Annual Report for

# Hanford Site

Epidemiologic Surveillance

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# 1993

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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

This report was prepared by the staff of the Center for Epidemiology within the Medical Sciences Division of the Oak Ridge Institute for Sciences and Education in conjunction with the Office of Epidemiologic Studies, U.S. Department of Energy.

Questions or comments may be directed to:

Dr. Bonnie Richter or
Dr. Cliff Strader
Mail Stop: EH-62/270CC
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

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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. This annual epidemiologic surveillance report provides the final summary for the Hanford Site 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 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 the Hanford Site. 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 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.

### Hanford Site at a Glance

- The Hanford labor force increased by 13.5% between 1992 and 1993. The site added 2,119 workers, about evenly divided between hourly and salaried occupational catgories.
- About 8% of the Hanford work force reported at least one absence of 5 or more consecutive workdays due to illness or injury during 1993.
- Respiratory diseases reflected the highest diagnosis rate for both men and women.
- Overall, rates of reported diagnoses were about 45% higher for hourly workers than for salaried workers. Diagnosis rates were consistently higher among hourly occupational groups, suggesting under reporting of health events by salaried workers.
- Compared with the work force as a whole, craftsmen, service workers, and workers engaged in nuclear specialties had higher relative risks of reported disease and injury than did administrative, technical, and professional occupational groups. The consistency of the difference suggests more complete reporting of health-related absences by hourly workers.
- Data on OSHA-recordable injuries and illnesses were not available for 1993.
- No deaths were reported among active 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 Data Surveillance 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.

In this annual report, the 1993 morbidity data for the Hanford Site are summarized. These analyses focus on absences of 5 or more consecutive workdays occurring among workers aged 15-85 years. They 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 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 Hanford Site occupies 560 square miles of semi-arid desert in southeastern Washington State. It was chosen for the Manhattan Project in 1943 to produce plutonium for the world's first nuclear weapons. Today the primary mission is cleanup and environmental restoration. Other activities include scientific and environmental research, development, and application of radioactive and hazardous waste management technology and the design, construction, and operation of energy-related test and development facilities. As a reflection of its changing mission, in 1991 management responsibility for the Hanford Site was transferred from the Office of Defense Programs to the Office of Environmental Restoration and Waste Management. Richland Operations Office provides local oversight and program management for the four prime contractors.

## Labor Force by Occupational Category, 1993

During 1993, there were 17,807 employees (aged 15-85) identified by Hanford as participants in epidemiologic surveillance. Sixty-seven percent (11,883 workers) were men, and 33% (5,924 workers) were women. No information was available concerning the racial/ethnic composition of the work force.

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 a worker's occupational category can change over the course of a year, workers were placed in the occupational category to which they were assigned on January 1, 1993. A small number of workers (8%) were in the "other" hourly category. Of these workers, 846 were classified as unknown; 348 as students, interns, and post doctoral appointments; and 225 as "specialists." The remaining 48 workers had a variety of different job titles.

Seventy-two percent of the workers were salaried, whereas 28% were hourly. The occupational categories with the largest number of employees were administration (31%), professional (27%), and technical (14%).

Compared with the work force in 1992, the work force in 1993 increased by 2,119 employees (13.5%). The biggest increase was among "other" hourly workers whose numbers increased 164.3%. The only occupational categories where the work force decreased in 1993 compared with the 1992 work force were the hourly service and nuclear categories. There were 39 fewer employees in the service category, a 3.8% reduction from 1992. The nuclear category decreased by 103 workers in 1993, a 9.8% reduction.

| | Occupational Category | Number of Workers in 1993 | Number of Workers in 1992 | % Change from Last Year |
|---|---|---|---|---|
| Salaried | Administration | 5,493 | 5,015 | +9.5% |
| | Professional | 4,868 | 4,259 | +14.3% |
| | Technical | 2,528 | 2,423 | +4.3% |
| | **Subtotal** | **12,889** | **11,697** | **+10.2%** |
| Hourly | Service | 999 | 1,038 | -3.8% |
| | Craftsmen & Manual Laborers | 1,506 | 1,349 | +11.6% |
| | Nuclear | 946 | 1,049 | -9.8% |
| | Other | 1,467 | 555 | +164.3% |
| | **Subtotal** | **4,918** | **3,997** | **+23.2%** |
| | **TOTAL** | **17,807** | **15,688** | **+13.5%** |

***Table 1. Labor Force by Occupational Category, 1993***

## Absences Among Work Force, 1993

*Absences per Person.* In 1993, 1,372 Hanford employees reported an absence of 5 or more consecutive workdays because of illness or injury. Of these workers, 173 (13%) had two or more absences. A total of 1,586 absences were reported by the employees (Table 2.A).

*Diagnoses per Absence.* A total of 2,002 diagnoses were associated with the 1,586 absences of 5 or more days. Multiple diagnoses were reported for 348 (22%) absences (Table 2.B).

