Forty-eight percent of these diagnoses were for dorsopathies (spinal disorders), and 35% were for arthritis and related disorders. Additionally, 103 digestive disease diagnoses were reported among 89 men. In addition to the 39 diagnoses for hernias, 18 diagnoses were reported for diseases of the mouth, jaw, and teeth; 12 for enteritis and colitis; and 10 for appendicitis. Ten cancers were reported among nine men in 1993. Three men had prostate cancers, and one man each had leukemia, lymphoma, colon cancer, kidney cancer, larynx cancer, and lung cancer. One of the nine men had multiple diagnoses.

The diagnostic category with the highest rate among women was diseases of the respiratory system (143.4 per 1,000), with 263 diagnoses reported among 215 women. This category accounted for 34% of all diagnoses reported for women. Pneumonia/bronchitis and chronic respiratory conditions each accounted for 34% of the diagnoses, with 29% due to upper respiratory

diseases. The diagnostic category with the second highest rate was external causes of injury (38.2 per 1,000), with 67 diagnoses reported among 63 women. Fifteen diagnoses were reported for overexertion and strenuous movement, 14 for accidental falls, and 13 for traffic accidents. The category of genitourinary diseases (37.0 per 1,000) had the third highest rate, with 58 women reporting 72 diagnoses. Fifteen diagnoses were related to the urinary tract and 57 to the reproductive organs. The category of musculoskeletal diseases (35.6 per 1,000) ranked fourth, with 66 diagnoses among 56 women. Dorsopathies (spinal disorders) accounted for 41% of the diagnoses in this category. The fifth highest rate was for digestive system diseases (31.2 per 1,000), with 56 diagnoses among 50 women. The largest number of diagnoses in this category was 19, which were related to diseases of the jaw, mouth, and teeth. Eight cancer diagnoses were reported among four women: three breast cancers and one skin cancer. Three women had multiple diagnoses.

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 and parasitic diseases	001-139	87	12.4	9.6	16.0
Malignant neoplasms	140-208, 230-234	18	3.2	1.7	6.0
• Digestive organs	150-159	1	0.1	0.0	0.7
• Respiratory system	160-165	2	0.3	0.1	1.2
• Breast	174-175	6	0.6	0.3	1.3
• Genitourinary	179-185	3	0.5	0.1	1.5
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	3	1.4	0.4	5.1
Benign neoplasms and other	210-229, 235-239	16	3.0	1.6	5.5
Endocrine and metabolic diseases	240-279	26	4.1	2.6	6.5
Blood and blood-forming organs	280-289	4	0.4	0.1	1.0
Mental disorders	290-319	23	3.4	2.1	5.5
• Alcoholism	303	4	0.5	0.2	1.3
• Drug abuse	304-305	1	0.1	0.0	0.7
Nervous system and sense organs	320-389	104	15.2	12.0	19.3
Circulatory system	390-459	71	14.2	10.5	19.2
• Hypertension	401	11	1.4	0.8	2.7
• Acute myocardial infarction	410	10	2.5	1.2	5.6
• Ischemic disease, not M.I.	411-414, 429.2	17	3.4	1.8	6.4
• Cerebrovascular disease	430-438	2	0.6	0.1	2.7
Respiratory system	460-519	533	78.4	70.4	87.2
• Upper respiratory	460-465, 470-478	176	25.9	21.6	31.2
• Pneumonia/bronchitis	466, 480-487	193	29.3	24.5	35.0
• Chronic respiratory conditions	490-496	147	20.4	16.8	24.8
Digestive system	520-579	159	25.4	20.8	31.0
• Hernias	550-553	42	6.1	4.2	8.6
• Gall bladder disease	574-575	18	3.3	1.8	5.8
Genitourinary system	580-629	106	15.5	12.2	19.6
• Benign prostatic hypertrophy	600	2	0.4	0.1	1.5
• Endometriosis	617	10	1.3	0.6	2.8
• Ovarian cysts	620.0-620.2	5	0.8	0.3	2.4
• Female genital pain/bleeding	625-626	1	0.1	0.0	0.7
Pregnancy and childbirth ¹	630-676	55	8.8	6.7	11.5
Skin and subcutaneous tissue	680-709	12	1.9	1.0	3.6
Musculoskeletal	710-739	172	27.1	22.2	33.0
• Dorsopathies system	720-724	78	12.4	9.2	16.6
Symptoms, signs, and ill-defined conditions	740-799	52	9.6	6.8	13.6
External causes of injury	E800-999	225	32.7	27.6	38.7
• Transport accidents	E800-849	32	4.7	3.0	7.4
• Medical accidents	E870-879	2	0.2	0.0	0.7
• Accidental falls	E880-888	44	7.4	5.0	11.0
• Accidents - struck by objects	E916-918	8	1.0	0.5	2.0
• Accidents - machinery	E919	1	0.1	0.0	0.7
Total minus pregnancies		1,608	246.3	231.4	262.1
TOTAL		1,663	260.4	244.9	276.9

