DOE/EH-0257

2000

Oak Ridge National Laboratory Annual Epidemiologic Surveillance Report

Oak Ridge National Laboratory 2000
Epidemiologic Surveillance Report

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Additional information about the Department of Energy's Office of Health Programs, the Epidemiologic Surveillance Program, and annual reports for DOE sites participating in this program can be found at:

http://tis.eh.doe.gov/health/epi/surv/index.html

ACKNOWLEDGEMENT

Oak Ridge National Laboratory 2000

At A Glance

The ORNL work force experienced an increase of 173 workers in 2000. The average age of men and women in the work force remained similar (47 years for men, 45 years for women).

As in 1999, The OSHA-recordable rates among both men and women were highest among Crafts/Laborers workers. These workers accounted for 14 percent of the work force and 60 percent of the OSHA-recordable events.

Sprains and strains and bruises were the most common occupational injuries.

The OSHA-recordable rates for women tended to be higher than for men in all job categories except Scientists/Engineering.

Possible sentinel health events may or may not be work-related, but are of interest because they often help identify occupational health issues in need of attention. Nine of 694 diagnoses were identified as possible sentinel health events in 2000. All of the possible sentinel health events were carpal tunnel syndrome reported by nine male workers. These workers included four Laborers, three Crafts workers, one Professional employee, and one Operator.

Overall, the rate of 5-day absences (not necessarily work-related) increased with age among both men and women. The average number of days off related to these absences was not related to age.

Introduction

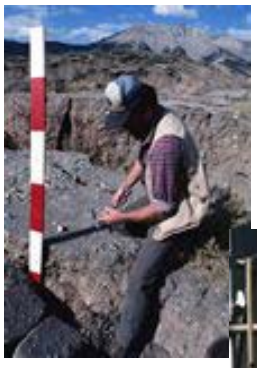
The U.S. Department of Energy's (DOE) commitment to assuring the health and safety of its workers includes the conduct of epidemiologic surveillance activities that provide an early warning system for health problems among workers. The Epidemiologic Surveillance Program monitors illnesses and health conditions that result in an absence of 5 or more consecutive workdays, occupational injuries and illnesses, and disabilities and deaths among current workers.

This report provides a summary of epidemiologic surveillance data collected from Oak Ridge National Laboratory (ORNL) from January 1, 2000 through December 31, 2000.The data were collected by a coordinator at ORNL and submitted to DOE's Epidemiologic Surveillance Data Center, located at Oak Ridge Institute for Science and Education, where quality control procedures and data analyses were carried out. Epidemiologic surveillance began in 1999 for ORNL.

The information presented in this report provides highlights of the data analyses conducted. Additional supporting tables are posted on the Office of Health Programs' Web site (**http://tis.eh.doe.gov/health/epi/surv/index.html**), or are available by request. The main sections of the report include: work force characteristics; absences due to injury or illness of 5 or more consecutive workdays; workplace injuries, illnesses, and deaths that were reportable to the Occupational Safety and Health Administration ("OSHA-recordable" events); and disabilities and deaths among current workers.

Note: In the figures and calculations that follow, percentages have been rounded to the nearest whole number.

DOE sites vary by mission, function, job classification, and worker exposures. Therefore, comparisons of ORNL with other DOE sites should be made with caution. In addition, many factors can affect the completeness and accuracy of health information reported at the sites, thereby affecting the observed patterns of illness and injury.



Site Overview

Originally known as Clinton Laboratories, the Oak Ridge National Laboratory (ORNL) was established in 1943 to carry out a single, well-defined mission: the pilot-scale production and separation of plutonium for the World War II Manhattan Project. The Clinton Pile, originally designated X-10, the first true plutonium production reactor, started operating in November 1943.

The primary site for ORNL is approximately 4,250 acres; the National Environmental Research Park (also part of ORNL) is approximately 20,000 acres; and the additional reservation area for which ORNL currently has contractual responsibility for management (Solway Bend) is approximately 350 acres. ORNL is about 10 miles southwest of Oak Ridge, Tennessee.

Approximately 531 buildings and other major facilities, totaling about 3.1 million square feet, are located throughout the primary ORNL site. ORNL facilities are also located outside the primary site boundary as well as at the Y-12 site, for a total of about 4 million square feet in facilities.

ORNL is a multiprogram science and technology laboratory. Their mission today is to conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. ORNL also performs other work for DOE, including isotope production, information management, and technical program management, and provides research and technical assistance to other organizations.

The site continues to evolve to meet DOE's changing needs. Currently under construction at ORNL is the Spallation Neutron Source (SNS). The SNS will be an accelerator-based neutron scattering facility to be used for research in broad areas of physical, chemical, materials, biological, and medical sciences. When completed in 2005, the SNS will provide the U.S. scientific community with a neutron source having greater intensity, power, and instrumentation than any other existing neutron source.

ORNL, as part of the Oak Ridge Reservation, was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in December 1989. The CERCLA remediation activities are covered under a 1992 tri-party Federal Facility Agreement among the Environmental Protection Agency, DOE, and the Tennessee Department of Environment and Conservation.

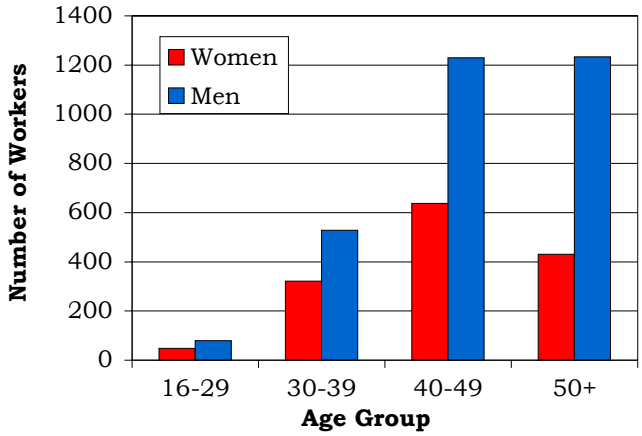
The site was managed through a contract with Lockheed Martin Energy Research Corporation until April 1, 2000, when the University of Tennessee-Battelle team replaced them as the managing contractor.

In September 2000, DOE announced that a 5-year plan is being developed to modernize facilities at ORNL. The plan includes the construction of 11 major facilities and the renovation of several others. The modernization plan represents the largest construction effort on the ORNL site since the Manhattan Project in 1943.

The ORNL Work Force - 2000

A total of 4,508 Oak Ridge National Laboratory (ORNL) employees were included in epidemiologic surveillance in 2000, an increase of 173 workers from 1999. The gender and age distribution of the 2000 work force is shown in Figure 1. There were 1,438 (32 percent) women and 3,070 (68 percent) men in the work force. The average age of male ORNL workers was 47 years and 45 years for females.

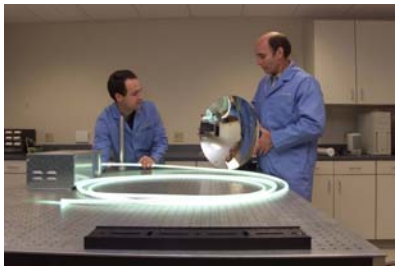
Figure 1. The Work Force by Gender and Age



The distribution of workers by job category and gender is shown in Figure 2. Individual job titles reported by ORNL were grouped together into 10 job categories because the small number of workers or health events in some categories limited the type of analyses that could be conducted. Men and women were not distributed equally among the various job categories. Almost 40 percent of female workers were in the Administrative category, while the largest percentage of male workers (23 percent) was in the Engineering group.