*Diagnosis Rates.* In 1993, 2,002 diagnoses noted for absences of 5 or more consecutive workdays yielded an age-adjusted rate of 109.7 diagnoses per 1,000 workers. The diagnosis rate for women (152.2 per 1,000) was more than 75% greater than the rate for men (85.8 per 1,000 persons) (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+ | | |
| Male | 11,883 | 11,115 | 680 | 75 | 9 | 4 | 768 | 873 |
| Female | 5,924 | 5,320 | 519 | 65 | 17 | 3 | 604 | 713 |
| **TOTAL** | **17,807** | **16,435** | **1,199** | **140** | **26** | **7** | **1,372** | **1,586** |

***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 | 5+ | | |
| Male | 662 | 182 | 26 | 3 | 0 | 873 | 1,116 |
| Female | 576 | 115 | 15 | 5 | 2 | 713 | 886 |
| **TOTAL** | **1,238** | **297** | **41** | **8** | **2** | **1,586** | **2,002** |

***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 | 11,883 | 1,116 | 93.9 | 85.8 | 80.6 | 91.3 |
| Female | 5,924 | 886 | 149.6 | 152.2 | 141.9 | 163.3 |
| **TOTAL** | **17,807** | **2,002** | **112.4** | **109.7** | **104.8** | **114.9** |

***Table 2.C. Diagnosis Rates***

†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 conditions of pregnancy and childbirth (21.8 per 1,000), diseases of the respiratory system (21.3 per 1,000), and external causes of injury (18.6 per 1,000). Together these three categories accounted for 45% of all diagnoses.

The diagnostic category with the highest rate among men was diseases of the respiratory system (18.5 per 1,000), with 246 diagnoses reported for 218 men. This accounted for 22% of all diagnoses among men. Of these diagnoses, 130 were related to pneumonia/bronchitis and 65 to upper respiratory problems. The category with the second highest rate was external causes of injury (17.4 per 1,000), with 232 diagnoses reported among 212 men. Sixty-eight injuries were related to overexertion and strenuous movement, 58 to unspecified causes, and 37 each to falls and transportation accidents. The category of digestive diseases (11.0 per 1,000) ranked third, with 141 diagnoses reported among 127 men. Hernias accounted for 40% of this category, and gall bladder disease accounted for 16%. Seventy-two men were diagnosed with 118 diseases of the circulatory system. Of these diagnoses, 48% were attributed to ischemic heart disease (inadequate blood supply to the heart) and 12% to acute myocardial infraction (heart attack). Additionally, 128 disorders of the musculoskeletal system were reported for 114 men. Of these diagnoses, 54% were attributed to dorsopathies (spinal disorders). Seventy nervous system diagnoses were reported for 63 men.

Eighteen cancers were reported among 15 men in 1993. Six men had a total of six diagnoses due to prostate cancer, two men had a total of four diagnoses due to digestive system cancer, and three men had a total of four diagnoses due to skin cancer. One diagnosis each of lung cancer, kidney cancer, lymphatic cancer, and connective tissue cancer reported by 4 different men comprise the remainder of the 18 reported cancers.

The diagnostic category with the highest rate among women was diseases of the respiratory system (27.4 per 1,000), with 150 diagnoses reported among 133 women. Thirty-seven percent of these diagnoses were related to upper respiratory illnesses, and 41% were due to pneumonia/bronchitis. The category with the second highest rate associated with absences was pregnancy and childbirth (21.8 per 1,000), with 140 diagnoses reported among 123 women. This category is discussed further in Table 6. The category of external causes of injury (21.3 per 1,000) ranked a close third, with 123 diagnoses reported for 116 women. Forty-six diagnoses were related to accidental falls, 34 to overexertion and strenuous movement, 18 to transport accidents, and 16 to other and unspecified environmental and accidental causes.

Eighteen cancers were reported among 12 women in 1993. Nine women had a total of 14 diagnoses related to breast cancer. One woman had two diagnoses for lymphatic cancer, and one woman each had a diagnosis of bladder cancer and lung cancer.

