WORK-RELATED LUNG DISEASE SURVEILLANCE REPORT 1999

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

WORK-RELATED LUNG DISEASE SURVEILLANCE REPORT 1999

Division of Respiratory Disease Studies
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention

December 1999

DISCLAIMER

Mention of the name of any company or product does not constitute the endorsement by the National Institute for Occupational Safety and Health.

Copies of this and other NIOSH documents are available from:

Publications Dissemination, EID
National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226-1998
FAX (513) 533-8573

DHHS (NIOSH) Number 2000-105

For further information about occupational safety and health, call **1-800-35-NIOSH**

This *Work-Related Lung Disease (WoRLD) Surveillance Report* is the fifth in a series of occupational respiratory disease surveillance reports (see page iv) produced by the National Institute for Occupational Safety and Health (NIOSH). It presents summary tables and figures of occupational respiratory disease surveillance data focusing on various occupationally-relevant respiratory diseases, including pneumoconioses, occupational asthma and other airways diseases, and several other respiratory conditions. For many of these diseases, selected data on related exposures are also presented.

The 1999 *WoRLD Surveillance Report* has three major sections: 1) a section that provides data highlights and data usage limitations; 2) a section comprised of 13 sub-sections, each concerning a major disease category and (where available) related occupational exposures; and 3) a section of appendices that provide descriptions of data sources, methods, and other supplementary information.

Similar to the 1994 *WoRLD Surveillance Report*, this report includes data on malignant neoplasm of the pleura, hypersensitivity pneumonitis, asthma, chronic obstructive pulmonary disease, respiratory conditions due to chemical fumes and vapors, and other work-related respiratory conditions, in addition to the pneumoconioses. This report updates pneumoconiosis mortality data published in the 1996 *WoRLD Surveillance Report* by addition of currently available data for 1993 through 1996. Pneumoconiosis conditions highlighted include asbestosis, coal workers' pneumoconiosis, silicosis, byssinosis, and pneumoconioses classified as either "unspecified" or "other," and all pneumoconioses aggregated.

For many of the conditions reported on, the 1999 *WoRLD Surveillance Report* presents national and state summary statistics such as counts, crude and age-adjusted mortality rates, and years of potential life lost to age 65 and to life expectancy. Proportionate mortality ratios by industry and occupation, are based on the most recent decade of data from a subset of states (see state list, Appendix E) for which usual industry and occupation have been coded for decedents. Also presented are U.S. state-level maps showing the geographic distribution of mortality and, for the pneumoconioses, tables and figures summarizing selected occupational exposure data for asbestos, coal and coal mine dust, silica dust, cotton dust, etc. (see agent categories, Appendix F).

Data contained in the 1999 *WoRLD Surveillance Report* originate from various publications, reports, and data files provided by the Association of Occupational and Environmental Clinics (AOEC), the Bureau of Labor Statistics (BLS), the Department of Labor (DOL), the Mine Safety and Health Administration (MSHA), the National Center for Health Statistics (NCHS), the Occupational Safety and Health Administration (OSHA), NIOSH, and the Social Security Administration (SSA). Details on the major data sources and on the methods used to compute specific statistics can be found in Appendices A and B, respectively.

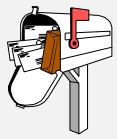
Interpreted with appropriate caution, the information contained in this report can help to establish priorities for research and prevention. It is also useful for tracking progress toward the elimination of important preventable occupational respiratory diseases, including those targeted in U.S. Public Health Service *Healthy People* objectives for the nation.

Comments and suggestions from users of earlier editions of the *WoRLD Surveillance Report* have influenced the content and format of this 1999 edition. To increase the utility of future editions, comments on the current report, descriptions of how the information is or could be used, and suggestions of other data for inclusion in future reports are invited.

See page ii of this report for information on how to order copies of previous *Work-Related Lung Disease Surveillance Reports*, described on the next page.