Figure 2. The Work Force by Job Category and Gender

Job Category	Women	Men
Administrative	548 38%	17 1%
Management	68 5%	392 13%
Professional	305 21%	387 13%
Engineering	60 4%	715 23%
Scientists	116 8%	579 19%
Technicians	124 8%	241 8%
Crafts	14 1%	386 12%
Laborers	72 5%	172 5%
Operators	4 <1%	67 2%
Unknown	127 9%	114 4%



Number and Length of Absences

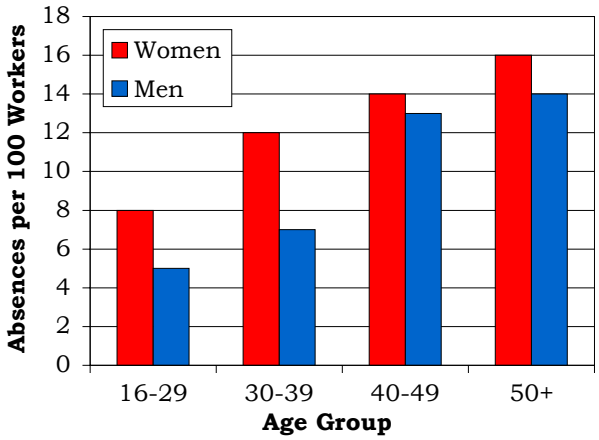
Epidemiologic surveillance examines absences of 5 or more consecutive workdays (also referred to as "5-day absences"). This absence threshold is based on DOE Order 440.1, which requires contractor management to notify Occupational Medicine when a worker has been absent for 5 or more consecutive workdays. If an absence on a Friday continues through Tuesday, the length of that absence includes the weekend. All injuries and illnesses due to a work-related incident also must be reported. Non-occupational illnesses and injuries that involve absences of fewer than 5 days do not routinely require a medical clearance for return to work and are therefore excluded from these analyses.

Specific absences of 5 or more consecutive workdays that were not the result of an injury or illness were excluded. These included seven women with reported absences due to maternity leave and two men and one woman with reported absences for conditions unrelated to the treatment of an illness or injury.

Throughout this report, analyses take gender, age, and occupation into account because the risk of illness and injury varies by these factors.

The rate of 5-day absences due to injury or illness varied by gender and age as shown in Figure 3. The 5-day absence rate among women was 14 per 100 workers (201 / 1,438) and 12 per 100 workers (369 / 3,070) among men. The 5-day absence rate increased with age among both men and women.

Figure 3. Absence Rate by Gender and Age



The average length of absence was 29 days for men and 34 days for women (Figure 4). The average duration of absence was not related to age among women or men.

Figure 4. Number of Days Absent by Gender and Age

Gender	Age	Number of Absences	Number of Days Absent	Average Number of Days Absent
Women	16-29	4	44	11
	30-39	40	1,469	37
	40-49	89	2,556	29
	50+	68	2,808	41
	Total	201	6,877	34
Men	16-29	4	91	23
	30-39	39	844	22
	40-49	156	4,919	32
	50+	170	4,840	28
	Total	369	10,694	29

The rate of 5-day absences due to illness or injury varied by job category among both men and women (Figure 5). Women had a higher rate of absence than did men within the same job category, except for those in the Administrative, Scientists, and Unknown categories. Workers in the Crafts and Laborers groups had the highest absence rates among male workers; men in the Engineering, Scientists, and Unknown groups had the lowest absence rates. The job categories with the highest rates among men also had the highest rates among women. The Unknown category had the lowest rate for women.

We saw no consistent pattern for average absence duration among men and women within a job category (Figure 6). Laborers, who had one of the higher absence rates among men, also had the longest average duration of absence (39 days). Male Administrative workers had the shortest average number of days absent, 18 days. Among women, Operators had the shortest average absence, 10 days. Women in Management had the longest average length of absence (50 days).

Figure 5. Absence Rate by Job Category and Gender

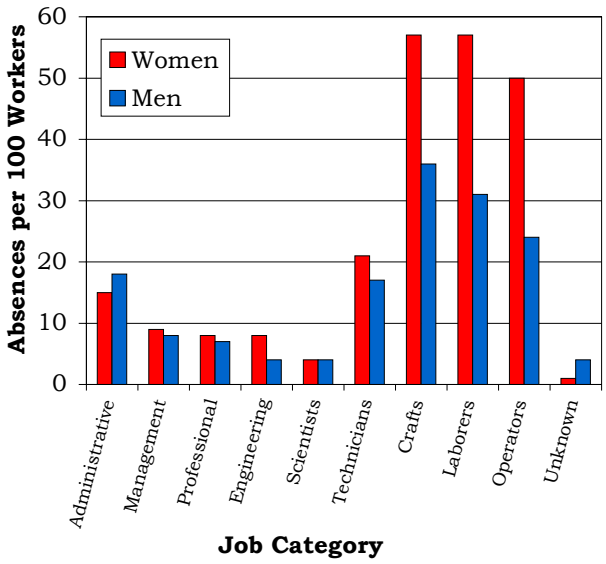
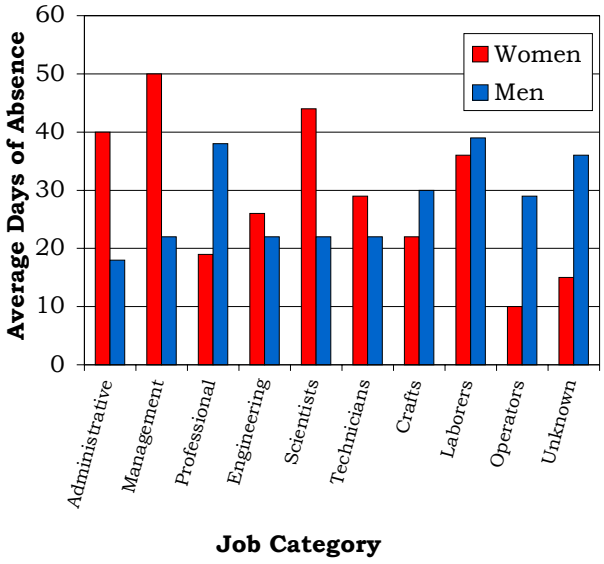
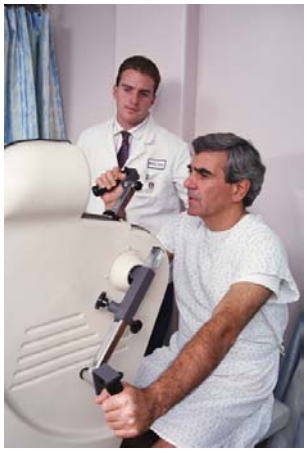


Figure 6. Average Duration of Absence by Job Category and Gender



Diagnostic Categories

Epidemiologic surveillance monitors *all* illnesses and injuries among active workers because it is not always possible to determine which health effects are due to occupational exposures and which ones are due to other causes. Most illness and injury diagnoses were reported to the occupational medicine clinic by workers who required return-to-work clearances. An absence due to illness or injury may involve more than one diagnosis, and epidemiologic surveillance includes all reported diagnoses. In addition, the OSHA 200 Log provides information on recorded occupational injuries and illnesses whether or not they involve absences.