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

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

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

¹ Only women age 18-45 years were included in the calculation of the rate for this diagnostic category.

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 and parasitic diseases	001-139	32	5.8	3.7	8.9
Malignant neoplasms	140-208, 230-234	10	3.0	1.3	6.9
• Digestive organs	150-159	1	0.1	0.0	1.0
• Respiratory system	160-165	2	0.4	0.1	1.6
• Breast	174-175	0			
• Genitourinary	179-185	3	0.6	0.2	2.0
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	3	1.8	0.5	6.4
Benign neoplasms and other	210-229, 235-239	6	1.0	0.4	2.3
Endocrine and metabolic diseases	240-279	16	3.1	1.7	5.7
Blood and blood-forming organs	280-289	1	0.1	0.0	0.9
Mental disorders	290-319	10	1.5	0.8	2.9
• Alcoholism	303	4	0.6	0.2	1.8
• Drug abuse	304-305	1	0.1	0.0	0.9
Nervous system and sense organs	320-389	51	9.2	6.6	12.8
Circulatory system	390-459	51	14.2	9.9	20.3
• Hypertension	401	7	1.0	0.5	2.2
• Acute myocardial infarction	410	10	3.2	1.5	7.1
• Ischemic disease, not M.I.	411-414, 429.2	13	3.4	1.6	7.2
• Cerebrovascular disease	430-438	1	0.2	0.0	1.7
Respiratory system	460-519	270	52.4	45.0	60.9
• Upper respiratory	460-465, 470-478	99	18.6	14.5	23.9
• Pneumonia/bronchitis	466, 480-487	104	20.8	16.3	26.7
• Chronic respiratory conditions	490-496	58	10.8	7.9	14.8
Digestive system	520-579	103	22.7	17.7	29.1
• Hernias	550-553	39	7.4	5.1	10.6
• Gall bladder disease	574-575	8	2.6	1.1	6.3
Genitourinary system	580-629	34	6.8	4.5	10.4
• Benign prostatic hypertrophy	600	2	0.5	0.1	1.9
• Endometriosis	617	NA	NA	NA	NA
• Ovarian cysts	620.0-620.2	NA	NA	NA	NA
• Female genital pain/bleeding	625-626	NA	NA	NA	NA
Pregnancy and childbirth	630-676	NA	NA	NA	NA
Skin and subcutaneous tissue	680-709	9	2.1	0.9	4.7
Musculoskeletal	710-739	106	24.6	19.0	31.8
• Dorsopathies system	720-724	51	11.2	7.7	16.2
Symptoms, signs, and ill-defined conditions	740-799	25	6.5	3.8	10.8
External causes of injury	E800-999	158	31.5	25.7	38.7
• Transport accidents	E800-849	19	3.4	2.0	5.9
• Medical accidents	E870-879	0			
• Accidental falls	E880-888	30	6.5	4.0	10.4
• Accidents - struck by objects	E916-918	7	1.0	0.5	2.2
• Accidents - machinery	E919	1	0.1	0.0	0.9
TOTAL		882	184.5	169.3	201.0