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

| Category of Diagnoses | ICD9-CM Code | Number of Diagnoses† | Age-Adjusted Rate per 1,000* | Lower 95% Confidence Limit per 1,000 | Upper 95% Confidence Limit per 1,000 |
|---|---|---|---|---|---|
| Infections and parasitic diseases | 001-139 | 50 | 2.7 | 2.0 | 3.6 |
| Malignant neoplasms | 140-208, 230-234 | 36 | 2.1 | 1.5 | 3.0 |
| • Digestive organs | 150-159 | 4 | 0.2 | 0.1 | 0.6 |
| • Respiratory system | 160-165 | 2 | 0.1 | 0.0 | 0.6 |
| • Breast | 174-175 | 11 | 0.6 | 0.3 | 1.2 |
| • Genitourinary | 179-189 | 8 | 0.5 | 0.3 | 1.1 |
| • Nervous system | 191-192 | 0 | | | |
| • Leukemia, lymphoma | 200-208 | 3 | 0.1 | 0.0 | 0.4 |
| Benign neoplasms and other | 210-229, 235-239 | 40 | 2.1 | 1.5 | 3.0 |
| Endocrine and metabolic diseases | 240-279 | 36 | 2.0 | 1.4 | 2.8 |
| Blood and blood-forming organs | 280-289 | 6 | 0.3 | 0.1 | 0.6 |
| Mental disorders | 290-319 | 57 | 3.0 | 2.3 | 4.0 |
| • Alcoholism | 303 | 13 | 0.6 | 0.3 | 1.1 |
| • Drug abuse | 304-305 | 1 | 0.1 | 0.0 | 0.6 |
| Nervous system and sense organs | 320-389 | 127 | 6.8 | 5.7 | 8.2 |
| Circulatory system | 390-459 | 139 | 8.4 | 7.1 | 9.9 |
| • Hypertension | 401 | 18 | 1.1 | 0.7 | 1.7 |
| • Acute myocardial infarction | 410 | 14 | 0.8 | 0.5 | 1.4 |
| • Ischemic disease, not M.I. | 411-414, 429.2 | 59 | 3.5 | 2.7 | 4.6 |
| • Cerebrovascular disease | 430-438 | 5 | 0.3 | 0.1 | 0.7 |
| Respiratory system | 460-519 | 396 | 21.3 | 19.3 | 23.6 |
| • Upper respiratory | 460-465, 470-478 | 121 | 6.6 | 5.5 | 8.0 |
| • Pneumonia/bronchitis | 466, 480-487 | 191 | 10.3 | 8.8 | 11.9 |
| • Chronic respiratory conditions | 490-496 | 80 | 4.2 | 3.4 | 5.3 |
| Digestive system | 520-579 | 204 | 11.0 | 9.5 | 12.7 |
| • Hernias | 550-553 | 66 | 3.6 | 2.8 | 4.6 |
| • Gall bladder disease | 574-575 | 48 | 2.6 | 1.9 | 3.5 |
| Genitourinary system | 580-629 | 129 | 6.7 | 5.6 | 8.0 |
| • Benign prostatic hypertrophy | 600 | 9 | 0.6 | 0.3 | 1.2 |
| • Endometriosis | 617 | 19 | 0.9 | 0.6 | 1.5 |
| • Ovarian cysts | 620.0-620.2 | 12 | 0.6 | 0.3 | 1.2 |
| • Female genital pain/bleeding | 625-626 | 14 | 0.6 | 0.4 | 1.1 |
| Pregnancy and childbirth[1] | 630-676 | 140 | 21.8 | 18.4 | 25.8 |
| Skin and subcutaneous tissue | 680-709 | 25 | 1.3 | 0.9 | 2.0 |
| Musculoskeletal | 710-739 | 211 | 11.4 | 9.9 | 13.1 |
| • Dorsopathies system | 720-724 | 94 | 4.9 | 4.0 | 6.1 |
| Symptoms, signs, and ill-defined conditions | 740-799 | 51 | 3.1 | 2.3 | 4.1 |
| External causes of injury | E800-999 | 355 | 18.6 | 16.7 | 20.7 |
| • Transport accidents | E800-849 | 55 | 2.9 | 2.2 | 3.9 |
| • Medical accidents | E870-879 | 3 | 0.2 | 0.1 | 0.5 |
| • Accidental falls | E880-888 | 83 | 4.5 | 3.6 | 5.7 |
| • Accidents - struck by objects | E916-918 | 11 | 0.5 | 0.3 | 1.0 |
| • Accidents - machinery | E919 | 2 | 0.1 | 0.0 | 0.4 |
| **Total minus pregnancies** | | **1,862** | **100.8** | **96.2** | **105.7** |
| **TOTAL** | | **2,002** | **109.7** | **104.8** | **114.9** |

† 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.