This report organizes illness and injury categories based on a standard reference, the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM). This reference is used to classify health events for statistical purposes. You can find specific health conditions in the Explanation of Diagnostic Categories.

The number of reported diagnoses categorized according to the ICD-9-CM and the number of lost calendar days are presented in Figure 7. Women reported 239 diagnoses and men reported 455 diagnoses in 2000. The most frequently reported diagnoses did not vary by gender. Among both women and men, respiratory conditions, disorders of the muscles and skeleton, and injuries were among the most frequently reported diagnoses. These diagnoses were also among the more commonly reported diagnoses in 1999.

Figure 7. Number of Diagnoses and Lost Calendar Days by Diagnostic Category (Categorized by ICD-9-CM) and Gender

Diagnostic Category	Women		Men	
	Number of Diagnoses	Number of Lost Calendar Days	Number of Diagnoses	Number of Lost Calendar Days
Benign Growths	3	140	4	116
Blood	1	7	1	7
Cancer	9	965	2	58
Digestive	20	474	39	794
Endocrine/ Metabolic	0	0	7	138
Existing Birth Condition	0	0	3	212
Genitourinary	22	696	20	359
Heart/ Circulatory	10	647	49	1,786
Infections/ Parasites	7	68	16	185
Injury	31	1,212	70	1,860
Miscarriage	0	0	NA	NA
Muscles & Skeleton	48	1,908	97	4,185
Nervous System	8	408	22	586
Psychological	9	395	14	405
Respiratory	65	876	96	1,180
Skin	2	17	3	30
Unspecified Symptoms	4	102	12	252

Note: Lost calendar days for each absence are counted more than once when multiple diagnoses occur in different diagnostic categories for the same absence.

Compared with diagnoses reported in 1999, the number of diagnoses reported in 2000 increased 37 percent among women and 89 percent among men. Similarly, the number of days of absence increased 87 percent among women and 77 percent among men in 2000. It is likely that much of this increase can be attributed to more complete reporting by the site in 2000; most epidemiologic surveillance sites experience improved reporting after their first year of participation in the program.

Women lost 6,877 calendar days due to injury and illness. Respiratory diseases (27 percent), muscles and skeleton conditions (20 percent), and injuries (13 percent) accounted for 60 percent of their reported diagnoses. The majority of the respiratory conditions were due to bronchitis and asthma (40 percent), followed by upper respiratory infections (34 percent). Joint disorders made up 38 percent of the muscles and skeleton conditions, followed by disk and back problems (35 percent). Sprains and strains (35 percent) and fractures (26 percent) were the most common injuries. One diagnosis each for an allergic reaction and complications of medical care were included among the injuries.

Men lost 10,694 calendar days due to injury and illness. Fifty-seven percent of all reported diagnoses among men were due to muscles and skeleton conditions (21 percent), respiratory conditions (21 percent), and injuries (15 percent). A closer look at diagnoses affecting the muscles and skeleton showed that about 44 percent were joint disorders and 40 percent were back problems and disk disorders. Upper respiratory infections accounted for 42 percent of the respiratory conditions, followed by pneumonia and influenza (34 percent). Sprains and strains (43 percent) and fractures (33 percent) were the most frequently reported injuries. Four diagnoses for allergic reactions and two diagnoses for complications of medical care were among the injury diagnoses.

The previously mentioned diagnoses did not vary much by age. Conditions affecting the respiratory system, diagnoses of the muscles and skeleton, and injuries were the most frequently reported categories for men and women of all ages except the youngest age group. Workers less than 30 years old reported only 10 diagnoses in 2000, 5 each for men and women.

Figure 8 shows the frequency of reported diagnoses by job category for men and women. The types of diagnoses did not vary significantly by job category. Among men, respiratory conditions, muscles and skeleton conditions, and injuries appeared frequently in most job categories. Respiratory conditions, muscles and skeleton conditions, injuries, and genitourinary diseases were common across most job categories among women. Twenty-one women reported 22 diagnoses for genitourinary tract conditions; eighteen of these diagnoses were for female reproductive disorders. We saw no indication that any particular diagnoses occurred disproportionately in a specific job category.

Figure 8. Most Frequently Reported Diagnoses by Job Category and Gender

Job Category	Men	Women
Administrative	Heart/Circulatory (1) Nervous System (1) Respiratory (1)	Respiratory (24) Muscles & Skeleton (23) Injury (15)
Management	Respiratory (9) Heart/Circulatory (8) Digestive (7) Injury (6) Muscles & Skeleton (6)	Nervous System (2) Cancer (1) Genitourinary (1) Heart/Circulatory (1) Injury (1) Muscles & Skeleton (1) Respiratory (1)
Professional	Digestive (6) Muscles & Skeleton (6) Injury (5)	Respiratory (9) Genitourinary (5) Digestive (4)
Engineering	Respiratory (8) Muscles & Skeleton (6) Digestive (5) Injury (5)	Muscles & Skeleton (2) Respiratory (2) Genitourinary (1)
Scientists	Injury (8) Muscles & Skeleton (7) Respiratory (5)	Genitourinary (2) Muscles & Skeleton (2) Benign Growths (1)
Technicians	Respiratory (17) Muscles & Skeleton (13) Heart/Circulatory (9)	Respiratory (14) Injury (4) Muscles & Skeleton (3)
Crafts	Muscles & Skeleton (40) Respiratory (38) Injury (20) Heart/Circulatory (19)	Muscles & Skeleton (6) Injury (5) Benign Growths (1) Unspecified Symptoms (1)
Laborers	Injury (13) Muscles & Skeleton (12) Respiratory (11) Nervous System (6)	Respiratory (14) Muscles & Skeleton (9) Digestive (4) Injury (4)
Operators	Injury (7) Muscles & Skeleton (6) Respiratory (4)	Genitourinary (2) Respiratory (1)
Unknown	Digestive (2) Infections/Parasites (1) Muscles & Skeleton (1)	Heart/Circulatory (1)

Note: Numbers in parentheses represent the number of reported diagnoses.

Rates of Disease Occurrence

A Word about Rates: The previous section considered the number of absences and health conditions among various worker groups. For example, Figure 7 shows that men reported 70 and women reported 31 diagnoses involving injuries during 2000. Men, therefore, reported more than twice as many injuries as women. As there were more than 2 times as many men than women at ORNL, it seems reasonable to expect more injuries among men than women. Does this mean that men were at greater risk of injuries compared with women in 2000? To correctly answer that question, the total number of men and women in the work force must be considered. To compare risk among men and women, it is necessary to calculate the injury rate for each gender. Rates are calculated by dividing the number of injury diagnoses in a given gender by the total number of employees of that gender. Multiply this number by 1,000 to get the diagnosis rate per 1,000 workers. For example:

70 injury diagnoses ÷ 3,070 men =
.023 x 1,000 = 23 injury diagnoses per 1,000 men

31 injury diagnoses ÷ 1,438 women =
.022 x 1,000 =22 injury diagnoses per 1,000 women

Comparing these rates now correctly suggests that the rate of reported injuries among women was about the same as the rate for men. They are called **crude rates** because they do not account for possible differences between men and women such as age and other factors that might affect the individual's risk of having an injury. Because age is so strongly related to the risk of disease and injury, epidemiologists almost always take age into account when comparing groups. This is done by using age-specific categories or by statistical methods of adjustment.