Send comments, suggestions, tear-out reader response card, and other correspondence to:

Work-Related Lung Disease Surveillance Report
Public Health Surveillance Team
Surveillance Branch
Division of Respiratory Disease Studies
NIOSH
1095 Willowdale Road
Morgantown, WV 26505-2888



***FAX*: 304-285-6111**

***E-Mail*: WoRLD@CDC.GOV**

Summary of Previous Work-Related Lung Disease (WoRLD) Surveillance Reports

***WoRLD Surveillance Report* (1991)**

The 1991 report is the first in the series of *WoRLD Surveillance Reports*. Data presented in the report, most of which relates to the 1968-1987 time period, originated from NIOSH, the National Center for Health Statistics, the Bureau of Labor Statistics, the Mine Safety and Health Administration, the Occupational Safety and Health Administration, the Department of Labor, the Health Care Financing Administration, and the Social Security Administration. The 1991 report is organized into two major sections, one of figures and the other of tables. Within each section, data are presented in the following sub-headings: asbestosis, coal workers' pneumoconiosis, silicosis, exposure to cotton dust, pneumonopathy due to inhalation of other dust (i.e., byssinosis), hypersensitivity pneumonitis, toxic agents, dust diseases of the lung, and compensation.

WoRLD Surveillance Report Supplement, 1992

The 1992 supplement presents updated data for many of the figures and tables presented in the 1991 report, including mortality data through 1988. In addition, the 1992 supplement includes data not previously presented: (1) sex, race, geographic distribution, usual industry, and usual occupation for deaths with asbestosis, malignant neoplasms of the pleura, malignant neoplasms of the peritoneum, coal workers' pneumoconiosis, silicosis, byssinosis, and hypersensitivity pneumonitis; (2) number of discharges with silicosis or asbestosis from the National Hospital Discharge Survey; and (3) reports of occupational asthma and silicosis from the Sentinel Event Notification Systems for Occupational Risks (SENSOR) Program.

WoRLD Surveillance Report, 1994

Data presented in the 1994 report originate from programs and activities administered by NIOSH, the National Center for Health Statistics, the Department of Labor, the Social Security Administration, the Mine Safety and Health Administration, the Occupational Safety and Health Administration, the Bureau of Mines, and the Association of Occupational and Environmental Clinics. The 1994 report is divided into 11 major sections, most containing both figures and data tables. Ten sections summarize mortality and morbidity data and other information, such as occupational exposures, for asbestosis, malignant neoplasms of the pleura, coal workers' pneumoconiosis, silicosis, pneumoconiosis due to other inorganic dust, unspecified pneumoconiosis, byssinosis, hypersensitivity pneumonitis, occupational asthma, and other lung conditions. The final section provides data from the Association of Occupational and Environmental Clinics Disease Surveillance Database. The 1994 report contains major additions, including previously unreported data, such as that from the National Health Interview Survey and the Association of Occupational and Environmental Clinics, and additional statistical measures, such as proportionate mortality ratios, both crude and age-adjusted rates at national and state levels, and years of potential life lost to age 65 and to life expectancy.

WoRLD Surveillance Report, 1996

The 1996 report focuses entirely on pneumoconiosis mortality and related exposures, providing updated mortality data from 1968 through 1992. It has three sections: 1) a section that describes data highlights and data limitations; 2) a section that updates and expands national data provided in the 1994 report; and 3) a section that provides detailed profiles of relevant data for each state in the U.S. Surveillance data include counts, crude and age-adjusted rates, years of potential life lost, and proportionate mortality ratios by industry and occupation. The 1996 report presents detailed tables of pneumoconiosis mortality data for each state and for the District of Columbia, as well as for counties within each state. It also presents county-level maps showing the geographic distribution of mortality for each pneumoconiosis and showing results of federal occupational exposure inspection sampling for agents that cause pneumoconiosis (e.g., asbestos, coal and coal mine dust, silica dust, cotton dust, etc.).

