

A M E N D E D
Annual Report for
**Brookhaven
National
Laboratory**

**Epidemiologic
Surveillance**

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Prepared by the Epidemiologic Surveillance Data Center, a joint program of the Oak Ridge Institute for Science and Education in conjunction with the Office of Epidemiologic Studies, U.S. Department of Energy

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Table of Contents

Foreword	1
BNL at a Glance: 1994	1
Introduction	2
Facility Overview	3
Labor Force by Occupational Category and Salary Status, 1994	4
Absences Among Work Force, 1994	5
Absences per Person	5
Diagnoses per Absence	5
Diagnosis Rates for Absences	5
Diseases and Injuries by Diagnostic Category, 1994	6
Men and Women	7
Men	8
Women	9
Diagnoses Associated with Pregnancy, Labor, and Delivery	10
Diagnoses by Occupational Category, 1994	10
Men and Women	11
Men	11
Women	11
Deaths Among Active Workers, 1994	12
Relative Risk for All Diseases and Injuries by Occupation	12
Relative Risk for Selected Disease and Injury Categories by Occupation	14
All Diseases and Injuries	12
Infections and Parasitic Diseases	12
Endocrine and Metabolic Diseases	12
Diseases of the Nervous System and Sense Organs	12
Diseases of the Circulatory System	12
Diseases of the Respiratory System	12
Diseases of the Digestive System	12
Diseases of the Genitourinary System	12
Diseases of the Musculoskeletal System	12
Symptoms, Signs, and Ill-Defined Conditions	12
Injury and Poisoning	12
Injury and Poisoning: Fractures	12
Injury and Poisoning: Sprains and Strains	12
Injury and Poisoning: Other Injuries	12
OSHA-Recordable Events Among BNL Employees, 1994	15
OSHA-Recordable Events per Person	15
Diagnoses per OSHA-Recordable Event	15
Diagnosis Rates for OSHA-Recordable Events	15
OSHA-Recordable Diseases and Injuries by Diagnostic Category, 1994	16
Men and Women	17
Men	18
Women	19
OSHA-Recordable Diagnoses by Occupational Category, 1994	20
Men and Women	21
Men	21
Women	21
OSHA-Recordable Relative Risk for All Diseases and Injuries by Occupation	22
OSHA-Recordable Relative Risk for Selected Disease and Injury Categories by Occupation	22
All Diseases and Injuries	23
Diseases of the Musculoskeletal System	23
Injury and Poisoning	23
Injury and Poisoning: Sprains and Strains	23
Injury and Poisoning: Open Wounds	23
Injury and Poisoning: Other Injuries	23

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. An 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, occupational injuries and illnesses, and deaths among active employees. This annual epidemiologic surveillance report provides the final summary of the 12-month period, January 1, 1994, through December 31, 1994, for the Brookhaven National Laboratory (BNL).

Caution is required when comparing this information with other DOE facilities. Interpretation of these data must take into account the occupational medicine 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 BNL. Continuing surveillance and data examination may suggest emerging trends that change the preliminary interpretation of the data.

Caution is also required when comparing information in this report to earlier reports. The methods used to collect and analyze the data in this report are different from those used in previous years.

Plans for future annual reports include a discussion of important new findings and changes occurring 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

investigation 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.

BNL at a Glance: 1994

- ◆ *This report corrects errors in the initial release of the BNL report for 1994. Erroneous selection criteria used to identify current workers for the rosters used in analyzing illnesses and injuries among BNL workers led to the inclusion of several hundred workers who were not currently employed at the site in 1994. This report provides illness and injury rates and comparisons based on the corrected roster.*
- ◆ The site experienced a 2.0% increase in the work force included in epidemiologic surveillance in 1994. The 68 additional workers included a 58.3% increase in administrative staff and a 19.3% increase in service workers. BNL workers classified as nuclear workers decreased by 56.5%. A portion of the increase observed may have been due to changes in the methods used to collect roster information for epidemiologic surveillance.
- ◆ As in 1993, the highest diagnosis rates were observed for injuries, diseases of the respiratory system, and musculoskeletal diseases. Injuries accounted for 23% of all diagnoses among men. Among women, 37% of the diagnoses involved respiratory diseases.
- ◆ The percentage of the work force reporting at least one absence of 5 or more consecutive days in 1994 (7.2%) remained similar to the 1993 percentage (7%).
- ◆ As in 1993, diagnosis rates were about 5 times higher for hourly than for salaried workers. The higher diagnosis rates observed among most hourly occupational groups may reflect underreporting of health events by salaried workers.
- ◆ 1994 marked the first year for which Occupational Safety and Health Administration (OSHA) recordable injury and illness data were included in epidemiologic surveillance at BNL. Crafts and service workers reported the highest rates of OSHA-recordable diagnoses; professional staff had the lowest recorded rates. Overall, the rate of OSHA-recordable events was almost twice as high for men as for women.

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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 for 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 amended annual report corrects errors in the initial release of the BNL report for 1994. Erroneous selection criteria used to identify current workers for the rosters used in analyzing illnesses and injuries among BNL workers led to the inclusion of several hundred workers who were not currently employed at the site in 1994. Their inclusion could have introduced inaccuracies in the illness and injury rates presented throughout the report. This revised and corrected version is intended to replace the report released initially.

In this annual report, the 1994 morbidity data for BNL are summarized. These analyses focus on absences of 5 or more consecutive workdays occurring among workers aged 16-76 years. They are arranged in five sets of tables that present: (1) the distribution of the labor force by occupational category and salary 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. In addition to this information, the report contains health events that are considered recordable by OSHA. The analyses of the OSHA data are arranged like the absences of 5 or more consecutive workdays. OSHA-recordable events are those that occur on the job or involve fatalities (regardless of the time between the injury and death); lost workday cases other than fatalities; and nonfatal cases without lost workdays resulting in transfer to another job, termination of employment, medical treatment other than first aid, loss of consciousness, or restriction of work or motion. Also recordable are any diagnosed occupational health events reported to the employer that are neither fatal nor result in lost workdays. 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.

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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 reports, 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.

Facility Overview

Located at the center of Long Island, New York, BNL is one of the nation's leading scientific research laboratories. The BNL was established in 1946 on the former site of Camp Upton and is operated by Associated Universities, Inc. (AUI), under contract with DOE.

The AUI is an independent corporation, governed by a board of trustees, whose members are affiliated with both national and international universities, research institutions, and industrial organizations.

The BNL's initial mission, to carry out research on the peaceful aspects of nuclear science, has been considerably broadened to include basic and applied research in many different areas.

The primary objective of BNL has always been to gain a deeper understanding of the laws of nature—the necessary foundation for all technical advances. New knowledge is constantly sought in such fields as physics, chemistry, biology, mathematics, medicine, oceanography, atmospheric science, and energy technology.