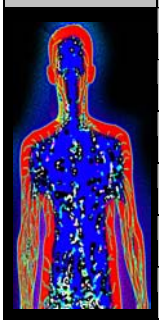
The diagnosis rate, also called the illness and injury rate, is the number of occurrences of a given disease or health condition observed over the course of a year per 1,000 workers at risk of getting that condition (see shaded box). One health condition, arthritis for example, may result in several 5-day absences over a year. Conversely, one 5-day absence may be associated with multiple diagnoses (e.g., the flu and a sprained wrist) recorded for epidemiologic surveillance.

In the following set of analyses, the four age groups previously used were collapsed into two groups: workers younger than 50 years of age and those 50 or older. In addition, the 10 job categories were combined into six larger groups. Five groups of diagnoses of particular interest to workers are presented in Figure 9: all illnesses and injuries combined, cancer, heart / circulatory system, respiratory system, and injury. Additional information about 10 other disease groups is also analyzed and can be found in the Supporting Tables.

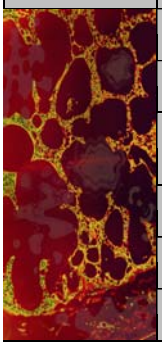
The rates for all illness and injuries combined among men tended to be greater for ORNL workers 50 years of age and older compared with younger workers. The opposite was true for women. Women and men classified as Crafts / Laborers had the highest rates.

Cancer rates presented in this report are based on reported 5-day absences during the year. A worker may experience several periods of absence from one cancer diagnosis due to medical complications or treatment regimens. Each absence results in the report of a cancer diagnosis; however, it

Figure 9. Illness and Injury Rates by Job Category, Gender, and Age

Diagnostic Category	Rate per 1,000			
All Illnesses & Injuries Combined	Job Category	Age	Men	Women
	Administrative/ Management	<50	73	146
		50+	133	242
	Professional	<50	66	87
		50+	83	80
	Scientists/ Engineering	<50	53	38
		50+	54	111
	Technicians/ Operators	<50	192	294
		50+	417	115
	Crafts/Laborers	<50	395	811
		50+	449	455
	Unknown	<50	54	11
		50+	0	0

Diagnostic Category	Rate per 1,000			
Respiratory	Job Category	Age	Men	Women
	Administrative/ Management	<50	26	23
		50+	23	73
	Professional	<50	12	30
		50+	0	27
	Scientists/ Engineering	<50	12	15
		50+	8	0
	Technicians/ Operators	<50	67	127
		50+	71	77
	Crafts/Laborers	<50	80	94
		50+	98	273
	Unknown	<50	0	0
		50+	0	0

Diagnostic Category	Rate per 1,000			
Cancer	Job Category	Age	Men	Women
	Administrative/ Management	<50	0	8
		50+	0	9
	Professional	<50	0	0
		50+	0	0
	Scientists/ Engineering	<50	0	0
		50+	2	0
	Technicians/ Operators	<50	0	20
		50+	0	0
	Crafts/Laborers	<50	3	38
		50+	0	0
	Unknown	<50	0	0
		50+	0	0

Diagnostic Category	Rate per 1,000			
Injury	Job Category	Age	Men	Women
	Administrative/ Management	<50	5	25
		50+	23	27
	Professional	<50	12	9
		50+	14	0
	Scientists/ Engineering	<50	10	0
		50+	10	0
	Technicians/ Operators	<50	40	39
		50+	48	0
	Crafts/Laborers	<50	65	151
		50+	51	30
	Unknown	<50	0	0
		50+	0	0

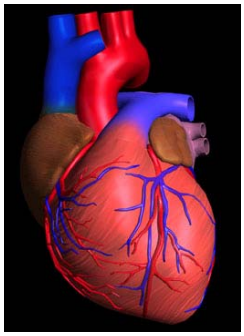
Diagnostic Category	Rate per 1,000			
Heart/ Circulatory	Job Category	Age	Men	Women
	Administrative/ Management	<50	16	5
		50+	28	23
	Professional	<50	4	0
		50+	14	0
	Scientists/ Engineering	<50	4	0
		50+	4	0
	Technicians/ Operators	<50	18	0
		50+	71	38
	Crafts/Laborers	<50	34	19
		50+	47	0
	Unknown	<50	0	11
		50+	0	0

does not imply that this is a new cancer. The cancer rates in this report are not comparable to the *incidence rates* frequently published in many articles on cancer, with which you may be familiar. Incident cancer rates are based on the number of new cancer cases diagnosed within a given time, usually a year.

The likelihood that an individual in the U.S. develops cancer increases with age. Our data did not reflect this

pattern. Among the nine workers who reported cancer in 2000, six were less than 50 years old. The nine workers reported 11 cancer diagnoses: 7 breast cancers, 2 genitourinary cancers, 1 skin cancer, and 1 digestive cancer. Four (67 percent) of the six women reporting 7 breast cancer diagnoses were Administrative workers. Thirty-eight percent of women at ORNL were in the Administrative category.

Older men had higher rates of heart / circulatory disease than younger men. Among women, no relationship was observed between age and heart / circulatory problems. With the exception of the Unknown category, men had higher rates of heart / circulatory conditions than women, regardless of age or job category. The highest rate was seen among older men in the Technicians / Operators category, with four men reporting 6 diagnoses. Twenty-five of the 47 absences among men occurred in workers aged 50 or older; 36 of 49 diagnoses among men of all ages involved hypertension or ischemic heart disease (restricted blood flow through an artery). Five of 10 diagnoses for heart / circulatory problems reported among women were for hypertension, with no reported diagnoses for ischemic heart disease. Compared with other workers, Technicians and Crafts workers were about 3 times more likely to report heart / circulatory conditions compared to workers in other job categories.



Crafts / Laborers had the highest rates of respiratory disease for men and women. Laborers were over 3 times more likely to report a respiratory condition and Crafts workers were almost 4 times as likely to report these conditions than were other workers. Women tended to have higher rates of respiratory disease than did men in all job categories. Similar patterns were seen in 1999. Technicians and Operators were at almost 3 times the risk of reporting a respiratory diagnosis compared to workers in other job categories.

Injury rates were generally higher among younger women and older men. The highest rates of injury were among men and women in the Crafts / Laborers group. Crafts workers and Laborers were about 4 times more likely to report an injury than were other workers. Compared with other workers, Crafts workers were over 7 times more likely to report a fracture of a lower limb and about 4 times more likely to report a back sprain or strain. Laborers were also 5 times more likely to report a back sprain or strain.

In other analyses, we compared the risk of illness and injury among workers classified in one job category with the risk to workers in the remaining nine job categories. Overall, workers in the Crafts and Laborers categories were over 3 times, Operators at 2 times, and Technicians at almost

twice the risk compared with all other groups for illness or injury. Crafts workers were at increased risk of many types of conditions compared with workers in other job categories: 8 times the risk of unspecified symptoms, 7 times the risk of an infectious disease, 5 times the risk of a psychological disorder, 4 times the risk of a condition of the muscles and skeleton, and over 3 times the risk of a genitourinary condition and disorder of the nervous system. Laborers were 8 times more likely to report a nervous system diagnosis; almost 6 times more likely to report a psychological disorder; about 4 times more likely to report an infectious disease, a genitourinary condition, or a muscles and skeleton disorder; and 3 times more likely to report a digestive disorder. Operators were at almost 3 times higher risk of muscles and skeleton conditions compared with other workers.