Acknowledgments

This report was prepared primarily by staff of the Public Health Surveillance Team, Surveillance Branch, Division of Respiratory Disease Studies (DRDS), NIOSH. Major contributors include several current members of the TeamSRochelle B. Althouse, Robert M. Castellan, John M. Wood, Ki Moon Bang, Jay H. Kim, and Dennis W. GroceSand several former membersSSteven R. Game, Helen S. Montagliani, and Ruth Ann Romero Jajosky. Janet M. Hale and Molly Pickett-Harner, both with the Communications and Information Activity, DRDS, provided helpful assistance. Gregory R. Wagner, Director, DRDS, offered enthusiastic support.

Special appreciation is expressed for the cooperation of staff at the Occupational Safety and Health Administration and at the Mine Safety and Health Administration, for providing data files of federal inspection data, and to state-level SENSOR Program staff, who provided data on silicosis and work-related asthma.

Draft portions of this report were provided for review and comment to individuals affiliated with academic institutions, public health agencies, and other governmental organizations, as well as to others within NIOSH. Their comments have resulted in several improvements in this final report.

Abbreviations

AOEC	Association of Occupational and Environmental Clinics
BLS	Bureau of Labor Statistics
BoC	Bureau of the Census
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CI	confidence interval
CIC	Census Industry Code
COC	Census Occupation Code
COPD	chronic obstructive pulmonary disease
CWP	coal workers' pneumoconiosis
CWXSP	Coal Workers' X-ray Surveillance Program
CXR	chest x-ray
DFR	Doctor's First Report
DHHS	Department of Health and Human Services
DOL	Department of Labor
DRDS	Division of Respiratory Disease Studies
FEV_1	forced expiratory volume in one second
ICD	International Classification of Diseases
ILO	International Labour Office
IMIS	Integrated Management Information System
LCL	lower confidence limit
MMWR	*Morbidity and Mortality Weekly Report*
MNMID	metal/nonmetal mine inspection data
MRE	Mining Research Establishment
MSHA	Mine Safety and Health Administration
NCHS	National Center for Health Statistics
n.e.c.	not elsewhere classified
NHANES	National Health and Nutrition Examination Survey
NHDS	National Hospital Discharge Survey
NIOSH	National Institute for Occupational Safety and Health
NOA	new onset asthma
n.o.s.	not otherwise specified
OA	occupational asthma
OSHA	Occupational Safety and Health Administration
PEFR	peak expiratory flow rate
PEL	permissible exposure limit
PHS	Public Health Service
PMF	progressive massive fibrosis
PMR	proportionate mortality ratio
PPD	purified protein derivative
RADS	reactive airways dysfunction syndrome
SIC	Standard Industrial Classification
SSA	Social Security Administration
SENSOR	Sentinel Event Notification Systems for Occupational Risks
SUDAAN	Survey Data Analysis (software)
TWA	time-weighted average
UCL	upper confidence limit
WAA	work-aggravated asthma
WoRLD	Work-Related Lung Disease
WRA	work-related asthma
YPLL	years of potential life lost

Contents

APPENDICES

Asbestosis Mortality

Asbestosis Morbidity

Asbestos Exposure

List of Tables and Figures

Coal Workers' Pneumoconiosis Mortality

Coal Workers' Pneumoconiosis Morbidity

Coal Workers' Pneumoconiosis Black Lung Benefits

Coal and Coal Mine Dust Exposure

Silicosis Mortality

List of Tables and Figures

Cotton Dust Exposure

Unspecified/Other Pneumoconioses Mortality

All Pneumoconioses Mortality

All Pneumoconioses Morbidity

Pneumoconiotic Agents Exposure

Malignant Neoplasm of the Pleura Mortality

Hypersensitivity Pneumonitis Mortality

Work-Related Asthma Sentinel Event Notification Systems for Occupational Risks (SENSOR)

Asthma Mortality

Asthma Morbidity

Chronic Obstructive Pulmonary Disease Mortality

Chronic Obstructive Pulmonary Disease Morbidity

Occupational Respiratory Conditions due to Toxic Agents Morbidity

Respiratory Conditions due to Chemical Fumes and Vapors Mortality

Pulmonary Tuberculosis Mortality

Multiple Work-Related Respiratory Conditions Morbidity

HIGHLIGHTS and LIMITATIONS

Selected Highlights

The following paragraphs highlight selected findings based on data presented in this and previous WoRLD Surveillance Reports.