Labor Force by Occupational Category and Salary Status, 1994

During 1994, there were 3,548 employees (aged 16-76) identified by BNL as participants in epidemiologic surveillance. Seventy-eight percent (2,755 workers) were men and 22% (793 workers) were women. Eighty-one percent (2,889 workers) were Caucasian, 8% (272 workers) were African Americans, and 8% (265 workers) were Asians. The remaining 3% (122 workers) included Hispanics and Native Americans.

The composition of the labor 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 category over the course of a year, workers were counted in the occupational category where they spent most of their time.

Eighty-four percent of the workers were salaried, whereas 16% were hourly. The occupational categories with the largest number of employees were professional (34.5%) and administrative (30.5%).

The labor force increased by 68 employees, a 2.0% increase, in 1994 compared to 1993. However, it should be noted that an unknown portion of this increase resulted from a change in the way the data were collected. The actual change in the size of the work force is not known. The biggest increase in the number

of workers was in the administrative category with a 58.3% increase. The largest decrease in numbers was in the nuclear category with a 56.5% decrease over 1993.

	Occupational Category	Number of Workers in 1994	Number of Workers in 1993	% Change from Last Year
Salaried	Administrative	1,081	683	+58.3
	Professional	1,225	1,424	-14.0
	Technical	672	806	-16.6
	Subtotal	2,978	2,913	+2.2
Hourly	Service	260	218	+19.3
	Crafts and Manual Labor	282	285	-1.1
	Nuclear	27	62	-56.5
	Other	1	2	-50.0
	Subtotal	570	567	+0.5
	TOTAL	3,548	3,480	+2.0

Table 1.
Labor
Force by
Occupational
Category and
Salary Status

Absences Among Work Force, 1994

Absences per Person. In 1994, 257 BNL employees reported an absence of 5 or more consecutive workdays because of illness or injury. Thirty-five (13.6%) of these workers had two or more absences. A total of 304 absences were reported by the employees (Table 2A).

Diagnoses per Absence. A total of 409 diagnoses were associated with the absences of 5 or more consecutive workdays. Multiple diagnoses were reported for 76 (25%) absences (Table 2B).

Diagnosis Rates for Absences. In 1994, the age-adjusted diagnosis rate for absences of 5 or more consecutive workdays was 111.4 diagnoses per 1,000 persons. The diagnosis rate for women (145.1 per 1,000) was higher than the rate for men (100.1 per 1,000) (Table 2C).

Employee Category	Number of Workers in 1994	Number of Absences				Total Persons Absent at Least Once	Total Number of Absences
		0	1	2	3+		
Men	2,755	2,564	165	18	8	191	227
Women	793	727	57	7	2	66	77
TOTAL	3,548	3,291	222	25	10	257	304

Table 2A.
Absences per Person

Employee Category	Number of Diagnoses per Absence				Total Number of Absences	Total Number of Diagnoses†
	1	2	3	4		
Men	173	38	10	6	227	303
Women	55	17	3	2	77	106
TOTAL	228	55	13	8	304	409

Table 2B.
Diagnoses per Absence

Employee Category	Number of Workers in 1994	Total 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
Men	2,755	303	110.0	100.1	87.8	114.0
Women	793	106	133.7	145.1	117.9	178.6
TOTAL	3,548	409	115.3	111.4	99.7	124.4

Table 2C.
Diagnosis Rates for Absences

† 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, 1994

The age-adjusted diagnosis rate for each diagnostic category is given for all workers in Table 3. 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 injury and poisoning (21.1 per 1,000), diseases of the respiratory system (20.3 per 1,000), and diseases of the musculoskeletal system (15.2 per 1,000). Together, these three categories accounted for 56% of all diagnoses.

Men. The diagnostic category with the highest rate among men (Table 4) was injury and poisoning (22.5 per 1,000) with 70 diagnoses among 59 men. This accounted for 23.1% of all diagnoses among men. Within this category, one subcategory had a relatively high number of diagnoses. Sprains and strains accounted for 43% of these diagnoses, with 30 diagnoses among 29 men. Thirteen diagnoses were sprains and strains of

the back, 13 of the lower extremities, and 4 of the upper extremities. One man had multiple diagnoses.

The second highest rate, making up 16.2% of the total diagnoses, was diseases of the musculoskeletal system (14.0 per 1,000), with 49 diagnoses reported for 41 men. Thirty-two diagnoses were related to dorsopathies (spinal disorders), nine to arthropathies (joint disease), six to rheumatism (excluding the back), and two to disorders of bone. Six men had multiple diagnoses.

Diseases of the respiratory system (13.0 per 1,000) ranked third, with 42 diagnoses reported for 29 men. Twenty-three diagnoses were related to upper respiratory diseases, 11 to chronic respiratory conditions, and 8 to pneumonia/bronchitis. Four men had multiple diagnoses. Four cancer diagnoses were reported among two men in 1994. All were for prostate cancer.

Women. The diagnostic category with the highest rate among women (Table 5) was diseases of the respiratory system (55.2 per 1,000), with 39 diagnoses reported among 26 women. This accounted for 36.8% of all diagnoses among women. Twenty-one diagnoses were related to upper respiratory diseases, nine to pneumonia/bronchitis, and nine to chronic respiratory conditions. Seven women had multiple diagnoses.

The second highest rate, making up 12.3% of the total diagnoses, was for diseases of the musculoskeletal system (18.8 per 1,000), with 13 diagnoses among 9 women. Seven diagnoses were related to dorsopathies (spinal disorders), two to rheumatism (excluding the back), two to disorders of bone and cartilage, one to derangement of the knee, and one to hammer toe. Four women had multiple diagnoses.

Injury and poisoning (14.3 per 1,000) ranked third, with 14 diagnoses reported for 12 women. Within this category, "other" injuries (5.9 per 1,000) had relatively high numbers, accounting for 43% of these diagnoses. Six diagnoses were reported among six women. Three diagnoses were related to contusions, two to unspecified injuries, and one to a superficial injury. The one cancer diagnosis reported in 1994 was a breast cancer.