Table 4.
Diseases and Injuries
by Diagnostic Category - Males

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

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

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 and parasitic diseases	001-139	55	28.8	21.4	38.8
Malignant neoplasms	140-208, 230-234	8	3.0	1.5	6.0
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	6	2.3	1.0	5.1
• Genitourinary	179-185	0			
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms and other	210-229, 235-239	10	9.4	4.2	21.4
Endocrine and metabolic diseases	240-279	10	6.5	3.3	13.0
Blood and blood-forming organs	280-289	3	1.0	0.3	3.2
Mental disorders	290-319	13	8.1	4.5	14.9
• Alcoholism	303	0			
• Drug abuse	304-305	0			
Nervous system and sense organs	320-389	53	27.5	20.2	37.3
Circulatory system	390-459	20	13.9	8.7	22.2
• Hypertension	401	4	3.1	1.1	8.5
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	4	3.6	1.3	9.6
• Cerebrovascular disease	430-438	1	1.0	0.1	7.4
Respiratory system	460-519	263	143.4	123.0	167.2
• Upper respiratory	460-465, 470-478	77	45.1	33.5	60.7
• Pneumonia/bronchitis	466, 480-487	89	48.2	37.3	62.4
• Chronic respiratory conditions	490-496	89	46.6	36.0	60.3
Digestive system	520-579	56	31.2	22.3	43.7
• Hernias	550-553	3	1.6	0.5	5.7
• Gall bladder disease	574-575	10	5.6	2.8	11.2
Genitourinary system	580-629	72	37.0	27.5	49.7
• Benign prostatic hypertrophy	600	NA	NA	NA	NA
• Endometriosis	617	10	4.2	2.1	8.3
• Ovarian cysts	620.0-620.2	5	2.3	0.8	6.5
• Female genital pain/bleeding	625-626	1	0.3	0.0	2.3
Pregnancy and childbirth ¹	630-676	55	8.8	6.7	11.5
Skin and subcutaneous tissue	680-709	3	1.7	0.5	5.7
Musculoskeletal	710-739	66	35.6	26.3	48.3
• Dorsopathies system	720-724	27	17.6	10.6	29.1
Symptoms, signs, and ill-defined conditions	740-799	27	18.8	11.5	30.7
External causes of injury	E800-999	67	38.2	27.6	53.1
• Transport accidents	E800-849	13	9.1	4.0	20.5
• Medical accidents	E870-879	2	0.7	0.2	2.6
• Accidental falls	E880-888	14	10.7	5.1	22.2
• Accidents - struck by objects	E916-918	1	0.9	0.1	6.4
• Accidents - machinery	E919	0			
Total minus pregnancies		726	404.3	368.9	443.1
TOTAL		781	442.4	405.2	482.9

Table 5.
Diseases and Injuries by Diagnostic Category - Females

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

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

¹ Only women age 18-45 years were included in the calculation of the rate for this diagnostic category.

Diagnoses Associated with Pregnancy, Labor, and Delivery

During 1993, 55 pregnancy-related diagnoses were reported among 54 women (Table 6). Sixty-nine percent of these were associated with normal deliveries.

Diagnoses by Occupational Category, 1993

During 1993, the age-adjusted diagnosis rate was the same among salaried and hourly workers (259.9 versus 258.7 per 1,000 persons) (Table 7). Service workers, who comprised about 3% of the work force, had the highest diagnosis rate (387.4 per 1,000), with 70 diagnoses reported among 39 workers. The administrative staff had the second highest diagnosis rate (323.2 per 1,000), with 502 diagnoses reported among 327 workers. Nuclear workers ranked third, with 251 diag-

noses reported for 161 workers (295.3 per 1,000). Professional workers had the lowest rate (156.4 per 1,000), with 215 diagnoses among 166 men.

The diagnosis rate among men was higher for hourly workers (224.1 per 1,000) than for salaried workers (160.1 per 1,000). Service workers had the highest rate (358.2 per 1,000), with 46 diagnoses reported for 24 men. The second highest rate was among the nuclear workers (227.5 per 1,000), with 137 diagnoses reported for 96 men. Craftsmen and manual laborers ranked third, with 213 diagnoses reported for 152 men (215.5 per 1,000). Professional workers had the lowest rate (117.7 per 1,000), with 149 diagnoses among 116 men.

The diagnosis rate among women was slightly higher for hourly workers than for salaried workers (486.7 versus 441.5 per 1,000 persons). Nuclear workers had the highest rate (561.4 per 1,000), with 114 diagnoses reported for 65 women. The second highest rate was among service workers (517.2 per 1,000), with 24 diagnoses reported for 21 workers. Technical workers ranked third, with 174 diagnoses reported for 104 women (495.8 per 1,000). Professional workers had the lowest rate (371.3 per 1,000), with 66 diagnoses among 50 women. The women had higher diagnosis rates than the men. This suggests a greater tendency among women to report illness or injury.