Asbestosis and Related Exposures

! During the 10-year period from 1987 to 1996, asbestosis deaths represented over 28% of all pneumoconiosis deaths.

! Asbestosis deaths have increased from fewer than 100 in 1968 to nearly 1,200 annually in the mid-1990s, with no apparent leveling off through 1996, the most recent year for which data are available.

! The geographic distribution of asbestos mortality tends to be more or less coastal. California, Pennsylvania, and New Jersey each account for nearly 10% of asbestosis decedents during the decade from 1987 to 1996. These three states together with Texas, accounted for one-third of asbestosis deaths in the 1987-1996 period.

! Based on a large subset of the national data for which decedents' usual occupation and industry information was available, construction accounted for one-fourth of decedents with asbestosis from 1987 through 1996.

! While OSHA and MSHA inspection sampling for occupational exposures to asbestos is somewhat variable from year to year, there appears to be a general reduction in exposure as reflected by percent of samples exceeding the permissible exposure limit (PEL)Sfrom nearly 4% of samples over the entire 10-year period from 1987 to 1996, to less than 1% during the most recent two years of that same period. Likewise, the average level of asbestos measured in these inspection samples declined by halfSfrom 40% to 21% of the PEL in those same time periods. Apparent substantial declines in these same indices of exposure have also been seen in several individual industries (e.g., miscellaneous nonmetallic mineral and stone products; construction; and motor vehicles and motor vehicle equipment) characterized by federal inspection sampling as having relatively high proportions of samples exceeding the PEL and/or relatively high average levels of asbestos exposure.

Coal Workers' Pneumoconiosis (CWP) and Related Exposures

! CWP deaths accounted for over 50% of pneumoconiosis deaths during the 10-year period from 1987 to 1996, clearly outnumbering deaths associated with other types of pneumoconiosis.

! Over the nearly 15 years from 1982 to 1996, CWP mortality has declined each year, from well over 2,500 deaths annually to fewer than 1,500 each year. Similarly, among active underground coal miners examined in a federally-administered CWP screening program, the prevalence of radiographically evident CWP has declined markedly since the mid-1970s.

! CWP mortality has been highly concentrated in coal producing states. For the decade from 1987 to 1996, nearly one-half of all CWP decedents were residents of Pennsylvania, alone. Pennsylvania, together with West Virginia, Virginia, and Kentucky, account for over thee-fourths of all CWP deaths from 1987 to 1996.

! Nearly all CWP deaths are associated with employment in the coal mining industry, for which a proportionate mortality ratio for CWP of 111 (95% CI = 108-115) was calculated based on a large subset of the national data from 1987 to 1996.

! Federal “Black Lung” Program payments have totaled over 16 billion dollars in the decade from 1987 to 1996, during which the number of beneficiaries declined from over 400,000 per year to less than 250,000 per year.

! Federal inspector samples suggest a modest decline in occupational exposures to respirable coal

and coal mine dust. For the 1977-1986 period, over 9% of MSHA samples exceeded the permissible exposure limit (PEL) and the average dust level was 47% of the PEL. For the 1995-1996 period, 6% of MSHA samples exceeded the PEL and the average measured dust level was 37% of the PEL.

Silicosis and Related Exposures

! Silicosis deaths represented 8% of all pneumoconiosis deaths in the U.S. during the 10-year period from 1987 to 1996.