*Table 4. Diseases and Injuries by Diagnostic Category - Males*

| Category of Diagnoses | ICD9-CM Code | Number of Diagnoses† | Age-Adjusted Rate per 1,000* | Lower 95% Confidence Limit per 1,000 | Upper 95% Confidence Limit per 1,000 |
|---|---|---|---|---|---|
| Infections and parasitic diseases | 001-139 | 25 | 2.1 | 1.4 | 3.3 |
| Malignant neoplasms | 140-208, 230-234 | 18 | 1.4 | 0.9 | 2.3 |
| • Digestive organs | 150-159 | 4 | 0.3 | 0.1 | 0.8 |
| • Respiratory system | 160-165 | 1 | 0.1 | 0.0 | 0.7 |
| • Breast | 174-175 | 0 | | | |
| • Genitourinary | 179-189 | 7 | 0.6 | 0.3 | 1.3 |
| • Nervous system | 191-192 | 0 | | | |
| • Leukemia, lymphoma | 200-208 | 1 | 0.1 | 0.0 | 0.4 |
| Benign neoplasms and other | 210-229, 235-239 | 9 | 0.9 | 0.5 | 1.9 |
| Endocrine and metabolic diseases | 240-279 | 22 | 1.7 | 1.1 | 2.6 |
| Blood and blood-forming organs | 280-289 | 4 | 0.3 | 0.1 | 0.7 |
| Mental disorders | 290-319 | 27 | 1.9 | 1.3 | 2.9 |
| • Alcoholism | 303 | 10 | 0.7 | 0.4 | 1.3 |
| • Drug abuse | 304-305 | 1 | 0.2 | 0.0 | 1.3 |
| Nervous system and sense organs | 320-389 | 70 | 5.0 | 4.0 | 6.4 |
| Circulatory system | 390-459 | 118 | 9.7 | 8.1 | 11.7 |
| • Hypertension | 401 | 11 | 1.0 | 0.5 | 1.7 |
| • Acute myocardial infarction | 410 | 14 | 1.1 | 0.6 | 1.8 |
| • Ischemic disease, not M.I. | 411-414, 429.2 | 57 | 4.6 | 3.5 | 6.0 |
| • Cerebrovascular disease | 430-438 | 2 | 0.2 | 0.0 | 0.7 |
| Respiratory system | 460-519 | 246 | 18.5 | 16.2 | 21.1 |
| • Upper respiratory | 460-465, 470-478 | 65 | 4.8 | 3.7 | 6.2 |
| • Pneumonia/bronchitis | 466, 480-487 | 130 | 10.0 | 8.3 | 12.0 |
| • Chronic respiratory conditions | 490-496 | 48 | 3.5 | 2.6 | 4.7 |
| Digestive system | 520-579 | 141 | 11.0 | 9.2 | 13.1 |
| • Hernias | 550-553 | 57 | 4.4 | 3.4 | 5.8 |
| • Gall bladder disease | 574-575 | 23 | 1.7 | 1.1 | 2.6 |
| Genitourinary system | 580-629 | 32 | 2.6 | 1.8 | 3.7 |
| • Benign prostatic hypertrophy | 600 | 9 | 0.8 | 0.4 | 1.6 |
| • 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 | 17 | 1.4 | 0.8 | 2.4 |
| Musculoskeletal | 710-739 | 128 | 9.6 | 8.0 | 11.4 |
| • Dorsopathies system | 720-724 | 69 | 5.0 | 3.9 | 6.4 |
| Symptoms, signs, and ill-defined conditions | 740-799 | 27 | 2.3 | 1.6 | 3.5 |
| External causes of injury | E800-999 | 232 | 17.4 | 15.2 | 20.0 |
| • Transport accidents | E800-849 | 37 | 3.0 | 2.1 | 4.3 |
| • Medical accidents | E870-879 | 0 | | | |
| • Accidental falls | E880-888 | 37 | 2.9 | 2.0 | 4.1 |
| • Accidents - struck by objects | E916-918 | 11 | 0.8 | 0.4 | 1.6 |
| • Accidents - machinery | E919 | 2 | 0.1 | 0.0 | 0.6 |
| **TOTAL** | | **1,116** | **85.8** | **80.6** | **91.3** |

† Includes all diagnoses reported with an absence of 5 or more days.
* Standardized to age distribution of 1970 U.S. population.

*Table 5. Diseases and Injuries by Diagnostic Category - Females*

| Category of Diagnoses | ICD9-CM Code | Number of Diagnoses† | Age-Adjusted Rate per 1,000* | Lower 95% Confidence Limit per 1,000 | Upper 95% Confidence Limit per 1,000 |
|---|---|---|---|---|---|
| Infections and parasitic diseases | 001-139 | 25 | 4.2 | 2.7 | 6.4 |
| Malignant neoplasms | 140-208, 230-234 | 18 | 3.6 | 2.3 | 5.9 |
| • Digestive organs | 150-159 | 0 | | | |
| • Respiratory system | 160-165 | 1 | 0.2 | 0.0 | 1.8 |
| • Breast | 174-175 | 11 | 2.2 | 1.2 | 4.1 |
| • Genitourinary | 179-189 | 1 | 0.2 | 0.0 | 1.8 |
| • Nervous system | 191-192 | 0 | | | |
| • Leukemia, lymphoma | 200-208 | 2 | 0.3 | 0.1 | 1.0 |
| Benign neoplasms and other | 210-229, 235-239 | 31 | 4.7 | 3.3 | 6.7 |
| Endocrine and metabolic diseases | 240-279 | 14 | 2.4 | 1.4 | 4.2 |
| Blood and blood-forming organs | 280-289 | 2 | 0.3 | 0.1 | 1.1 |
| Mental disorders | 290-319 | 30 | 5.2 | 3.6 | 7.7 |
| • Alcoholism | 303 | 3 | 0.4 | 0.1 | 1.2 |
| • Drug abuse | 304-305 | 0 | | | |
| Nervous system and sense organs | 320-389 | 57 | 11.6 | 8.7 | 15.4 |
| Circulatory system | 390-459 | 21 | 4.0 | 2.5 | 6.3 |
| • Hypertension | 401 | 7 | 1.2 | 0.5 | 2.6 |
| • Acute myocardial infarction | 410 | 0 | | | |
| • Ischemic disease, not M.I. | 411-414, 429.2 | 2 | 0.3 | 0.1 | 1.0 |
| • Cerebrovascular disease | 430-438 | 3 | 0.6 | 0.2 | 2.1 |
| Respiratory system | 460-519 | 150 | 27.4 | 23.1 | 32.5 |
| • Upper respiratory | 460-465, 470-478 | 56 | 9.9 | 7.5 | 13.1 |
| • Pneumonia/bronchitis | 466, 480-487 | 61 | 10.9 | 8.3 | 14.3 |
| • Chronic respiratory conditions | 490-496 | 32 | 6.4 | 4.4 | 9.3 |
| Digestive system | 520-579 | 63 | 11.1 | 8.6 | 14.4 |
| • Hernias | 550-553 | 9 | 1.4 | 0.7 | 2.7 |
| • Gall bladder disease | 574-575 | 25 | 4.7 | 3.2 | 7.1 |
| Genitourinary system | 580-629 | 97 | 14.4 | 11.8 | 17.7 |
| • Benign prostatic hypertrophy | 600 | NA | NA | NA | NA |
| • Endometriosis | 617 | 19 | 2.7 | 1.7 | 4.2 |
| • Ovarian cysts | 620.0-620.2 | 12 | 1.7 | 0.9 | 2.9 |
| • Female genital pain/bleeding | 625-626 | 14 | 2.0 | 1.2 | 3.3 |
| Pregnancy and childbirth[1] | 630-676 | 140 | 21.8 | 18.4 | 25.8 |
| Skin and subcutaneous tissue | 680-709 | 8 | 1.5 | 0.7 | 3.3 |
| Musculoskeletal | 710-739 | 83 | 15.1 | 12.0 | 19.0 |
| • Dorsopathies system | 720-724 | 25 | 4.3 | 2.8 | 6.5 |
| Symptoms, signs, and ill-defined conditions | 740-799 | 24 | 5.0 | 3.2 | 7.7 |
| External causes of injury | E800-999 | 123 | 21.3 | 17.6 | 25.7 |
| • Transport accidents | E800-849 | 18 | 2.6 | 1.6 | 4.1 |
| • Medical accidents | E870-879 | 3 | 0.7 | 0.2 | 2.7 |
| • Accidental falls | E880-888 | 46 | 8.9 | 6.5 | 12.2 |
| • Accidents - struck by objects | E916-918 | 0 | | | |
| • Accidents - machinery | E919 | 0 | | | |
| **Total minus pregnancies** | | **746** | **131.9** | **122.1** | **142.4** |
| **TOTAL** | | **886** | **152.2** | **141.9** | **163.3** |