Table 3.
Diseases and
Injuries by
Diagnostic
Category - Men
and Women

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	10	3.3	1.5	6.9
Malignant neoplasms	140-208, 230-234	5	1.2	0.5	2.9
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	1	0.2	0.0	1.6
• Genitourinary	179-189	4	1.0	0.4	2.6
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	5	1.1	0.4	2.6
Endocrine and metabolic diseases	240-279	12	2.9	1.7	5.2
Blood and blood-forming organs	280-289	1	0.2	0.0	1.6
Mental disorders	290-319	11	4.1	2.0	8.2
• Alcoholism	303	0			
• Drug abuse	304-305	1	0.2	0.0	1.4
Nervous system and sense organs	320-389	18	6.7	3.9	11.7
Circulatory system	390-459	28	6.6	4.5	9.5
• Hypertension	401	9	2.0	1.0	3.9
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	6	1.4	0.6	3.2
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	81	20.3	16.0	25.6
• Upper respiratory	460-465, 470-478	44	11.0	8.0	15.2
• Pneumonia/bronchitis	466, 480-487	17	4.0	2.5	6.5
• Chronic respiratory conditions	490-496	20	5.2	3.2	8.4
Digestive system	520-579	29	6.5	4.5	9.4
• Hernias	550-553	7	1.5	0.7	3.2
• Gallbladder disease	574-575	6	1.3	0.6	3.0
Genitourinary system	580-629	17	4.9	2.8	8.5
• Benign prostatic hypertrophy	600	0			
• Endometriosis	617	0			
• Ovarian cysts	620.0-620.2	0			
• Female genital pain/bleeding	625-626	0			
Pregnancy and childbirth ¹	630-676	6	4.0	1.8	9.3
Skin and subcutaneous tissue	680-709	9	2.1	1.1	4.1
Musculoskeletal system	710-739	62	15.2	11.6	19.9
• Dorsopathies	720-724	39	8.9	6.5	12.2
Congenital anomalies	740-759	2	1.5	0.4	6.1
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	19	5.8	3.4	10.0
Injury and poisoning	800-999	84	21.1	16.6	26.7
• Fractures, all sites	800-829	11	2.4	1.3	4.4
• Dislocations	830-839	8	1.8	0.9	3.6
• Sprains and strains	840-848	34	9.6	6.5	14.3
• Intracranial injuries	850-854	0			
• Internal injuries	860-869	0			
• Open wounds	870-897	6	1.3	0.6	3.0
• Other injuries	900-999	25	5.9	4.0	8.7
Health status/health service contact	V01-V82	10	3.9	1.9	8.1
• Family history of health problems	V10-V19	5	1.7	0.6	4.8
• Circumstances related to reproduction/development	V20-V28	3	1.7	0.5	6.0
• Specific procedure/aftercare	V50-V59	1	0.2	0.0	1.6
Total minus pregnancies		403	107.4	96.1	119.9
TOTAL		409	111.4	99.7	124.4

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

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

¹ Only women aged 18-45 were included in the calculation of the rates for these diagnostic categories.

Table 4.
Diseases
and Injuries
by Diagnostic
Category - Men

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	7	2.8	1.1	7.3
Malignant neoplasms	140-208, 230-234	4	1.2	0.4	3.2
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	0			
• Genitourinary	179-189	4	1.2	0.4	3.2
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	4	1.1	0.4	2.9
Endocrine and metabolic diseases	240-279	10	3.0	1.6	5.5
Blood and blood-forming organs	280-289	1	0.3	0.0	2.2
Mental disorders	290-319	8	2.3	1.1	4.6
• Alcoholism	303	0			
• Drug abuse	304-305	1	0.3	0.0	1.8
Nervous system and sense organs	320-389	12	7.9	4.0	15.6
Circulatory system	390-459	26	7.5	5.1	11.1
• Hypertension	401	8	2.3	1.1	4.6
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	6	1.8	0.8	3.9
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	42	13.0	9.4	18.1
• Upper respiratory	460-465, 470-478	23	7.5	4.7	12.0
• Pneumonia/bronchitis	466, 480-487	8	2.4	1.2	4.8
• Chronic respiratory conditions	490-496	11	3.1	1.7	5.6
Digestive system	520-579	24	6.9	4.6	10.2
• Hernias	550-553	6	1.7	0.7	3.7
• Gallbladder disease	574-575	3	0.9	0.3	2.7
Genitourinary system	580-629	14	4.8	2.6	9.0
• Benign prostatic hypertrophy	600	0			
• Endometriosis	617	NA			
• Ovarian cysts	620.0-620.2	NA			
• Female genital pain/bleeding	625-626	NA			
Pregnancy and childbirth	630-676	NA			
Skin and subcutaneous tissue	680-709	8	2.3	1.2	4.6
Musculoskeletal system	710-739	49	14.0	10.6	18.6
• Dorsopathies	720-724	32	9.2	6.5	13.0
Congenital anomalies	740-759	1	1.2	0.2	8.4
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	15	6.0	3.2	11.4
Injury and poisoning	800-999	70	22.5	17.2	29.5
• Fractures, all sites	800-829	9	2.5	1.3	4.9
• Dislocations	830-839	8	2.3	1.2	4.7
• Sprains and strains	840-848	30	11.0	7.1	17.2
• Intracranial injuries	850-854	0			
• Internal injuries	860-869	0			
• Open wounds	870-897	4	1.1	0.4	3.1
• Other injuries	900-999	19	5.5	3.5	8.7
Health status/health service contact	V01-V82	8	3.2	1.4	7.6
• Family history of health problems	V10-V19	5	2.4	0.8	7.1
• Circumstances related to reproduction/development	V20-V28	1	0.3	0.0	1.8
• Specific procedure/aftercare	V50-V59	1	0.3	0.0	2.2
TOTAL		303	100.1	87.8	114.0

† 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 ^t	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	3	4.0	1.2	13.8
Malignant neoplasms	140-208, 230-234	1	0.9	0.1	6.7
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	1	0.9	0.1	6.7
• Genitourinary	179-189	0			
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	1	1.3	0.2	9.5
Endocrine and metabolic diseases	240-279	2	2.3	0.6	9.3
Blood and blood-forming organs	280-289	0			
Mental disorders	290-319	3	6.5	2.1	20.3
• Alcoholism	303	0			
• Drug abuse	304-305	0			
Nervous system and sense organs	320-389	6	5.9	2.6	13.3
Circulatory system	390-459	2	2.3	0.6	9.3
• Hypertension	401	1	0.9	0.1	6.7
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	0			
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	39	55.2	39.1	78.0
• Upper respiratory	460-465, 470-478	21	27.4	17.1	43.9
• Pneumonia/bronchitis	466, 480-487	9	13.1	6.4	26.9
• Chronic respiratory conditions	490-496	9	14.7	7.3	29.7
Digestive system	520-579	5	4.9	2.0	12.0
• Hernias	550-553	1	0.9	0.1	6.2
• Gallbladder disease	574-575	3	3.2	1.0	10.0
Genitourinary system	580-629	3	4.4	1.3	14.7
• Benign prostatic hypertrophy	600	NA			
• Endometriosis	617	0			
• Ovarian cysts	620.0-620.2	0			
• Female genital pain/bleeding	625-626	0			
Pregnancy and childbirth ¹	630-676	6	11.8	5.2	26.9
Skin and subcutaneous tissue	680-709	1	0.9	0.1	6.7
Musculoskeletal system	710-739	13	18.8	10.4	33.7
• Dorsopathies	720-724	7	7.8	3.7	16.5
Congenital anomalies	740-759	1	2.2	0.3	15.5
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	4	5.0	1.7	14.5
Injury and poisoning	800-999	14	14.3	8.2	24.8
• Fractures, all sites	800-829	2	1.8	0.4	7.0
• Dislocations	830-839	0			
• Sprains and strains	840-848	4	4.9	1.7	14.3
• Intracranial injuries	850-854	0			
• Internal injuries	860-869	0			
• Open wounds	870-897	2	1.8	0.4	7.0
• Other injuries	900-999	6	5.9	2.6	13.2
Health status/health service contact	V01-V82	2	4.4	1.1	17.4
• Family history of health problems	V10-V19	0			
• Circumstances related to reproduction/development	V20-V28	2	4.4	1.1	17.4
• Specific procedure/aftercare	V50-V59	0			
Total minus pregnancies		100	133.3	107.6	165.1
TOTAL		106	145.1	117.9	178.6

Table 5.
Diseases
and Injuries
by Diagnostic
Category - Women

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

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

¹ Only women aged 18-45 were included in the calculation of the rates for these diagnostic categories.