! Over the past several decades, mortality associated with silicosis has declined, from well over 1,000 deaths annually in the late 1960s to less than 250 per year in 1994, 1995, and 1996, the most recent years for which data are available.

! Compared to asbestosis, CWP, and byssinosis, silicosis mortality appears to be somewhat less concentrated by geographic region or by industry. However, Pennsylvania, alone, accounts for nearly 18% of silicosis deaths for the 1987-1996 decade, ranking first among all states in number of silicosis deaths and third in age-adjusted silicosis mortality rate behind only West Virginia and Colorado.

! In a recent 10-year period, OSHA and MSHA inspectors have found over-exposures to silica more frequently than over-exposures to other pneumoconiotic agents. For the 1987-1996 decade, more than 13% of the 165,723 OSHA and MSHA inspector samples for silica exceeded the permissible exposure limit (PEL). By comparison, for the same period, approximately 6% of the 251,432 OSHA and MSHA inspector samples for all other pneumoconiotic agents exceeded the PEL.

! Federal inspector sampling during the 1995-1996 period suggests that a number of industries continue to be characterized by substantial respirable silica hazard. For example, in both the construction industry and the miscellaneous fabricated metal products industry, over one-third of samples exceeded the PEL and the average measured silica dust level was more than 10 times higher than the PEL. These are two of many industries for which more than 15% of inspector samples exceeded the PEL for respirable silica.

Byssinosis and Related Exposures

! In comparison with other pneumoconioses, byssinosis deaths (as enumerated from death certificate data) remain very few in numberSless than 20 annually.

! Byssinosis mortality is concentrated predominantly in textile producing areas in the southeastern United States.

! Only one industrySyarn, thread, and fabric millsSwas associated with a significantly high byssinosis mortality as reflected in a proportionate mortality ratio of 27 (95% CI=20-35) for the 1987-1996 period.

! OSHA inspectors measured over-exposures to cotton dust in 25% of the 461 samples collected during 1987-1996, and the average level of exposure was four times higher than the permissible exposure limit (PEL). In the most recent two years of that same period, however, only 11% of the 55 samples collected exceeded the PEL, and the average measured level was well below the PEL.

Unspecified/Other Pneumoconioses

! The pattern of deaths from unspecified/other pneumoconioses, which account for nearly 10% of all pneumoconiosis deaths during the 1987-1996 period, tends to resemble coal workers' pneumoconiosis (and, less so, silicosis) mortality with respect to: geographic distribution; a clear peak in 1972; and occupations and industries associated with high proportionate mortality ratios (PMRs).

Selected Highlights

All Pneumoconioses and Related Exposures

! During the 29-year period from 1968 to 1996 there were a total of 113,519 pneumoconiosis deaths among U.S. residents, age 15 and over.

! Overall pneumoconiosis mortality in the U.S. has been gradually declining over the past two-and-one-half decades, from a peak of more than 5,000 deaths in 1972 to 3,114 pneumoconiosis deaths in 1996.

! The pattern of all pneumoconiosis mortality is largely influenced by coal workers' pneumoconiosis (CWP), given the large number of CWP deaths relative to deaths associated with other types of pneumoconiosis.

! Mining industries have the two highest (and three of the five highest) proportionate mortality ratios (PMRs) for all pneumoconioses by industry. Ship building and repair, various manufacturing industries, and construction are also associated with significantly elevated pneumoconiosis PMRs.

! During a recent two-year period (1995-1996), non-mining industries accounted for less than six percent of all federal inspector samples for airborne pneumoconiotic agents. Within the non-mining industries, the construction industry was the most frequently sampled, though fewer than 500 inspector samples were reported in construction over these same two years. The average level for samples collected in the construction industry was more than seven times higher than the applicable permissible exposure limit (PEL). By comparison, more than one-half of all federal inspector samples for airborne pneumoconiotic agents (48,117 of 87,513 samples) reported for 1995 and 1996 were collected in the coal mining industry. The average level of these dust samples collected in coal mines was less than half the applicable PEL.