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
Ectopic and Molar Pregnancy/Abortive Outcome	630-639	3	0.4	0.1	1.4
Complications of Pregnancy	640-648	8	1.3	0.6	2.6
Normal Delivery	650	38	6.3	4.6	8.7
Other Indications for Care in Pregnancy, Labor, and Delivery‡	651-659	0			
Complications of Labor and Delivery	660-676	6	0.8	0.3	1.7
TOTAL		55	8.8	6.7	11.5

Table 6.
Diagnoses Associated with Pregnancy and Delivery

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

*Only women age 18-45 years were included in the calculation of the rates for these diagnostic categories.

‡Includes delivery by cesarian section and multiple births.

	Occupational Category	Number of Workers	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administration	1,593	502	323.2	291.2	358.8
	Professional	1,219	215	156.4	133.3	183.4
	Technical	1,363	379	283.6	244.8	328.4
	Subtotal	4,175	1,096	259.9	241.3	279.8
Hourly	Service	171	70	387.4	287.0	523.0
	Craftsmen and Manual Laborers	1,066	245	222.3	184.7	267.5
	Nuclear	936	251	295.3	248.2	351.3
	Other	50	1	6.7	0.9	47.5
	Subtotal	2,223	567	258.7	231.8	288.7
TOTAL	6,398	1,663	260.4	244.9	276.9	

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 per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administration	705	132	192.1	156.1	236.4
	Professional	1,030	149	117.7	97.9	141.4
	Technical	1,015	205	187.2	153.0	229.1
	Subtotal	2,750	486	160.1	143.1	179.0
Hourly	Service	136	46	358.2	243.7	526.5
	Craftsmen and Manual Laborers	993	213	215.5	174.5	266.0
	Nuclear	738	137	227.5	177.8	291.0
	Other	31	0			
	Subtotal	1,898	396	224.1	195.6	256.9
TOTAL	4,648	882	184.5	169.3	201.0	

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 per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administration	888	370	428.2	378.6	484.4
	Professional	189	66	371.3	254.0	542.6
	Technical	348	174	495.8	408.6	601.5
	Subtotal	1,425	610	441.5	398.6	488.9
Hourly	Service	35	24	517.2	339.0	789.1
	Craftsmen and Manual Laborers	73	32	383.3	253.3	580.1
	Nuclear	198	114	561.4	448.6	702.6
	Other	19	1	17.6	2.5	124.7
	Subtotal	325	171	486.7	408.6	579.7
TOTAL	1,750	781	442.4	405.2	482.9	

Table 9.
Diagnoses by Occupational Category - Females

† 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 All Diseases and Injuries by Occupation

In Table 10, the risk of one or more absences associated with all diagnoses for specific occupational categories is compared with all other occupational categories in the Rocky Flats work force. This comparison also 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 of 5 or more consecutive workdays during 1993. This was done to minimize the problem associated with one person having multiple absences for the same condition.

The statistical methods used to compare the incidence of absences are the relative risk (RR) and the 95% confidence interval. The relative risk is the rate of absence in one group divided by the rate in a reference (comparison) group. The reference group is all workers other than the occupational category of primary interest. A relative risk of 1.0 indi-

cates that both groups have the same risk of absence. A relative risk *greater than 1.0* indicates that workers in a selected occupational category have a higher risk of absence than workers in all other occupational categories combined. A relative risk *less than 1.0* implies that the selected occupational group has a lower risk of absence compared with all other occupational categories combined.

The confidence interval is a statistical measure of the precision of the risk estimate. A 95% confidence interval indicates the range in which one would expect the relative risk to fall 95% of the time. If the confidence interval includes the value 1.0, then the rate of absence is likely to have occurred by chance; in other words, the relative risk is not statistically significant at the 95% confidence level. For example, a relative risk of 2.0 with a confidence interval of 0.9 to 2.1 would not be considered statistically significant, whereas a relative risk of 1.4 with a confi-

dence interval of 1.2 to 1.7 would be considered statistically significant. The width of the confidence interval indicates the amount of uncertainty in the risk estimate and is affected by sample size and the number of events in the diagnostic category.