Diagnoses Associated with Pregnancy, Labor, and Delivery

During 1994, six pregnancy-related diagnoses were reported among five women (Table 6). There was one diagnosis for ectopic and molar pregnancy/abortive outcomes; one for other indications for care in pregnancy, labor, and delivery; and two diagnoses for complications occurring in the course of labor and delivery. Two women had normal deliveries. One woman had multiple diagnoses.

Diagnoses by Occupational Category, 1994

During 1994, the age-adjusted diagnosis rate for all employees (Table 7) was 5 times higher among hourly workers than salaried workers (343.0 versus 66.5 per 1,000 persons). Crafts and manual laborers, who comprised 7.9% of the work force, had the highest diagnosis rate (578.4 per 1,000), with 120 diagnoses reported for 66 workers. Service

workers had the second highest diagnosis rate (276.8 per 1,000), with 74 diagnoses reported among 55 persons. Technical workers ranked third, with 84 diagnoses reported for 54 workers (119.5 per 1,000). Professional workers had the lowest rate (15.9 per 1,000 workers), with 25 diagnoses for 15 workers.

Men. The diagnosis rate among men (Table 8) was 6.5 times higher for hourly workers (317.6 per 1,000) than for salaried workers (48.9 per 1,000). Crafts and manual laborers had the highest rate (580.3 per 1,000), with 119 diagnoses reported for 65 men. The second highest rate was among the service workers (229.1 per 1,000), with 53 diagnoses reported among 41 men. Technical workers ranked third, with 78 diagnoses reported among 49 men (124.0 per 1,000). Professional workers had the lowest rate (15.0 per 1,000), with 21 diagnoses reported for 13 men.

Women. The diagnosis rate among women (Table 9) was over 3.5 times higher for hourly workers (457.3 per 1,000) than for salaried workers (120.4 per 1,000). Service workers had the highest rate (470.7 per 1,000), with 21 diagnoses reported for 14 women. The second highest rate was among the administrative workers (149.0 per 1,000), with 74 diagnoses reported among 44 women. Crafts and manual laborers ranked third, with one diagnosis reported for one woman (99.3 per 1,000). Excluding nuclear workers because there was only one woman in this category, professional workers had the lowest rate (47.7 per 1,000), with four diagnoses for two women.

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	1	2.3	0.3	16.2
Complications Related to Pregnancy	640-648	0			
Normal Delivery	650	2	4.6	1.1	18.3
Other Indications for Care in Pregnancy, Labor, and Delivery‡	651-659	1	2.3	0.3	16.2
Complications of Labor, Delivery, and Puerperium	660-676	2	4.0	1.0	16.1
TOTAL		6	13.1	5.9	29.3

Table 6.
Diagnoses Associated with Pregnancy, Labor, and Delivery

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

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

‡ Includes delivery by cesarian section and multiple births.

Table 7.
*Diagnoses by
Occupational
Category - Men
and Women*

Occupational Category		Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	1,081	101	91.5	74.1	112.9
	Professional	1,225	25	15.9	10.7	23.6
	Technical	672	84	119.5	95.0	150.2
	Subtotal	2,978	210	66.5	57.1	77.5
Hourly	Service	260	74	276.8	216.3	354.2
	Crafts and Manual Labor	282	120	578.4	398.4	839.5
	Nuclear	27	4	65.3	24.5	174.0
	Other	1	1	81.2	11.4	576.2
	Subtotal	570	199	343.0	293.5	400.9
TOTAL		3,548	409	111.4	99.7	124.4

Table 8.
*Diagnoses by
Occupational
Category - Men*

Occupational Category		Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	553	27	38.9	26.6	56.8
	Professional	1,075	21	15.0	9.8	23.0
	Technical	610	78	124.0	97.5	157.7
	Subtotal	2,238	126	48.9	40.1	59.6
Hourly	Service	212	53	229.1	170.4	308.0
	Crafts and Manual Labor	278	119	580.3	400.2	841.6
	Nuclear	26	4	70.8	26.6	188.5
	Other	1	1	81.2	11.4	576.2
	Subtotal	517	177	317.6	269.3	374.7
TOTAL		2,755	303	100.1	87.8	114.0

Table 9.
*Diagnoses by
Occupational
Category -
Women*

Occupational Category		Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	528	74	149.0	116.3	190.8
	Professional	150	4	47.7	16.8	135.3
	Technical	62	6	76.6	30.8	190.6
	Subtotal	740	84	120.4	95.3	152.2
Hourly	Service	48	21	470.7	295.2	750.7
	Crafts and Manual Labor	4	1	99.3	14.0	704.6
	Nuclear	1	0			
	Subtotal	53	22	457.3	294.7	709.5
	TOTAL	793	106	145.1	117.9	178.6

† Includes all diagnoses reported for an absence of 5 or more days, including absences for pregnancy and childbirth.

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

Deaths Among Active Workers, 1994

There were six deaths reported among active workers during 1994. Three deaths were due to heart disease, two to cancer, and one to an unknown cause.

Relative Risk for All Diseases and Injuries by Occupation

In Table 10, the risk of one or more absences associated with selected diagnostic categories for specific occupational categories is compared with all other occupational categories in the BNL 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 for 5 or more consecutive workdays during 1994. This was done to minimize the problem associated with one person having multiple absences for the same condition. Some disease categories are not shown in Table 10 because the total number of health events in these categories was too small to permit the calculation of relative risks.

Throughout this report, various tables and discussions refer to rates of illness or injury. Rates in this report reflect the number of events

(e.g., absences, diagnoses) per 1,000 "person-years." A "person-year" is a unit of measurement combining persons and time; it is equivalent to one person followed up for 1 year. When an individual worker remains in the work force for the entire year, she or he contributes one person-year to the calculation of rates of disease and injury presented in the report. Rates of disease and injury are often presented as the number of diagnoses or absences from work per thousand workers per year, or per 1,000 person-years.