† 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, 140 pregnancy-related diagnoses were reported among 123 women (Table 6). There were 69 normal deliveries, 25 diagnoses associated with pregnancy complications, and 27 with other indications for care in pregnancy, labor, and delivery.

## Diagnoses by Occupational Category, 1993

During 1993, the age-adjusted diagnosis rate for all employees was approximately one-and-a-half times higher among hourly workers than salaried workers (144.2 versus 99.3 per 1,000 persons) (Table 7). Service workers, who comprised 5.6% of the work force, had the highest diagnosis rate (229.2 per 1,000), with 228 diagnoses reported for 169 workers. Nuclear workers had the second highest diagnosis rate (213.0 per 1,000), with 213 diagnoses reported among 134 persons. Craftsmen and manual laborers ranked third, with 252 diagnoses reported for 166 workers (132.9 per 1,000). Professionals had the lowest diagnosis rate (66.6 per 1,000), with 343 diagnoses reported among 245 men.

The diagnosis rate among men was higher for hourly workers (132.2 per 1,000) than for salaried workers (65.1 per 1,000) (Table 8). Service workers had the highest rate (182.2 per 1,000), with 156 diagnoses reported for 121 men. The second highest rate was among the nuclear workers (149.2 per 1,000), with 124 diagnoses reported among 78 men. Craftsmen and manual laborers ranked third (132.6 per 1,000), with 244 diagnoses reported among 160 men. Again, professional workers had the lowest rate (54.0 per 1,000), with 245 diagnoses reported among 176 men.

The diagnosis rate among women was also higher for hourly workers (202.9 per 1,000) than for salaried workers (149.5 per 1,000). Several hourly occupational categories had small numbers resulting in wide confidence intervals (Table 9). Nuclear workers had the highest rate (466.4 per 1,000), with 89 diagnoses reported for 56 women. The second highest rate was among the service workers (395.7 per 1,000), with 72 diagnoses reported among 48 women. Technical workers ranked third (205.4 per 1,000), with 143 diagnoses reported among 91 women. Professional workers had the lowest diagnosis rate (119.4 per 1,000), with 98 diagnoses reported among 69 women. The women had higher diagnosis rates than the men; this suggests a greater tendency among women to report injury or illness.

| 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 | 8 | 1.3 | 0.6 | 2.6 |
| Complications of Pregnancy | 640-648 | 25 | 3.7 | 2.5 | 5.5 |
| Normal Delivery | 650 | 69 | 10.8 | 8.5 | 13.7 |
| Other Indications for Care in Pregnancy, Labor, and Delivery‡ | 651-659 | 27 | 4.3 | 2.9 | 6.3 |
| Complications of Labor and Delivery‡ | 660-676 | 11 | 1.8 | 1.0 | 3.3 |
| **TOTAL** | | **140** | **21.8** | **18.4** | **25.8** |

†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.