None of the occupational categories were at a statistically significant, increased risk of being absent 5 or more consecutive workdays due to all the illness or injury categories combined. The risk of absence for "other" hourly workers (RR=0.1) had a statistically significant decrease.

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	327	0.9	0.8	1.1
Professional	1,219	165	0.8	0.7	1.0
Technical	1,363	248	1.1	0.9	1.2
Service	171	39	1.4	1.0	1.9
Craftsmen and Manual Laborers	1,066	173	1.1	1.0	1.3
Nuclear	936	161	1.1	0.9	1.3
Other	50	1	0.1	0.0	0.9
TOTAL	6,398	1,114			

Table 10.
All Diseases and Injuries by Occupational Categories

† Persons with multiple absences during the time period were counted only once.

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

Relative Risk for Selected Disease and Injury Categories by Occupation

Tables 11.A through 11.N present relative risk of absences of 5 or more consecutive workdays for selected disease categories among workers by each occupational category.

Technical workers were significantly more likely to be absent at least once during 1993 for respiratory diseases (RR=1.5). Service workers were significantly more likely to be absent at least once during 1993 for nervous system and sense organ disorders (RR=3.4) and respiratory diseases (RR=1.8). Significantly

elevated risk among craftsmen and manual laborers were found for digestive diseases (RR=1.7) and external causes of injury (RR=1.6). Nuclear workers had a significantly elevated risk for external causes of injury (RR=1.5). The only significantly decreased risk was observed for external causes of injury among professional workers (RR=0.5).

The reasons for the large differences in overall diagnosis rates and relative risks for particular diagnostic categories among different occupational categories may be due to

small numbers. However, the consistency of the differences across broad diagnostic categories suggests that compliance with reporting back to work through an occupational physician varies among occupational categories.

Deaths Among Active Workers, 1993

During 1993, no deaths were reported among active workers.

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	31	1.0	0.6	1.6
Professional	1,219	12	1.0	0.5	1.9
Technical	1,363	23	1.5	0.9	2.4
Service	171	1	0.5	0.1	3.8
Craftsmen and Manual Laborers	1,066	5	0.6	0.2	1.4
Nuclear	936	10	0.9	0.5	1.8
Other	50	0			
TOTAL	6,398	82			

Table 11.A.
Infections and Parasitic Diseases

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	5	1.9	0.6	5.7
Professional	1,219	0			
Technical	1,363	5	2.4	0.8	7.7
Service	171	0			
Craftsmen and Manual Laborers	1,066	1	0.3	0.0	2.9
Nuclear	936	2	1.2	0.3	5.4
Other	50	0			
TOTAL	6,398	13			

Table 11.B.
Malignant Neoplasms

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	6	1.0	0.3	3.7
Professional	1,219	0			
Technical	1,363	3	1.1	0.3	4.2
Service	171	1	2.8	0.4	21.9
Craftsmen and Manual Laborers	1,066	2	1.2	0.2	7.4
Nuclear	936	2	1.0	0.2	4.8
Other	50	1	26.7	1.0	683.5
TOTAL	6,398	15			

Table 11.C.
Benign Neoplasms and Others

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	7	1.2	0.4	3.5
Professional	1,219	3	0.9	0.2	3.1
Technical	1,363	2	0.4	0.1	1.8
Service	171	1	2.0	0.3	15.3
Craftsmen and Manual Laborers	1,066	3	1.1	0.3	3.9
Nuclear	936	4	1.6	0.5	4.8
Other	50	0			
TOTAL	6,398	20			

Table 11.D.
Endocrine and Metabolic Diseases

† Persons with multiple absences during the time period were counted only once.