The statistical methods used to compare the incidence of absences are the relative risk (RR) and the

Table 10. Relative Risk for Selected Disease and Injury Categories by Occupation

Disease	Administrative 1,081 Person-Years				Professional 1,225 Person-Years				Technical 672 Person-Years				Service 260 Person-Years				
	Persons with at Least One Event*	Relative Risk**	Confidence Limit	Lower 95%	Upper 95%	Persons with at Least One Event*	Relative Risk**	Confidence Limit	Lower 95%	Upper 95%	Persons with at Least One Event*	Relative Risk**	Confidence Limit	Lower 95%	Upper 95%	Persons with at Least One Event*	Relative Risk**
All Diseases and Injuries	62	0.6	0.4	0.8	15	0.1	0.1	0.2	54	1.2	0.9	1.6	5	1	0.8	0.6	1.0
Infections and Parasitic Diseases	3	0.8	0.2	4.0	0				3	1.9	0.4	8.9	1	1	0.8	0.6	1.0
Endocrine and Metabolic Diseases	2	0.5	0.1	2.6	1	0.1	0.01	1.6	2	1.3	0.3	6.1	1	1	0.8	0.6	1.0
Nervous System and Sense Organs	4	0.6	0.2	2.7	1	0.2	0.02	1.4	2	0.7	0.1	3.5	1	1	0.8	0.6	1.0
Circulatory System	4	0.6	0.1	2.3	4	0.3	0.1	1.0	3	0.7	0.2	2.2	1	1	0.8	0.6	1.0
Respiratory System	21	0.8	0.4	1.5	2	0.1	0.02	0.3	8	1.0	0.4	2.0	1	1	0.8	0.6	1.0
Digestive System	3	0.3	0.1	1.3	2	0.1	0.03	0.6	7	1.6	0.7	3.8	1	1	0.8	0.6	1.0
Genitourinary System	3	0.7	0.2	3.0	0				4	2.2	0.7	7.2	1	1	0.8	0.6	1.0
Musculoskeletal System	12	0.7	0.3	1.6	4	0.2	0.1	0.4	13	1.5	0.8	2.9	1	1	0.8	0.6	1.0
Symptoms, Signs, and Ill-Defined Conditions	3	0.4	0.1	2.4	0				2	0.7	0.2	3.4	1	1	0.8	0.6	1.0
Injury and Poisoning	10	0.3	0.2	0.8	1	0.02	0.003	0.2	14	1.0	0.6	1.8	2	2	0.8	0.6	1.0
Injury and Poisoning: Fractures	1	0.3	0.1	2.0	1	0.2	0.02	1.3	6	5.6	1.8	17.0	2	2	0.8	0.6	1.0
Injury and Poisoning: Sprains and Strains	4	0.4	0.1	1.2	0				1	0.1	0.01	0.8	1	1	0.8	0.6	1.0
Injury and Poisoning: Other Injuries	5	0.4	0.1	2.0	0				6	1.9	0.7	5.0	1	1	0.8	0.6	1.0

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

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

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* indicates 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 to 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 confidence 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.

Service workers (RR=3.8), crafts and manual laborers (RR=4.5), and other workers (RR=13.5) had statistically significant increased risks of being absent 5 or more consecutive workdays in 1994 due to disease or injury. Administrative workers (RR=0.6) and professional workers (RR=0.1) had statistically significant decreased risks of an absence.

Crafts and Manual Labor 282 Person-Years				Nuclear 27 Person-Years				Other 1 Person-Year				Total 3,548 Person-Years			
Confidence Limit		Confidence Limit		Confidence Limit		Confidence Limit		Confidence Limit		Confidence Limit		Confidence Limit		Confidence Limit	
Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	Relative Risk**	Persons with at Least One Event*	
Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%	Lower 95%	Upper 95%
8	2.8	5.1	66	4.5	3.3	6.0	4	2.2	0.8	6.0	1	13.5	1.8	100.2	257
4	1.2	16.5	1	1.6	0.2	13.4	0				0				10
1	0.3	16.5	4	7.7	1.9	31.3	0				0				10
2	1.4	12.9	3	3.9	1.1	14.5	0				0				14
7	0.7	9.8	8	5.4	2.2	13.0	0				0				22
8	1.9	7.5	12	5.4	2.6	11.2	1	3.5	0.5	26.5	0				55
2	0.3	5.5	10	7.0	3.0	16.3	0				1	269.0	16.8	4301.0	25
4	0.6	10.4	2	2.8	0.6	13.7	1	12.5	1.5	105.0	0				12
4	1.1	5.3	13	3.9	2.0	7.6	1	2.9	0.4	21.7	0				50
0	1.5	16.5	5	8.8	2.5	31.1	0				0				14
7	3.4	9.6	24	6.1	3.6	10.3	1	1.7	0.2	12.6	0				71
6	0.2	13.5	1	1.2	0.1	11.0	0				0				10
7	3.2	14.1	15	10.8	5.1	23.0	1	3.1	0.4	22.9	0				33
4	3.0	18.1	5	3.4	1.2	9.8	0				0				23

Relative Risk for Selected Disease and Injury Categories by Occupation

Table 10 also presents the relative risks of absences of 5 or more consecutive workdays for selected disease categories among workers by each occupational category.

Malignant neoplasms is not presented because only three workers reported diagnoses in this disease category in 1994. One was an administrative worker, and two were technical workers.

Technical workers were significantly more likely to be absent at least once during 1994 for fractures (RR=5.6), as a subcategory of the injury and poisoning category. Service workers were also at an increased risk due to infections and parasitic diseases (RR=4.4); diseases of the nervous system and sense organs (RR=4.2); diseases of the respiratory system (RR=3.8); diseases of the musculoskeletal system (RR=2.4); symptoms, signs, and ill-defined conditions (RR=5.0); and injury and poisoning (RR=5.7), as a whole; with sprains and strains (RR=6.7), and "other" injuries (RR=7.4), as subcategories of injury and poisoning.

Crafts and manual laborers were significantly more likely to be absent at least once during 1994 for endocrine and metabolic diseases (RR=7.7); diseases of the nervous system and sense organs (RR=3.9); diseases of the circulatory system (RR=5.4); diseases of the respiratory system (RR=5.4); diseases of the digestive system (RR=7.0); diseases of the musculoskeletal system (RR=3.9); symptoms, signs, and ill-defined conditions (RR=8.8); and injury and poisoning (RR=6.1), as a whole; with sprains and strains (RR=10.8), and other injuries (RR=3.4), as subcategories of injury and poisoning.

Nuclear workers were found to have a statistically significant increased risk associated with diseases of the genitourinary system (RR=12.5).

Administrative workers were significantly less likely to be absent at least once during 1994 for injury and poisoning (RR=0.3), as a whole. Professional workers had a statistically significant decreased risk of

diseases of the respiratory system (RR=0.1), diseases of the digestive system (RR=0.1), diseases of the musculoskeletal system (RR=0.2), and injury and poisoning, as a whole (RR=0.02). Technical workers were also significantly less likely to be absent due to sprains and strains (RR=0.1), as a subcategory of the injury and poisoning category.

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 differences across various diagnostic categories suggests that compliance with reporting back to work through an occupational physician varies among the occupational categories.

OSHA-Recordable Events Among BNL Employees, 1994

OSHA-Recordable Events per Person.

In 1994, 156 BNL employees had at least one OSHA- recordable event. Thirteen (8%) of these workers had two or more events. There was a total of 169 OSHA-recordable events among all employees (Table 11A).