***Table 6. Diagnoses Associated with Pregnancy and Delivery***

| | 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 | 5,493 | 617 | 115.9 | 106.6 | 126.1 |
| | Professional | 4,868 | 343 | 66.6 | 59.5 | 74.4 |
| | Technical | 2,528 | 315 | 125.0 | 111.3 | 140.4 |
| | **Subtotal** | **12,889** | **1,275** | **99.3** | **93.7** | **105.2** |
| Hourly | Service | 999 | 228 | 229.2 | 198.4 | 264.9 |
| | Craftsmen and Manual Laborers | 1,506 | 252 | 132.9 | 115.4 | 153.0 |
| | Nuclear | 946 | 213 | 213.0 | 181.9 | 249.4 |
| | Other | 1,467 | 34 | 36.3 | 24.9 | 53.0 |
| | **Subtotal** | **4,918** | **727** | **144.2** | **133.8** | **155.5** |
| | **TOTAL** | **17,807** | **2,002** | **109.7** | **104.8** | **114.9** |

***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 | 2,191 | 160 | 71.4 | 58.9 | 86.7 |
| | Professional | 4.150 | 245 | 54.0 | 47.3 | 61.6 |
| | Technical | 1,805 | 172 | 89.9 | 76.9 | 105.0 |
| | **Subtotal** | **8,146** | **577** | **65.1** | **59.7** | **71.1** |
| Hourly | Service | 807 | 156 | 182.2 | 152.6 | 217.5 |
| | Craftsmen and Manual Laborers | 1,460 | 244 | 132.6 | 114.7 | 153.2 |
| | Nuclear | 766 | 124 | 149.2 | 121.3 | 183.5 |
| | Other | 704 | 15 | 22.7 | 13.0 | 39.5 |
| | **Subtotal** | **3,737** | **539** | **132.2** | **121.0** | **144.5** |
| | **TOTAL** | **11,883** | **1,116** | **85.8** | **80.6** | **91.3** |

***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 | 3.302 | 457 | 142.4 | 129.2 | 157.0 |
| | Professional | 718 | 98 | 119.4 | 94.1 | 151.6 |
| | Technical | 723 | 143 | 205.4 | 172.7 | 244.4 |
| | **Subtotal** | **4,743** | **698** | **149.5** | **138.0** | **161.8** |
| Hourly | Service | 192 | 72 | 395.7 | 308.3 | 507.9 |
| | Craftsmen and Manual Laborers | 46 | 8 | 153.7 | 68.1 | 346.9 |
| | Nuclear | 180 | 89 | 466.4 | 362.2 | 600.4 |
| | Other | 763 | 19 | 64.8 | 38.5 | 108.9 |
| | **Subtotal** | **1,181** | **188** | **202.9** | **174.1** | **236.5** |
| | **TOTAL** | **5,924** | **886** | **152.2** | **141.9** | **163.3** |

***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 Hanford 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* 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 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 confidence interval of *1.2 to 1.7* would be considered statistically significant. The range 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=2.6) and nuclear workers (RR=2.1) had more than twice the risk of being absent 5 or more consecutive workdays in 1993 due to disease or injury. Craftsmen and manual laborers also showed an increased risk of absence compared with other workers (RR=1.7). Workers in the administration and professional categories had a statistically significant, decreased risk of absences (RR=0.8 and RR=0.6, respectively) compared with other workers (Table 10).

| Occupational Category | Person-Years | Persons with at Least One Event* | Relative Risk** | Lower 95% Confidence Limit | Upper 95% Confidence Limit |
|---|---|---|---|---|---|
| Office Management and Administration | 5,493 | 427 | 0.8 | 0.7 | 0.9 |
| Engineers, Scientists, and Health Care | 4,868 | 245 | 0.6 | 0.6 | 0.7 |
| Technical Support | 2,528 | 208 | 1.1 | 1.0 | 1.3 |
| Service | 999 | 169 | 2.6 | 2.2 | 3.0 |
| Craftsmen and Manual Laborers | 1,506 | 166 | 1.7 | 1.5 | 2.1 |
| Nuclear Specialties | 946 | 134 | 2.1 | 1.8 | 2.5 |
| Other | 1,467 | 23 | 0.2 | 0.1 | 0.3 |
| **TOTAL** | 17,807 | 1,372 | | | |

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

***Table 10. All Diseases and Injuries by Occupational Categories***

## Relative Risk for Selected Disease and Injury Categories by Occupation

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

Technical workers were found to have a statistically significant, elevated risk of absences related to malignant neoplasms (RR=2.8). Eight technical workers, five women and three men, had at least one absence due to cancer. All five women had breast cancer. The five women technical workers were comprised of two chemical technicians, one health physics technician, one principal technician, and one editor. The three men, all of whom were instrument technicians, had lung cancer, prostate cancer, and connective tissue cancer. Service workers were significantly more likely to be absent at least once during 1993 for diseases of the nervous system and sense organs (RR=2.3), diseases of the respiratory system (RR=2.4), diseases of the digestive system (RR=2.3), diseases of the genitourinary system (RR=2.6), diseases of the skin and subcutaneous tissue (RR=7.3), diseases of the musculoskeletal system (RR=2.4), and external causes of injury (RR=3.9). Craftsmen and manual laborers were found to have statistically significant, elevated risk associated with diseases of the nervous system and sense organs (RR=2.8), diseases of the circulatory system (RR=2.0), diseases of the respiratory system (RR=1.9), and injury from external causes (RR=2.1). Nuclear workers were significantly more likely to be absent at least once during 1993 for infections and parasitic diseases (RR=2.7), endocrine and metabolic diseases (RR=5.5), mental disorders (RR=3.0), diseases of the nervous system and sense organs (RR=2.9), diseases of the respiratory system (RR=2.6), diseases of the genitourinary system (RR=2.6), diseases of the skin and subcutaneous tissue (RR=3.6), diseases of the musculoskeletal system (RR=2.5), and external causes of injury (RR=2.2).