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

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	10	1.6	0.7	3.9
Professional	1,219	1	0.2	0.0	2.0
Technical	1,363	4	0.9	0.3	2.5
Service	171	1	1.9	0.3	14.1
Craftsmen and Manual Laborers	1,066	1	0.4	0.1	2.2
Nuclear	936	5	2.0	0.7	5.5
Other	50	0			
TOTAL	6,398	22			

Table 11.E.
Mental Disorders

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	30	1.0	0.7	1.6
Professional	1,219	17	1.2	0.7	2.0
Technical	1,363	21	1.1	0.7	1.8
Service	171	7	3.4	1.5	7.3
Craftsmen and Manual Laborers	1,066	7	0.5	0.3	1.1
Nuclear	936	9	0.7	0.4	1.4
Other	50	0			
TOTAL	6,398	91			

Table 11.F.
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	1,593	15	1.0	0.5	1.9
Professional	1,219	11	1.0	0.5	2.0
Technical	1,363	11	1.0	0.5	1.9
Service	171	2	1.3	0.3	5.3
Craftsmen and Manual Laborers	1,066	11	1.0	0.5	1.9
Nuclear	936	8	1.1	0.5	2.2
Other	50	0			
TOTAL	6,398	58			

Table 11.G.
Diseases of the Circulatory System

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	125	0.8	0.6	1.0
Professional	1,219	63	0.8	0.6	1.1
Technical	1,363	128	1.5	1.2	1.8
Service	171	19	1.8	1.1	2.8
Craftsmen and Manual Laborers	1,066	54	0.9	0.7	1.2
Nuclear	936	58	0.9	0.7	1.2
Other	50	0			
TOTAL	6,398	447			

Table 11.H.
Diseases of the Respiratory System

† Persons with multiple absences during the time period were counted only once.

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

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	38	1.0	0.6	1.4
Professional	1,219	19	0.7	0.4	1.2
Technical	1,363	23	0.7	0.5	1.2
Service	171	4	1.1	0.4	3.0
Craftsmen and Manual Laborers	1,066	33	1.7	1.1	2.5
Nuclear	936	22	1.2	0.8	1.9
Other	50	0			
TOTAL	6,398	139			

Table 11.I.
Diseases of the Digestive System

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	37	1.2	0.8	2.0
Professional	1,219	12	0.6	0.5	1.8
Technical	1,363	14	0.7	0.4	1.3
Service	171	4	2.1	0.8	5.7
Craftsmen and Manual Laborers	1,066	9	1.0	0.5	2.2
Nuclear	936	10	0.9	0.5	1.8
Other	50	0			
TOTAL	6,398	86			

Table 11.J.
Diseases of the Genitourinary System

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	3	1.0	0.2	4.3
Professional	1,219	0			
Technical	1,363	3	1.3	0.4	4.7
Service	171	1	3.3	0.4	25.9
Craftsmen and Manual Laborers	1,066	4	2.3	0.7	10.6
Nuclear	936	1	0.5	0.1	4.4
Other	50	0			
TOTAL	6,398	12			

Table 11.K.
Diseases of 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	1,593	36	0.7	0.5	1.1
Professional	1,219	21	0.7	0.5	1.2
Technical	1,363	34	1.1	0.7	1.6
Service	171	8	2.1	1.0	4.2
Craftsmen and Manual Laborers	1,066	30	1.4	0.9	2.1
Nuclear	936	25	1.2	0.8	1.9
Other	50	0			
TOTAL	6,398	154			

Table 11.L.
Diseases of the Musculoskeletal System

† Persons with multiple absences during the time period were counted only once.
* Adjusted for age and gender – compared with all occupational categories.

Occupational Category	Person-Years	Persons with at Least One Event†	Relative Risk*	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	1,593	17	1.1	0.5	2.2
Professional	1,219	8	1.0	0.5	2.2
Technical	1,363	7	0.7	0.3	1.5
Service	171	1	0.8	0.1	6.0
Craftsmen and Manual Laborers	1,066	5	0.7	0.3	1.9
Nuclear	936	10	1.8	0.9	3.5
Other	50	0			
TOTAL	6,398	48			

Table 11.M.
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	1,593	47	0.8	0.6	1.2
Professional	1,219	20	0.5	0.3	0.8
Technical	1,363	41	0.9	0.7	1.3
Service	171	7	1.3	0.6	2.8
Craftsmen and Manual Laborers	1,066	46	1.6	1.2	2.3
Nuclear	936	41	1.5	1.1	2.1
Other	50	0			
TOTAL	6,398	202			

Table 11.N.
External Causes of Injury

† Persons with multiple absences during the time period were 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	E810-E819	Includes accidents involving motor vehicles alone or with other motor vehicles, pedestrians, or vehicles operated by pedals.
Other accidents	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.

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.

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 1993 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 5 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.