Sentinel Health Events for Occupations

A sentinel health event for occupation (SHEO) is a disease, disability, or death that is likely to be occupationally related. Its occurrence may serve as a warning signal that materials substitution, engineering control, personal protection, or medical care may be required to reduce the risk of injury or illness among the work force. Sixty-four medical conditions associated with workplace exposures from studies of many different industries have been identified as sentinel health events. Although sentinel health events may indicate an occupational exposure, many may also result from non-occupational exposures. Due to this uncertainty, sentinel health events are assessed in two categories.

Definite Sentinel Health Events: Conditions that are unlikely to occur in the absence of an occupational exposure. Asbestosis, a lung disease resulting from exposure to asbestos, is an example.

Possible Sentinel Health Events: Conditions such as lung cancer or carpal tunnel syndrome may or may not be related to occupation. Detailed occupational and non-occupational information is required to determine the work-relatedness of the illness. For example, lung cancer may result from asbestos exposure or smoking. Carpal tunnel syndrome may result from a job requiring typing or from a hobby such as playing the piano.

One definite sentinel health event was identified in 2000. A female Crafts worker fell at work and reported multiple bruises, a neck sprain, and an open wound of the head. Seven calendar days were lost from this event. Nine of 694 diagnoses (1 percent) were identified as possible sentinel health events (Figure 10). All of the possible sentinel health events were carpal tunnel syndrome reported by nine male workers. They resulted in 415 lost calendar days. These workers included four Laborers, three Crafts workers, one Professional employee, and one Operator. All but one employee was aged 40+.

Figure 10. Characteristics of SHEOs by Gender

	Total Number of SHEO Diagnoses		Total Number of Days Absent	
	Men	Women	Men	Women
Definite	0	3	0	7
Possible	9	0	415	0
Total	9	3	415	7

Disabilities Among Active Workers

Disability data for the 2000 ORNL work force were not available.

Deaths Among Active Workers

Death data for the 2000 ORNL work force were not available.

OSHA-Recordable Events

The Occupational Safety and Health Administration (OSHA) requires employers to maintain a record of occupational injuries and illnesses that have occurred among employees and to make that information available to OSHA on request. Employers maintain the information from these OSHA-recordable events in the OSHA 200 Log. OSHA-recordable events differ from health events captured through return-to-work clearances in at least two important respects: 1) they do not necessarily result in days lost from work, and 2) they are usually accompanied by a specific determination that they are work-related.

Figure 11 shows the distribution of OSHA-recordable events by gender and age. There were 50 OSHA-recordable events among women and 94 among men. The overall rate of OSHA-recordable events was the same for men and women (3 per 100 workers). The average number of lost or restricted workdays was not related to age for either men or women.

The distribution of OSHA-recordable events by job category and gender is shown in Figure 12. Men had higher rates of OSHA-recordable events than did women in two job categories: Administrative and Scientists. Women and men in the Unknown job category did not report any OSHA events. Female Scientists also reported no OSHA events. The Operators group had the highest rate of OSHA events (50 per 100 workers) among women; however, the rate is based on a small group of workers (4 female Operators). The next highest rate for women was among the Laborers (24 per 100 workers). Laborers and Crafts workers had the highest rates of OSHA events among men (13 per 100 workers and 12 per 100 workers, respectively).

Figure 11. OSHA-Recordable Events by Gender and Age

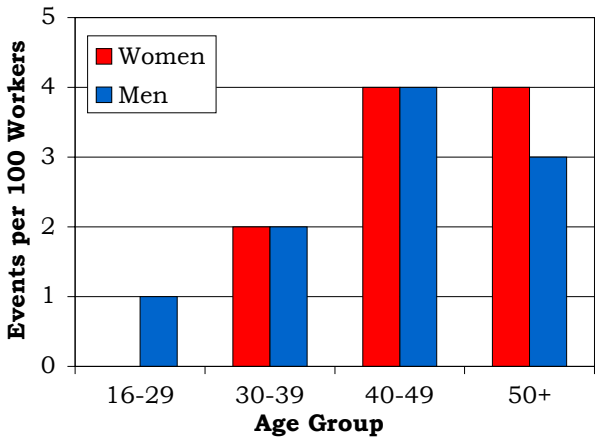
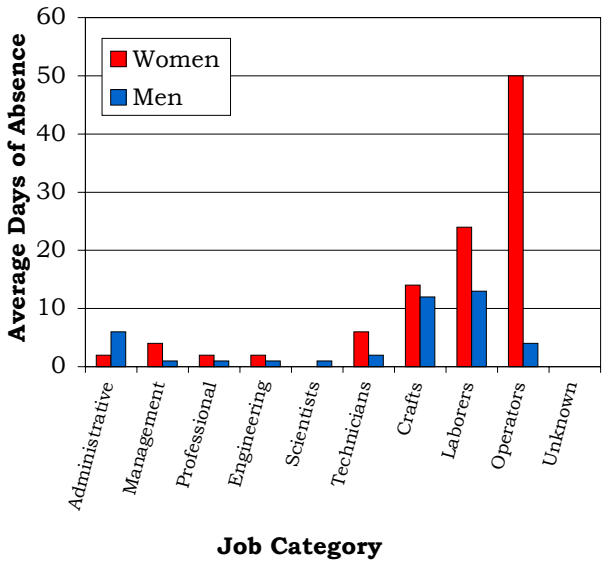


Figure 12. OSHA-Recordable Events by Job Category and Gender



The average number of workdays lost or with restricted activity due to an OSHA event was 15 days for men; 12 days for women. Workers in the Operators and Laborers job categories had the highest average number of lost or restricted workdays among male workers (27 days and 24 days, respectively). Women in the Crafts category averaged the highest number of lost or restricted workdays (78 days). This was based on two OSHA events. One event accounted for 154 lost and restricted workdays for this job category when a female Crafts worker fell from equipment to the pavement and sustained an open wound to the head and multiple open wounds to the leg.

Diagnostic and Accident Categories for OSHA-Recordable Events

The 144 OSHA events recorded on the OSHA 200 Logs contained 82 diagnoses among women and 124 diagnoses among men (Figure 13).

Injuries accounted for 62 percent of the diagnoses reported among women, the most common of which were sprains and strains (37 percent). Twenty-four percent of the reported injuries among women were bruises. Among men, injuries accounted for 75 percent of the diagnoses reported, again primarily due to sprains and strains (42 percent). Bruises (19 percent) were also frequently reported among men. After injuries, the most common type of OSHA-recordable diagnoses among both men and women was conditions involving the muscles and skeleton.

Figure 13. OSHA-Recordable Diagnoses by Diagnostic Category and Gender

Diagnostic Category	Gender	
	Women	Men
Muscles & Skeleton	19	20
Nervous System	3	9
Psychological	1	0
Skin	2	2
Unspecified Symptoms	6	0
Injury	51	93
Fractures – Upper Limb	0	2
Fractures – Lower Limb	2	2
Dislocations	1	2
Back Sprains & Strains	9	21
Other Sprains & Strains	10	18
Open Wounds – Head, Neck, Trunk	1	2
Open Wounds – Upper Limb	3	10
Open Wounds – Lower Limb	1	0
Superficial Injuries	2	8
Bruises	12	18
Foreign Bodies Entering Orifice	0	7
Burns	2	2
Unspecified Injuries	5	1
Adverse Reactions to Non-Medical Substances	3	0

Ninety-nine percent (142) of the 144 OSHA events were described as “an accident” in the OSHA logs (Figure 14).