The lower overall diagnosis rates observed among salaried workers was also apparent in the relative risk analyses. Administration workers were significantly less likely to be absent at least once during 1993 due to mental disorders (RR=0.5), diseases of the nervous system and sense organs (RR=0.6), diseases of the respiratory system (RR=0.6), and external causes of injury (RR=0.6). Significantly decreased risks among workers in professional positions were observed for endocrine and metabolic diseases (RR=0.2), diseases of the nervous system and sense organs (RR=0.4), diseases of the respiratory system (RR=0.6), diseases of the musculoskeletal system (RR=0.4), and external causes of injury (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 | 5,493 | 17 | 0.9 | 0.5 | 1.8 |
| Professional | 4,868 | 11 | 1.0 | 0.5 | 1.9 |
| Technical | 2,528 | 4 | 0.6 | 0.2 | 1.5 |
| Service | 999 | 5 | 2.1 | 0.8 | 5.5 |
| Craftsmen and Manual Laborers | 1,506 | 3 | 1.1 | 0.3 | 3.8 |
| Nuclear | 946 | 6 | 2.7 | 1.1 | 6.6 |
| Other | 1,467 | 1 | 0.2 | 0.0 | 1.6 |
| **TOTAL** | **17,807** | **47** | | | |

***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 | 5,493 | 8 | 0.6 | 0.2 | 1.5 |
| Professional | 4,868 | 6 | 0.8 | 0.3 | 2.2 |
| Technical | 2,528 | 8 | 2.8 | 1.2 | 6.3 |
| Service | 999 | 1 | 0.7 | 0.1 | 4.7 |
| Craftsmen and Manual Laborers | 1,506 | 3 | 1.5 | 0.4 | 5.4 |
| Nuclear | 946 | 1 | 0.9 | 0.1 | 7.3 |
| Other | 1,467 | 0 | | | |
| **TOTAL** | **17,807** | **27** | | | |

***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 | 5,493 | 18 | 0.9 | 0.5 | 1.8 |
| Professional | 4,868 | 7 | 1.0 | 0.4 | 2.5 |
| Technical | 2,528 | 6 | 1.3 | 0.5 | 3.0 |
| Service | 999 | 2 | 1.4 | 0.3 | 5.7 |
| Craftsmen and Manual Laborers | 1,506 | 1 | 0.7 | 0.1 | 5.9 |
| Nuclear | 946 | 3 | 2.3 | 0.7 | 7.7 |
| Other | 1,467 | 1 | 0.3 | 0.0 | 1.8 |
| **TOTAL** | **17,807** | **38** | | | |

***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 | 5,493 | 7 | 0.4 | 0.1 | 1.0 |
| Professional | 4,868 | 2 | 0.2 | 0.0 | 0.8 |
| Technical | 2,528 | 8 | 2.1 | 0.9 | 4.7 |
| Service | 999 | 3 | 1.8 | 0.6 | 5.9 |
| Craftsmen and Manual Laborers | 1,506 | 5 | 2.1 | 0.8 | 6.0 |
| Nuclear | 946 | 7 | 5.5 | 2.3 | 12.7 |
| Other | 1,467 | 1 | 0.5 | 0.1 | 3.3 |
| **TOTAL** | **17,807** | **33** | | | |

***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 | 5,493 | 14 | 0.5 | 0.2 | 0.9 |
| Professional | 4,868 | 14 | 1.3 | 0.7 | 2.4 |
| Technical | 2,528 | 9 | 1.3 | 0.6 | 2.7 |
| Service | 999 | 6 | 2.4 | 1.0 | 5.6 |
| Craftsmen and Manual Laborers | 1,506 | 3 | 0.9 | 0.3 | 2.9 |
| Nuclear | 946 | 7 | 3.0 | 1.4 | 6.7 |
| Other | 1,467 | 0 | | | |
| **TOTAL** | **17,807** | **53** | | | |

***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 | 5,493 | 29 | 0.6 | 0.4 | 0.9 |
| Professional | 4,868 | 13 | 0.4 | 0.2 | 0.7 |
| Technical | 2,528 | 18 | 1.2 | 0.7 | 2.0 |
| Service | 999 | 13 | 2.3 | 1.3 | 4.1 |
| Craftsmen and Manual Laborers | 1,506 | 20 | 2.8 | 1.7 | 4.8 |
| Nuclear | 946 | 14 | 2.9 | 1.6 | 5.1 |
| Other | 1,467 | 3 | 0.4 | 0.1 | 1.3 |
| **TOTAL** | **17,807** | **110** | | | |