Malignant Neoplasm of the Pleura

! Occupations and industries associated with high proportionate mortality ratios (PMRs) for malignant neoplasm of the pleura are similar to those associated with high PMRs for asbestosis, reflecting a common and powerful etiology (asbestos) for these two disease categories.

Hypersensitivity Pneumonitis (HP)

! The annual number of HP deaths has been generally increasing, from less than 20 per year prior to 1979 to 51 in 1996.

! The highest HP mortality rates for the 1987-1996 period are in the upper Midwest and northern Plains states, along with Vermont and Idaho.

! Agricultural industries (both livestock and crops) are associated with significantly elevated proportionate mortality ratios for HP, as are farming occupations.

Asthma

! Based on a recent national survey of the U.S. population, the hospital industry is associated with the highest estimated asthma prevalence for nonsmokersS14.4% (95% CI=8.1-20.7), or more than twice the estimated asthma prevalence among non-smokers overallS6.6% (95% CI=5.8-7.4).

! Child day care services is associated with the highest proportionate mortality ratio (PMR) for asthma. Health services and hospitals are two of the other top five industries with significantly elevated PMRs for asthma. Five of the top ten occupations associated with significantly elevated PMRs for asthma are related to the health care industry.

! Public health surveillance programs in four states (California, Massachusetts, Michigan, and New Jersey) identified over 1,100 cases of work-related asthma over a recent three-year period (1993-1995). Over 80% represented asthma caused by occupational exposure; the remainder represented preexisting asthma aggravated by occupational exposure.

Chronic Obstructive Pulmonary Disease (COPD)

! In part due to the high frequency of COPD deaths allowing for high statistical power in the proportionate mortality ratio (PMR) analyses, long lists of occupations and industries are associated with significantly elevated PMRs. Mining machine operators lead the list of occupations with significantly elevated PMRs for COPD; earth and oil well drillers are also among the top five occupations. The five industries with the highest PMRs for COPD are coal mining, nonmetal mining, iron and steel foundries, metal mining, and structural clay products.

! Based on a recent survey of the U.S. population, textile mill products is the industry group associated with highest COPD prevalence for nonsmokersS8.4% (95% CI=1.0-15.8). Among 44 industry groups, the closely related apparel and other textile products group is associated with the seventh highest COPD prevalence for non-smokersS5.9% (95% CI=1.2-10.6).

Respiratory Conditions due to Toxic Agents

! Based on a national sample of employers, there has been a general increase in the number of work-related respiratory conditions due to toxic agents. The average estimated number of such conditions for the most recent five-year period for which data are available (1992-1996) is nearly twice that of the earliest five-year period for which data are presented in this report (1973-1977). In 1996, the most recent year for which data are available, there were an estimated 21,700 work-related respiratory conditions due to toxic agents in the United States.

! The major industry groups associated with the highest annual rates of work-related respiratory conditions due to toxic agents are manufacturing (4.2 per 10,000 full-time workers), services (3.5 per 10,000 full-time workers), and transportation and public utilities (3.1 per 10,000 full-time workers). With respect to industry group sectors, the transportation equipment industry, with rates ranging from about 11 to 20 per 10,000 workers over the most recent five-year period for which data are available, has consistently ranked first (in four years) or second (in one year) during those years.

! Only one industrySconstructionSwas associated with a significantly elevated proportionate mortality ratio (PMR) for respiratory conditions (not necessarily work-related) due to chemical fumes and vapors.

Pulmonary Tuberculosis

! A wide range of occupations and industries were found to be associated with significantly elevated tuberculosis mortality. Based on data from 1987-1996, crushing and grinding machine operators is the occupation with the highest proportionate mortality ratio (PMR) for tuberculosis and metal mining is the industry associated with the highest PMR for tuberculosis; both are also associated with silicosis, which is known to increase susceptibility to tuberculosis.