Employee Category	Number of Workers in 1994	Number of OSHA-Recordable Events			Total Persons with at Least One Event	Total Number of Events
		0	1	2		
Men	2,755	2,622	120	13	133	146
Women	793	770	23	0	23	23
TOTAL	3,548	3,392	143	13	156	169

Diagnosis Rates for OSHA-Recordable Events. In 1994, the age-adjusted diagnosis rate for OSHA events was 61.8 per 1,000 persons. The age-adjusted diagnosis rate for men (68.5 per 1,000) was almost twice as high as the rate for women (37.9 per 1,000) (Table 11C).

Table 11A.
OSHA-Recordable Events per Person

Employee Category	Number of Diagnoses per OSHA Event			Total Number of Events	Total Number of Diagnoses
	1	2	3		
Men	97	46	3	146	198
Women	17	5	1	23	30
TOTAL	114	51	4	169	228

Table 11B.
Diagnoses per OSHA-Recordable Event

Employee Category	Number of Workers in 1994	Total 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
Men	2,755	198	71.9	68.5	58.0	81.0
Women	793	30	37.8	37.9	25.8	55.6
TOTAL	3,548	228	64.3	61.8	53.2	71.7

Table 11C.
Diagnosis Rates for OSHA-Recordable Events

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

OSHA-Recordable Diseases and Injuries by Diagnostic Category, 1994

The age-adjusted diagnosis rate for each diagnostic category is presented for all workers combined in Table 12. Tables 13 and 14 show the diagnosis rates by gender to further describe the disease and injury patterns in the work force.

For all workers, the diagnostic category with the highest rate (Table 12) was injury and poisoning (46.7 per 1,000), with 170 diagnoses reported for 133 people, which accounted for 75% of all the diagnoses. Within this category were three subcategories with relatively high rates. These were sprains and strains (17.1 per 1,000), with 67 diagnoses among 59 workers; "other" injuries (17.0 per 1,000), with 57 diagnoses among 49 workers; and open wounds (10.9 per 1,000), with 39 diagnoses among 36 workers.

Men. The leading diagnostic category among men (Table 13), accounting for 74% of all diagnoses, was injury and poisoning (52.3 per 1,000), with 147 diagnoses among 114 men. Within this category were three subcategories with relatively high rates. "Other" injuries (19.3 per

1,000) accounted for 33% of the injury and poisoning diagnoses, with 49 diagnoses among 43 men. These included 19 diagnoses for contusions; 8 for other injuries; 7 for foreign bodies in the eye; 5 for abrasion/friction burns; 4 for second degree burns to the upper limb; 3 to toxic effects of fumes or vapors; 2 to insect bites; and 1 to a crushing injury to the toes. Six men had multiple diagnoses. Sprains and strains (17.8 per 1,000) accounted for 39% of the injury and poisoning diagnoses, with 57 diagnoses among 49 men. Twenty-nine diagnoses were sprains and strains of the back, 15 of the lower extremities, 10 of the upper extremities, 2 to the ribs, and 1 unspecified site. Five men had multiple diagnoses. Open wounds (13.2 per 1,000) accounted for 23% of the injury and poisoning diagnoses, with 34 diagnoses among 31 men. Twenty-four diagnoses were for open wounds of the upper limb; eight of the head; and two of the lower limb. Three men had multiple diagnoses.

The second highest rate, accounting for 12% of all diagnoses, was for diseases of the musculoskeletal system (6.7 per 1,000), with 24 diagnoses among 21 men. Ten diagnoses were related to dorsopathies (back disorders), ten to rheumatism (excluding the back), and four to arthropathies (joint disease).

Women. The diagnostic category with the highest rate was the same among women as for men (Table 14). Injury and poisoning (28.0 per 1,000) accounted for 77% of all diagnoses, with 23 diagnoses among 19 women. Within this category, two subcategories had relatively high rates. Sprains and strains (12.5 per 1,000) accounted for 43.5% of these diagnoses, with 10 diagnoses for 10 women. Seven of these were sprains and strains of the back, two of the upper extremities, and one of an unspecified site. There were no multiple diagnoses. "Other" injuries (11.0 per 1,000) accounted for 34.8% of the injury and poisoning diagnoses, with eight diagnoses among six women. These included four diagnoses for contusions, one for a first degree burn to the head, one for an abrasion, one for an insect sting, and one for an unspecified ankle injury. One woman had multiple diagnoses. Diseases of the musculoskeletal system followed with six diagnoses among five women (7.7 per 1,000). Five diagnoses were due to rheumatism (excluding the back), and one was due to joint pain. One woman had multiple diagnoses.

Table 12.
OSHA-Recordable Diseases and Injuries by Diagnostic Category - Men and Women

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	1	0.2	0.0	1.6
Malignant neoplasms	140-208, 230-234	0			
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	0			
• Genitourinary	179-189	0			
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	2	0.4	0.1	1.7
Endocrine and metabolic diseases	240-279	0			
Blood and blood-forming organs	280-289	0			
Mental disorders	290-319	0			
• Alcoholism	303	0			
• Drug abuse	304-305	0			
Nervous system and sense organs	320-389	6	1.8	0.7	4.8
Circulatory system	390-459	0			
• Hypertension	401	0			
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	0			
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	0			
• Upper respiratory	460-465, 470-478	0			
• Pneumonia/bronchitis	466, 480-487	0			
• Chronic respiratory conditions	490-496	0			
Digestive system	520-579	4	1.0	0.4	2.5
• Hernias	550-553	4	1.0	0.4	2.5
• Gallbladder disease	574-575	0			
Genitourinary system	580-629	1	0.2	0.0	1.4
• Benign prostatic hypertrophy	600	0			
• Endometriosis	617	0			
• Ovarian cysts	620.0-620.2	0			
• Female genital pain/bleeding	625-626	0			
Pregnancy and childbirth	630-676	0			
Skin and subcutaneous tissue	680-709	5	1.1	0.5	2.6
Musculoskeletal system	710-739	30	7.2	4.9	10.6
• Dorsopathies	720-724	10	2.2	1.2	4.2
Congenital anomalies	740-759	0			
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	7	2.2	0.9	5.2
Injury and poisoning	800-999	170	46.7	39.2	55.5
• Fractures, all sites	800-829	6	1.4	0.6	3.1
• Dislocations	830-839	0			
• Sprains and strains	840-848	67	17.1	13.1	22.4
• Intracranial injuries	850-854	1	0.2	0.0	1.4
• Internal injuries	860-869	0			
• Open wounds	870-897	39	10.9	7.5	15.7
• Other injuries	900-999	57	17.0	12.5	23.2
Health status/health service contact	V01-V82	2	1.0	0.2	4.8
• Family history of health problems	V10-V19	0			
• Circumstances related to reproduction/development	V20-V28	1	0.8	0.1	5.4
• Specific procedure/aftercare	V50-V59	0			
Total minus pregnancies		228	61.8	53.2	71.7
TOTAL		228	61.8	53.2	71.7

† Includes all diagnoses resulting from an OSHA-recordable event.