***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 | 5,493 | 21 | 0.7 | 0.4 | 1.2 |
| Professional | 4,868 | 27 | 0.9 | 0.6 | 1.5 |
| Technical | 2,528 | 13 | 1.1 | 0.6 | 2.0 |
| Service | 999 | 3 | 0.5 | 0.2 | 1.7 |
| Craftsmen and Manual Laborers | 1,506 | 17 | 2.0 | 1.1 | 3.4 |
| Nuclear | 946 | 6 | 1.5 | 0.6 | 3.4 |
| Other | 1,467 | 2 | 0.5 | 0.1 | 2.2 |
| **TOTAL** | **17,807** | **89** | | | |

***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 | 5,493 | 91 | 0.6 | 0.5 | 0.8 |
| Professional | 4,868 | 60 | 0.6 | 0.4 | 0.7 |
| Technical | 2,528 | 58 | 1.2 | 0.9 | 1.6 |
| Service | 999 | 43 | 2.4 | 1.7 | 3.3 |
| Craftsmen and Manual Laborers | 1,506 | 50 | 1.9 | 1.4 | 2.5 |
| Nuclear | 946 | 43 | 2.6 | 1.9 | 3.6 |
| Other | 1,467 | 6 | 0.2 | 0.1 | 0.5 |
| **TOTAL** | **17,807** | **351** | | | |

***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 | 5,493 | 53 | 0.9 | 0.6 | 1.2 |
| Professional | 4,868 | 44 | 0.8 | 0.6 | 1.1 |
| Technical | 2,528 | 25 | 1.0 | 0.6 | 1.5 |
| Service | 999 | 23 | 2.3 | 1.5 | 3.6 |
| Craftsmen and Manual Laborers | 1,506 | 21 | 1.3 | 0.8 | 2.1 |
| Nuclear | 946 | 14 | 1.5 | 0.8 | 2.5 |
| Other | 1,467 | 3 | 0.2 | 0.1 | 0.8 |
| **TOTAL** | **17,807** | **183** | | | |

***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 | 5,493 | 40 | 0.8 | 0.5 | 1.2 |
| Professional | 4,868 | 17 | 0.8 | 0.5 | 1.4 |
| Technical | 2,528 | 16 | 1.3 | 0.7 | 2.2 |
| Service | 999 | 10 | 2.6 | 1.3 | 5.0 |
| Craftsmen and Manual Laborers | 1,506 | 4 | 0.9 | 0.3 | 2.5 |
| Nuclear | 946 | 10 | 2.6 | 1.3 | 5.0 |
| Other | 1,467 | 1 | 0.1 | 0.0 | 0.8 |
| **TOTAL** | **17,807** | **98** | | | |

***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 | 5,493 | 5 | 0.5 | 0.1 | 1.5 |
| Professional | 4,868 | 0 | | | |
| Technical | 2,528 | 5 | 1.6 | 0.6 | 4.2 |
| Service | 999 | 8 | 7.3 | 3.2 | 16.6 |
| Craftsmen and Manual Laborers | 1,506 | 1 | 0.5 | 0.1 | 3.7 |
| Nuclear | 946 | 4 | 3.6 | 1.2 | 10.5 |
| Other | 1,467 | 1 | 0.7 | 0.1 | 4.8 |
| **TOTAL** | **17,807** | **24** | | | |

***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 | 5,493 | 61 | 0.9 | 0.7 | 1.3 |
| Professional | 4,868 | 23 | 0.4 | 0.2 | 0.6 |
| Technical | 2,528 | 31 | 1.3 | 0.9 | 1.9 |
| Service | 999 | 23 | 2.4 | 1.6 | 3.8 |
| Craftsmen and Manual Laborers | 1,506 | 21 | 1.4 | 0.9 | 2.3 |
| Nuclear | 946 | 21 | 2.5 | 1.6 | 3.9 |
| Other | 1,467 | 3 | 0.2 | 0.1 | 0.8 |
| **TOTAL** | **17,807** | **183** | | | |

***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 | 5,493 | 16 | 0.8 | 0.4 | 1.4 |
| Professional | 4,868 | 7 | 0.5 | 0.2 | 1.2 |
| Technical | 2,528 | 11 | 1.9 | 1.0 | 3.8 |
| Service | 999 | 3 | 1.2 | 0.4 | 3.8 |
| Craftsmen and Manual Laborers | 1,506 | 4 | 1.2 | 0.4 | 3.5 |
| Nuclear | 946 | 4 | 2.1 | 0.8 | 5.6 |
| Other | 1,467 | 3 | 0.8 | 0.3 | 2.6 |
| **TOTAL** | **17,807** | **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 | 5,493 | 77 | 0.6 | 0.5 | 0.8 |
| Professional | 4,868 | 49 | 0.5 | 0.3 | 0.6 |
| Technical | 2,528 | 51 | 1.1 | 0.8 | 1.5 |
| Service | 999 | 61 | 3.9 | 2.9 | 5.1 |
| Craftsmen and Manual Laborers | 1,506 | 51 | 2.1 | 1.5 | 2.9 |
| Nuclear | 946 | 37 | 2.2 | 1.5 | 3.0 |
| Other | 1,467 | 2 | 0.1 | 0.0 | 0.3 |
| **TOTAL** | **17,807** | **328** | | | |

***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 prostrate 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.