The majority of events were described as “other accidents,” a broad category including 71 percent of the accidents among women and 80 percent among men. Overexertion and strenuous movements were responsible for 61 percent of the “other accidents,” followed by being struck by an object (12 percent) and cutting / piercing instrument / objects (10 percent). After "other accidents," falls were the second most common type of accident (13 percent).

Figure 14. OSHA-Recordable Accidents by Type and Gender

Accident Category	Gender	
	Women	Men
	Number of Accidents	Number of Accidents
Motor Vehicle Non-Traffic	1	2
Poisoning – Non-Medicinal	2	0
Falls	10	9
Natural/Environmental Factors	1	2
Submersion/Suffocation/ Foreign Bodies	0	6
Other Accidents	34	75
Struck by an Object	3	10
Caught Between Objects	0	3
Cutting/Piercing Instrument/Object	3	8
Hot, Corrosive, or Caustic Material/Steam	2	3
Visible/UV Light	0	1
Overexertion/Strenuous Movements	23	44
Human Bite	0	1
Repetitive Trauma	3	5
Total	48	94

Rates of OSHA-Recordable Events

The rates of all OSHA-recordable events by age and job categories and gender are shown in Figures 15 and 16. The rates for women tended to be higher than men in all job categories except Scientists / Engineering. The OSHA-recordable rates among both men and women were highest among Crafts / Laborers workers. Most of the OSHA health conditions involved injury. When the rate for OSHA-recordable injuries was considered separately from other OSHA-recordable health conditions, the same job category had the highest rates for both men and women workers. These workers accounted for 14 percent of the work force and 60 percent of the OSHA-recordable events.

Figure 15. OSHA-Recordable Rates by Age and Job Categories Among Women, All Diagnoses Combined

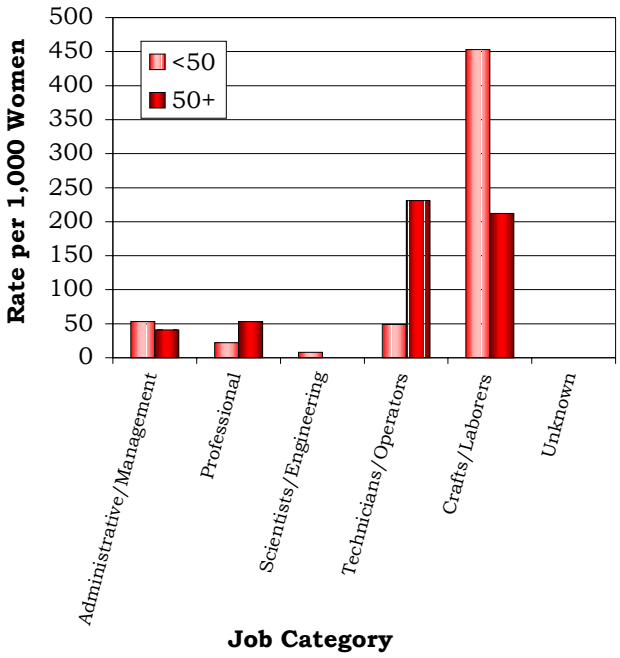
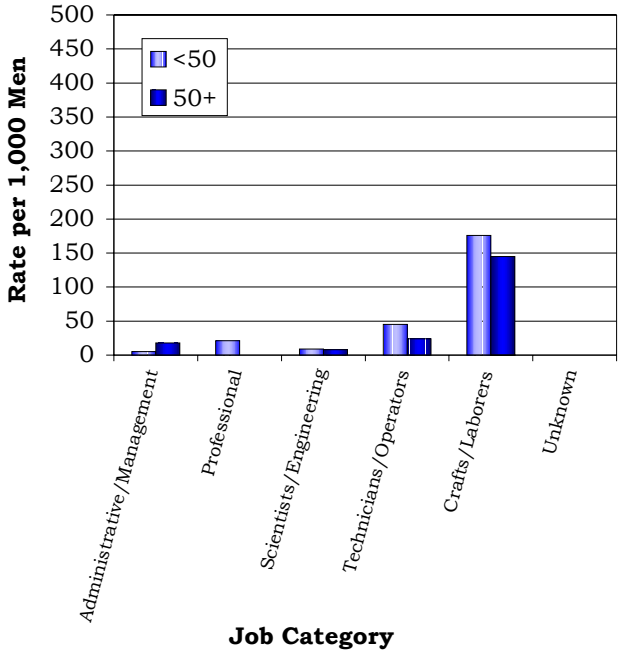


Figure 16. OSHA-Recordable Rates by Age and Job Categories Among Men, All Diagnoses Combined



Laborers were 8 times more likely to suffer a back sprain or strain and 13 times more likely to report a sprain or strain to areas other than the back than were other groups of workers. Crafts workers were at a 3 times greater risk of a back sprain or strain and 5 times greater risk of suffering a sprain or strain to areas other than the back. Operators were also at a greater risk of reporting a sprain or strain to the back (5 times). While both the Crafts workers and Laborers were at an increased risk of conditions affecting the muscles and skeleton (13 times and 5 times, respectively), they were at an equal risk of sustaining an open wound to the upper limb (5 times). Only Crafts workers were at a greater risk of reporting nervous system disorders (10 times) and bruises (7 times).

Glossary

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

Age-Adjusted Rate: A rate that has been mathematically adjusted to account for the effects of differences in the age composition between groups.

Age-Specific Rate: A rate that is calculated for a specific age group (e.g., 16 to 29 years old). Only people in the specific age group are included in the calculation of the rate.

Confidence Interval: A range of values determined by the degree of random variability in the data. The width of the confidence interval is affected by the size of the group being studied and how often the event whose true value is sought occurs. Generally, as the size of the group or the frequency of the event increases, the width of the confidence interval decreases. The level of confidence, for example a 95 percent confidence level, indicates the percentage (e.g., 95 percent) of time that the true value is expected to fall within the confidence interval if the mathematical procedure is repeated 100 times.

Demographics: Characteristics of human populations related to their size, density, age distribution, and vital status.

Diagnosis (diagnoses): Identification of a disease or health condition from signs and symptoms.

Diagnosis Rate: The number of occurrences of a given disease or health condition observed during a given time period per the number of workers at risk of getting that disease during that time period. It is usually multiplied by 100 or 1,000 to produce a rate expressed as a convenient number.

Diagnostic Category: A particular type of disease, a group of related health conditions, or diseases that all affect the same organ system.

Epidemiologic Surveillance: The ongoing evaluation of the health of a human population which is based on the collection and interpretation of demographic and health information for that population.

Epidemiology: The study of the distribution and determinants of diseases and health conditions in human populations.

ICD-9-CM Code: An abbreviation for the *International Classification of Diseases, 9th Revision, Clinical Modification*. An internationally accepted standardized system for the classification of disease and health data collected from medical records.

OSHA: An acronym for the Occupational Safety and Health Administration.

OSHA Event: An abbreviation used throughout this report for an OSHA-Recordable Event.

OSHA-Recordable Event: An accident that occurs on the job and involves fatalities (regardless of time between injury and death), time lost from work, transfer of employment, medical treatment other than first aid, loss of consciousness, or restriction of work or motion. Also included is any diagnosed occupational health event reported to the employer that is neither fatal nor results in workdays lost. By law, these events are recordable in the OSHA 200 Log.