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

Table 13.
OSHA-Recordable Diseases and Injuries by Diagnostic Category - Men

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	1	0.3	0.0	2.2
Malignant neoplasms	140-208, 230-234	0			
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	0			
• Genitourinary	179-189	0			
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	2	0.6	0.1	2.2
Endocrine and metabolic diseases	240-279	0			
Blood and blood-forming organs	280-289	0			
Mental disorders	290-319	0			
• Alcoholism	303	0			
• Drug abuse	304-305	0			
Nervous system and sense organs	320-389	6	2.5	0.9	7.1
Circulatory system	390-459	0			
• Hypertension	401	0			
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	0			
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	0			
• Upper respiratory	460-465, 470-478	0			
• Pneumonia/bronchitis	466, 480-487	0			
• Chronic respiratory conditions	490-496	0			
Digestive system	520-579	4	1.2	0.4	3.1
• Hernias	550-553	4	1.2	0.4	3.1
• Gallbladder disease	574-575	0			
Genitourinary system	580-629	1	0.3	0.0	1.8
• Benign prostatic hypertrophy	600	0			
• Endometriosis	617	NA			
• Ovarian cysts	620.0-620.2	NA			
• Female genital pain/bleeding	625-626	NA			
Pregnancy and childbirth	630-676	NA			
Skin and subcutaneous tissue	680-709	5	1.4	0.6	3.4
Musculoskeletal system	710-739	24	6.7	4.5	10.1
• Dorsopathies	720-724	10	2.9	1.5	5.4
Congenital anomalies	740-759	0			
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	7	2.9	1.2	7.4
Injury and poisoning	800-999	147	52.3	43.0	63.7
• Fractures, all sites	800-829	6	1.8	0.8	3.9
• Dislocations	830-839	0			
• Sprains and strains	840-848	57	17.8	13.3	23.9
• Intracranial injuries	850-854	1	0.3	0.0	1.8
• Internal injuries	860-869	0			
• Open wounds	870-897	34	13.2	8.7	20.1
• Other injuries	900-999	49	19.3	13.6	27.3
Health status/health service contact	V01-V82	1	0.3	0.0	2.2
• Family history of health problems	V10-V19	0			
• Circumstances related to reproduction/development	V20-V28	0			
• Specific procedure/aftercare	V50-V59	0			
TOTAL		198	68.5	58.0	81.0

† Includes all diagnoses resulting from an OSHA-recordable event.

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

Table 14.
OSHA-Recordable Diseases and Injuries by Diagnostic Category - Women

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	0			
Malignant neoplasms	140-208, 230-234	0			
• Digestive organs	150-159	0			
• Respiratory system	160-165	0			
• Breast	174-175	0			
• Genitourinary	179-189	0			
• Nervous system	191-192	0			
• Leukemia, lymphoma	200-208	0			
Benign neoplasms	210-229, 235-239	0			
Endocrine and metabolic diseases	240-279	0			
Blood and blood-forming organs	280-289	0			
Mental disorders	290-319	0			
• Alcoholism	303	0			
• Drug abuse	304-305	0			
Nervous system and sense organs	320-389	0			
Circulatory system	390-459	0			
• Hypertension	401	0			
• Acute myocardial infarction	410	0			
• Ischemic disease, not M.I.	411-414, 429.2	0			
• Cerebrovascular disease	430-438	0			
Respiratory system	460-519	0			
• Upper respiratory	460-465, 470-478	0			
• Pneumonia/bronchitis	466, 480-487	0			
• Chronic respiratory conditions	490-496	0			
Digestive system	520-579	0			
• Hernias	550-553	0			
• Gallbladder disease	574-575	0			
Genitourinary system	580-629	0			
• Benign prostatic hypertrophy	600	NA			
• Endometriosis	617	0			
• Ovarian cysts	620.0-620.2	0			
• Female genital pain/bleeding	625-626	0			
Pregnancy and childbirth	630-676	0			
Skin and subcutaneous tissue	680-709	0			
Musculoskeletal system	710-739	6	7.7	3.3	17.9
• Dorsopathies	720-724	0			
Congenital anomalies	740-759	0			
Certain perinatal conditions	760-779	0			
Symptoms, signs, and ill-defined conditions	780-799	0			
Injury and poisoning	800-999	23	28.0	18.1	43.4
• Fractures, all sites	800-829	0			
• Dislocations	830-839	0			
• Sprains and strains	840-848	10	12.5	6.4	24.3
• Intracranial injuries	850-854	0			
• Internal injuries	860-869	0			
• Open wounds	870-897	5	4.5	1.9	10.9
• Other injuries	900-999	8	11.0	5.3	23.0
Health status/health service contact	V01-V82	1	2.2	0.3	15.5
• Family history of health problems	V10-V19	0			
• Circumstances related to reproduction/development	V20-V28	1	2.2	0.3	15.5
• Specific procedure/aftercare	V50-V59	0			
Total minus pregnancies		30	37.9	25.8	55.6
TOTAL		30	37.9	25.8	55.6

† Includes all diagnoses resulting from an OSHA-recordable event.

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

OSHA-Recordable Diagnoses by Occupational Category, 1994

During 1994, the age-adjusted diagnosis rate for all employees (Table 15) was almost 7 times higher among hourly workers than salaried workers (217.3 versus 31.1 per 1,000 persons). Crafts and manual laborers, who comprised 7.9% of the work force, had the highest diagnosis rate (451.1 per 1,000), with 86 diagnoses reported for 55 persons. The second highest diagnosis rate was among service workers (151.9 per 1,000), with 40 diagnoses reported for 30 persons. Nuclear workers (127.0 per 1,000) ranked third, with six diagnoses reported among three workers. The diagnosis rate for workers in the professional category was lower than all other occupational categories (7.6 per 1,000 workers), with 12 diagnoses for 9 workers.

Men. The diagnosis rate among men (Table 16) was more than 6.5 times higher for hourly workers (218.5 per 1,000) than for salaried workers (32.3 per 1,000). Crafts and manual laborers had the highest rate (454.0 per 1,000), with 86 diagnoses reported for 55 men. Service workers ranked second (144.1 per 1,000), with 30 diagnoses reported among 22 men. Nuclear workers followed, with six diagnoses reported for three men (133.8 per 1,000). As seen with the combined groups, professional workers had the lowest rate (6.5 per 1,000) with nine diagnoses reported for seven men.

Women. The diagnosis rate among women (Table 17) was over 5.5 times higher for the hourly workers (151.4 per 1,000) than for the salaried workers (26.8 per 1,000). The diagnosis rate for workers in the service category (159.9 per 1,000) was the highest with ten diagnoses

reported among eight women. Technical workers (42.1 per 1,000) ranked second with three diagnoses reported for two women. The third highest rate occurred among administrative workers (27.5 per 1,000), with 14 diagnoses reported among 11 women. The diagnosis rate was the lowest among the crafts and manual laborers and the nuclear workers, neither group having any diagnoses reported.