Person-Year: A unit of measurement combining the number of people being studied with the time that each was observed equivalent to 1 person followed for 1 year. For example, 5 people followed for 1 year contribute five person-years, as do 10 people each followed for half a year.

Relative Risk: The ratio of the occurrence of a disease or health condition in one group compared to the rate of occurrence of that same disease or health condition in another group.

Explanation of Diagnostic Categories

Throughout this report, health conditions have been grouped into a number of diagnostic categories which come from the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM). For the text of this report the categories are abbreviated to make the report easier to read. The following table lists the abbreviated categories used throughout the annual report and the corresponding ICD-9-CM codes found in the supporting tables.

Abbreviated Categories Used in the Annual Report	ICD-9-CM Codes
Benign Growths	210-229 235-239
Blood	280-289
Cancer	140-208 230-234
Digestive	520-579
Endocrine / Metabolic	240-279
Existing Birth Conditions	740-759
Genitourinary	580-629
Heart / Circulatory	390-459
Infections / Parasites	001-139
Injury	800-999
Miscarriage	630-676
Muscles and Skeleton	710-739
Nervous System	320-389
Psychological	290-319
Respiratory	460-519
Skin	680-709
Unspecified Symptoms	780-799

ICD-9-CM Codes

All conditions	001-V82	All reported health events
Infectious and parasitic diseases	001-139	Diseases caused by bacteria, viruses, and parasites
• Intestinal infections	001-009	Infections of the bowel or gut
• Tuberculosis	010-018	TB in the lungs and other organs
• Zoonotic bacterial diseases	020-027	Bacterial diseases that animals transmit to humans
• Other bacterial diseases	030-041	Whooping cough, diphtheria, strep throat, and gangrene
• Human Immunodeficiency Virus (HIV) infection	042	AIDS
• Poliomyelitis and other non-arthropod diseases of the central nervous system	045-049	Viral meningitis (swelling of the layers covering the brain and spinal cord); viral encephalitis (swelling of the brain); and polio
• Viral diseases accompanied by exanthem	050-057	Diseases accompanied by rashes or blisters like chickenpox, measles, shingles, and herpes
• Arthropod-borne viral diseases	060-066	Encephalitis (swelling of the brain) caused by bites from virus-carrying ticks or mosquitoes
• Other diseases caused by viruses and chlamydiae	070-079	Viral hepatitis, mumps, rabies, and mononucleosis
• Rickettsioses and other arthropod-borne diseases	080-088	Rocky Mountain spotted fever, malaria, and lyme disease
• Other spirochetal diseases	100-104	Trench mouth and Weil's disease (jaundice caused by coil-shaped bacteria)
• Mycoses	110-118	Athlete's foot; fungal infections of fingernails and toenails; and thrush
• Helminthiases	120-129	Pinworms, tapeworms, roundworms, and whipworms

• Other infectious and parasitic diseases	130-136	Lice, chiggers, scabies, and mites
• Late effects of infectious or parasitic diseases	137-139	Side effects of TB, chickenpox, or polio even though the disease is no longer active
Malignant neoplasms	140-208, 230-234	All cancers, regardless of the part of the body affected
• Lip, oral cavity, and pharynx	140-149	Lip, mouth, throat, and tongue
• Digestive organs and peritoneum	150-159	Stomach, esophagus (tube that transports food to the stomach), intestines, colon, rectum, anus, liver, pancreas, and gallbladder
• Respiratory system and intrathoracic organs	160-165	Sinuses, throat, voice box, lungs, and heart
• Bone, connective tissue, skin, and breast	170-176	Bone, muscle, ligament, tendon, blood vessels, fat, skin, and breast
• Genitourinary organs	179-189	Kidney, bladder, and cervix, ovary, uterus, and prostate
• Other and unspecified sites	190-199	Eye, brain, and thyroid
• Lymphatic and hematopoietic tissue	200-208	Leukemia, lymphoma, Hodgkin's disease, multiple myeloma, lymphosarcoma, and reticulum cell sarcoma
• Carcinoma in situ	230-234	A cancer that is confined to the site of origin (has not spread to neighboring tissue)
Benign neoplasms and neoplasms of uncertain behavior and unspecified nature	210-229 235-239	Tumors that are not cancerous or do not exhibit cancerous behavior, regardless of the part of the body affected
Endocrine, nutritional, and metabolic diseases and disorders of the immune system	240-279	Diseases affecting the hormone secreting glands and organs. Overactive thyroid; underactive thyroid; vitamin deficiency; diabetes; gout; and problems affecting the antibody producing system

Disorders of the blood and blood forming organs	280-289	Anemia and hemophilia (excludes leukemia)
Mental disorders	290-319	Psychiatric diagnoses - Non-psychotic disorders: depression; anxiety, fear, and stress disorders; alcoholism; drug dependence; and eating disorders, such as anorexia; Psychotic disorders: dementia, schizophrenia, and manic depression
Diseases of the nervous system and sense organs	320-389	Huntington's chorea; Alzheimer's and Parkinson's disease; epilepsy; multiple sclerosis; migraine; diseases of the eye, such as cataract and glaucoma
• Inflammatory diseases of the central nervous system	320-326	Bacterial meningitis (swelling of the layers covering the brain and spine); bacterial encephalitis (swelling of the brain); and brain and spinal abscesses
• Hereditary and degenerative diseases of the central nervous system	330-337	Alzheimer's and Parkinson's disease, tremors, and Huntington's chorea
• Other disorders of the central nervous system	340-349	Multiple sclerosis (MS), cerebral palsy, epilepsy, and migraine
• Disorders of the peripheral nervous system	350-359	Nerve disorders of the face, carpal tunnel syndrome, muscular dystrophy
• Disorders of the eye	360-379	Inflammation and ulcers of the eye and eyelid; detached retina; pink eye; problems with tear ducts; glaucoma; and cataracts
• Diseases of the ear and mastoid process	380-389	Infections of the outer, middle, or inner ear; ringing of the ears; hearing loss

Diseases of the circulatory system	390-459	Rheumatic fever, heart murmurs, heart attacks, angina, hardening of the arteries, varicose veins, hemorrhoids, and phlebitis
• Acute rheumatic fever	390-392	High fever and joint pain with possible heart damage
• Chronic rheumatic heart disease	393-398	Long lasting swelling and damage to the heart which results from rheumatic fever
• Hypertensive disease	401-405	High blood pressure
• Ischemic heart disease (Restricted blood flow to the heart)	410-414	Heart attack and angina
• Diseases of pulmonary circulation	415-417	Blood clots in the lung and pulmonary aneurysm (bulge that develops in the wall of the pulmonary artery, which is the artery that carries blood to the lungs)
• Other forms of heart disease	420-429	Swelling of the inner lining, middle lining, or sac enclosing the heart; heart failure; and irregular heartbeat
• Cerebrovascular disease	430-438	Stroke, bleeding in the brain, and blockage or low blood flow in blood vessels of the brain
• Diseases of the arteries and capillaries	440-448	Hardening of the arteries; aneurysm (bulge that develops in the walls of arteries); and blood clots
• Diseases of the veins, lymphatics, and other circulatory system diseases	451-459	Phlebitis (swelling of a vein), thrombophlebitis (swelling of a vein which has a blood clot), varicose veins, and hemorrhoids

Diseases of the respiratory system	460-519	Colds, sinusitis, laryngitis, pneumonia, influenza, chronic bronchitis, asthma, and emphysema
• Acute respiratory infections	460-466	Colds, sore throat, sinus infections, swollen tonsils, and bronchitis
• Other diseases of the upper respiratory tract	470-478	Allergies, hay fever, sinus infections, bronchitis, and sore throat that continue for a long time
• Pneumonia and influenza	480-487	"The flu" and pneumonia caused by a bacteria or virus
• Chronic obstructive pulmonary diseases and allied conditions	490-496	Emphysema and asthma
• Pneumoconiosis and other lung diseases caused by external agents	500-508	Black lung; miners' asthma; asbestosis; silicosis; berylliosis; and conditions caused by chemical fumes and vapors
• Other diseases of the respiratory system	510-519	Pleurisy (swelling of the lining of the lungs), collapsed lung, and respiratory failure
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 oral cavity, salivary glands, and jaw	520-529	Tooth problems (too many, too few, abnormal shape or size, cavities, bleeding gums, toothaches), and infections and swelling of the mouth, jaw, and tongue
• Diseases of the esophagus, stomach, and duodenum	530-537	Ulcers of the esophagus (tube that transports food to the stomach), stomach, and small intestine; indigestion; and uncontrollable vomiting

• Appendicitis	540-543	Swelling of the appendix (rupture, surgery, or both may result)
• Hernia of the abdominal cavity	550-553	Ruptures of the groin and diaphragm (muscle which separates the chest area from the lower part of the trunk)
• Non-infectious enteritis and colitis	555-558	Crohn's disease and swelling of the intestine and colon
• Other diseases of the intestines and peritoneum	560-569	Irritable bowel syndrome, blockage of the intestine, constipation, and diarrhea
• Other diseases of the digestive system	570-579	Diseases of the liver, gallbladder, and pancreas; hepatitis; blood in stool; and bleeding in the stomach and intestine
Diseases of the genitourinary system	580-629	Diseases affecting the kidneys, the prostate, and testes; benign breast diseases; infertility (male and female); diseases of the ovary; pelvic inflammatory disease; and menstrual disorders
• Nephritis, nephrotic syndrome, and nephrosis	580-589	Swelling of the kidney; swelling of the small blood vessels in the kidney; and kidney failure
• Other diseases of the urinary system	590-599	Swelling and infection of the kidney and bladder; kidney stones; and difficulty urinating
• Diseases of the male genital organs	600-608	Enlarged prostate; swelling of the scrotum and prostate; and abscess of the prostate
• Disorders of the breast	610-611	Benign tumors, cysts, and infections of the breast
• Inflammatory disease of the female pelvic organs	614-616	Swelling of the uterus, ovary, fallopian tubes, or cervix
• Other diseases of the female genital tract	617-629	Conditions associated with menopause and postmenopause; PMS; infertility; and cramps

Complications of pregnancy, childbirth, and the puerperium	630-676	Miscarriage; complications of pregnancy, such as hemorrhage; pregnancy-related high blood pressure; preeclampsia; and premature labor or other complications of labor
• Ectopic and molar pregnancy	630-633	Development of fetus outside the uterus and growth of cysts
• Other pregnancy with abortive outcome	634-639	Miscarriage and complications associated with miscarriage
• Complications mainly related to pregnancy	640-648	Abnormal bleeding and possible miscarriage; infections; high blood pressure caused by pregnancy; and premature labor
• Normal delivery, and other indications for care in pregnancy, labor, and delivery	650-659	Delivery requiring little or no assistance; multiple births; breech birth; and problems of the fetus or placenta which affect care of mother
• Complications occurring mainly in the course of labor and delivery	660-669	Long labor; unusually fast delivery; and abnormal bleeding after delivery
• Complications of the puerperium	670-676	Infections of the breast; blood clot in lung; and varicose veins
Diseases of the skin and subcutaneous tissue	680-709	Acne, cellulitis, sunburn, psoriasis, and seborrhea
• Infections of the skin and subcutaneous tissue	680-686	Abscesses, boils, hair-containing cysts, and pus-filled blisters
• Other inflammatory conditions of skin and subcutaneous tissue	690-698	Skin rashes caused by detergents, oils, greases, solvents, sun, food, drugs, or medicine
• Other diseases of the skin and subcutaneous tissue	700-709	Corns, calluses, heat rash, swollen hair follicles, acne, and ingrown fingernails and toenails

Diseases of the musculoskeletal system and connective tissue	710-739	Arthritis, systemic lupus erythematosus, ankylosing spondylitis, herniated intervertebral disk ("slipped disk"), lumbago, sciatica, rheumatism, tendonitis, and osteoporosis
• Arthropathies and related disorders	710-719	Arthritis; joint pain and stiffness; and other diseases of the connective tissue which supports and connects internal organs, forms bones and blood vessel walls, and attaches to bones
• Dorsopathies	720-724	Swelling of the spine; herniated, slipped, and ruptured disk; rheumatoid arthritis of the spine; lumbago; and sciatica
• Rheumatism, excluding the back	725-729	Swelling and degeneration of joints, muscles, tendons; tennis elbow; and bursitis
• Osteopathies, chondropathies, and acquired musculoskeletal deformities	730-739	Fracture caused by bone disease; osteoporosis; curvature of the spine; flat foot; hammer toe; and development of deformities of the nose, toes, feet, legs, arms, and hands
Congenital anomalies	740-759	Spina bifida; cleft palate; harelip; and various chromosomal anomalies, such as Klinefelter's syndrome
Certain conditions originating in the perinatal period	760-779	Maternal high blood pressure; maternal malnutrition; ectopic pregnancy; breech birth; fetal malnutrition or slow growth; injuries related to birth trauma; and perinatal jaundice
Symptoms, signs, and ill-defined conditions	780-799	Blackout, chills, dizziness, fatigue, pallor, abnormal weight loss, undiagnosed chest pain, and heartburn

• Symptoms	780-789	Hallucinations, fainting, convulsions, dizziness, fatigue, fever, sleep disturbance, rash, headache, sore throat, chest pain, nausea, vomiting, and heartburn
• Non-specific abnormal findings	790-796	Abnormal x-ray, blood, stool, and urine test results
• Ill-defined and unknown causes of morbidity and mortality	797-799	Senility; asphyxia; respiratory arrest; nervousness; and unexplained death within 24 hours of onset of symptoms
Injury and poisoning	800-999	Dislocation of joints; sprains and strains of associated muscles; concussions; bruises; cuts; internal injuries from crushing, puncture, tearing, or blunt impact; burns; blisters; poisoning; frostbite; heatstroke; 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 are injuries to muscle from overuse or stretching the muscle beyond its normal limit; sprains are injuries involving tearing or overextending the ligaments of a joint
• Intracranial injuries excluding those with skull fractures	850-854	Concussions; internal bruises; and bleeding within the head without a fracture of the bones of the skull
• Internal injuries of the thorax, abdomen, and pelvis	860-869	Bruising, crushing, tearing, or rupturing the chest, abdomen, and pelvis and the organs within these areas of the body
• Open wounds	870-897	Animal bites; cuts; lacerations; punctures; and amputations, excluding the arteries and veins

• Other injuries and late 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; heatstroke; electrocution; and altitude sickness
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	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	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

NOTES