Table 15.
OSHA-Recordable Diagnoses by Occupational Category - Men and Women

	Occupational Category	Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	1,081	31	29.3	19.9	43.3
	Professional	1,225	12	7.6	4.3	13.4
	Technical	672	53	74.2	55.5	99.2
	Subtotal	2,978	96	31.1	24.7	39.1
Hourly	Service	260	40	151.9	109.1	211.6
	Crafts and Manual Labor	282	86	451.1	290.6	700.2
	Nuclear	27	6	127.0	51.7	312.1
	Other	1	0			
	Subtotal	570	132	217.3	179.3	263.3
TOTAL		3,548	228	61.8	53.2	71.7

Table 16.
OSHA-Recordable Diagnoses by Occupational Category - Men

	Occupational Category	Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	553	17	31.9	18.6	54.6
	Professional	1,075	9	6.5	3.4	12.5
	Technical	610	50	77.7	57.3	105.3
	Subtotal	2,238	76	32.3	24.6	42.4
Hourly	Service	212	30	144.1	98.7	210.3
	Crafts and Manual Labor	278	86	454.0	293.2	702.9
	Nuclear	26	6	133.8	55.4	323.2
	Other	1	0			
	Subtotal	517	122	218.5	178.5	267.5
TOTAL		2,755	198	68.5	58.0	81.0

Table 17.
OSHA-Recordable Diagnoses by Occupational Category - Women

	Occupational Category	Number of Workers in 1994	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Salaried	Administrative	528	14	27.5	15.6	48.2
	Professional	150	3	22.1	7.1	68.8
	Technical	62	3	42.1	13.2	134.0
	Subtotal	740	20	26.8	16.8	42.7
Hourly	Service	48	10	159.9	83.3	307.3
	Crafts and Manual Labor	4	0			
	Nuclear	1	0			
	Subtotal	53	10	151.4	78.0	294.0
	TOTAL	793	30	37.9	25.8	55.6

† Includes all diagnoses resulting from an OSHA-recordable event.

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

OSHA-Recordable Relative Risk for All Diseases and Injuries by Occupation

In Table 18, the risk of one or more OSHA-recordable events associated with selected diagnostic categories for each occupational category is compared with all other occupational categories in the BNL 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* OSHA-recordable events during 1994. This was done to minimize the problem associated with one person having multiple events for the same condition. Again, the

statistical methods used to compare the incidence of events are the relative risk and the 95% confidence interval.

Service workers (RR=3.0) and crafts and manual laborers (RR=6.2) had statistically significant increased risks of an OSHA-recordable event in 1994. Administrative workers (RR=0.4) and professional workers (RR=0.1) had statistically significant decreased risks of an event.

OSHA-Recordable Relative Risk for Selected Disease and Injury Categories by Occupation

Table 18 also presents the relative risk of an OSHA-recordable event for selected disease categories among workers by each occupational category.

Examination of the table shows that service workers were significantly more likely to have at least one OSHA-recordable event during 1994 for musculoskeletal system (RR=3.2) and injury and poisoning (RR=3.5), as a whole; with sprains and strains (RR=4.9) and "other" injuries (RR=2.9), as subcategories of injury and poisoning. Crafts and

manual laborers were also significantly more likely to have at least one OSHA-recordable event during 1994 for musculoskeletal system (RR=6.2) and injury and poisoning (RR=5.5), as a whole; with sprains and strains (RR=7.0), open wounds (RR=4.4), and "other" injuries (RR=5.4), as subcategories of injury and poisoning.

Professional workers were significantly less likely to have an OSHA-recordable event due to the musculoskeletal system (RR=0.2) or injury and poisoning (RR=0.1), as a whole; with sprains and strains (RR=0.1), open wounds (RR=0.2), and "other" injuries (RR=0.04), as subcategories of injury and poisoning. Administrative workers were also at significantly less risk for an OSHA-recordable event from injury and poisoning (RR=0.4), as a whole; with sprains and strains (RR=0.1) as a subcategory of injury and poisoning.

Table 18.
OSHA-Recordable Relative Risk for
Selected Disease and Injury
Categories by Occupation

		Disease					
		All Diseases and Injuries	Musculoskeletal System	Injury and Poisoning	Injury and Poisoning: Sprains and Strains	Injury and Poisoning: Open Wounds	Injury and Poisoning: Other Injuries
Administrative 1,081 Person-Years	Persons with at Least One Event*	22	4	18	4	9	8
	Relative Risk**	0.4	0.3	0.4	0.1	1.0	0.5
	Confidence Limit	Lower 95%	0.2	0.1	0.2	0.4	0.2
		Upper 95%	0.6	1.2	0.7	2.1	1.2
Professional 1,225 Person-Years	Persons with at Least One Event*	9	2	7	3	3	1
	Relative Risk**	0.1	0.2	0.1	0.1	0.2	0.04
	Confidence Limit	Lower 95%	0.1	0.04	0.05	0.04	0.005
		Upper 95%	0.2	0.6	0.2	0.5	0.3
Technical 672 Person-Years	Persons with at Least One Event*	37	5	33	13	8	13
	Relative Risk**	1.2	1.0	1.3	1.2	1.1	1.3
	Confidence Limit	Lower 95%	0.8	0.4	0.9	0.6	0.5
		Upper 95%	1.8	2.5	1.9	2.2	2.5
Service 260 Person-Years	Persons with at Least One Event*	30	5	29	16	5	10
	Relative Risk**	3.0	3.2	3.5	4.9	1.8	2.9
	Confidence Limit	Lower 95%	2.0	1.2	2.3	2.8	0.7
		Upper 95%	4.4	8.3	5.2	8.8	4.7
Crafts and Manual Labor 282 Person-Years	Persons with at Least One Event*	55	9	44	22	10	16
	Relative Risk**	6.2	6.2	5.5	7.0	4.4	5.4
	Confidence Limit	Lower 95%	4.4	2.6	3.8	3.9	2.1
		Upper 95%	8.8	14.5	8.1	12.4	9.3
Nuclear 27 Person-Years	Persons with at Least One Event*	3	1	2	1	1	1
	Relative Risk**	2.3	5.3	1.8	2.2	3.0	2.2
	Confidence Limit	Lower 95%	0.7	0.7	0.4	0.3	0.4
		Upper 95%	7.2	40.6	7.2	16.2	22.3
Other 1 Person-Year	Persons with at Least One Event*	0	0	0	0	0	0
	Relative Risk**						
	Confidence Limit	Lower 95%					
		Upper 95%					
Total 3,548 Person-Years	Total Number of Persons with at Least One Event	156	26	133	59	36	49

* Persons with multiple events 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 (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.

Person-year - A unit of measurement combining persons and time equivalent to one person followed up for one year. In Epidemiologic Surveillance reports, rates are often expressed as the number of events (e.g., illness absences, injuries) per 1,000 person-years.

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 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.