Multiple Work-Related Respiratory Conditions

! The final section of this report presents additional data from the Bureau of Labor Statistics Annual Survey and the Association of Occupational and Environmental Clinics Database, both of which include information on a wide range of work-related respiratory diseases. Data are presented on work-related upper airway disorders (e.g., allergic rhinitis,

perforated nasal septum), malignant diseases (e.g., nasal and laryngeal, as well as pulmonary and pleural), infectious diseases (e.g., influenza, pneumonia, and Legionnaires' disease), and other respiratory diseases (e.g., pneumonitis/interstitial fibrosis, not elsewhere classified, etc.). The last two tables in this report should remind readers that there is much more to work-related lung disease and other occupational respiratory diseases than they might otherwise realize.

In addition to the following cautions, readers should see Appendix A for other limitations relating to specific sources of data presented in this report.

General

! Readers are reminded that the data presented in this report are not a comprehensive summary of all data with potential relevance for surveillance of work-related lung diseases.

! Many tables and figures presented in this report contain small numbers. Those responsible for preparing this report decided to limit censoring on the basis of small numbers, recognizing that by doing so opportunities are being provided for over-interpretation of the data. Moreover, rates have been calculated on the basis of these small numbers and are shown, along with rankings of these rates. Readers are cautioned that rates based on small numbers can be quite unstable, so any inferences should be drawn with care. Readers should keep both rates and counts in mind when considering the data tabulated in this report.

! Even for the pneumoconioses, a decedent's or survey respondent's usual occupation and industry are not always indicative of the occupation and industry associated with the responsible exposure. Readers are therefore cautioned not to assume causative inferences about occupations and industries listed in various mortality and morbidity tables presented in this report. This caution is especially applicable for diseases that do not have long latencies (e.g., asthma).

Disease Data

! Work-related respiratory diseases are typically, though not always, chronic and may also have long latencies. As reflected in median ages at death presented in this report for the pneumoconioses, many affected individuals live to or even beyond average life expectancy. The fact that many affected individuals do not die as a direct result of their work-related respiratory disease led to a decision to consider all causes of death, both underlying and contributory, in the development of the summary tables and figures of mortality data presented in this report. In the absence of better national morbidity (i.e., incidence and prevalence) data on most of these diseases, the intent is to provide a better assessment of disease occurrence and distribution than would be possible if consideration were restricted to underlying causes of death.

! Certifying physicians typically do not list all of a decedent's diseases on the death certificate. Therefore, even though contributory causes of death are considered, the mortality data presented in this report underestimate the total occurrence of pneumoconioses and other diseases.

! As with any analysis based on death certificate data, there is undoubtedly some misclassification of cause of death. A treating physician may not correctly diagnose a particular disease during a patient's life or, as mentioned above, a certifying physician may fail to list a correctly diagnosed disease on the death certificate, particularly if another disease was directly responsible for the decedent's death. In addition, the diagnoses listed on the death certificate are sometimes miscoded.

! Data that depend, either directly or indirectly, on physician reporting or recording of occupational disease diagnoses can be influenced significantly by the physician's ability or willingness to suspect and evaluate a relationship between work and health. These, in turn, are influenced by evolving medical scientific information, and by the legal, political, and social environment. Some factors may lead to increased diagnosis and recording/reporting (e.g., the Coal Mine Health and Safety Act of 1969 increasing recognition and recording of coal workers' pneumoconiosis), while other factors may reduce occupational disease recognition or reporting (e.g., long latency between a work exposure and disease development, or concern about involvement in litigation).

Selected Limitations

! One feature that clearly distinguishes byssinosis from the mineral dust pneumoconioses is the absence of characteristic fibrosis and associated lung opacities on radiographic examination of the chest. Byssinosis is not characterized by radiographic lung opacities and in advanced stages of the disease, byssinosis is clinically indistinguishable from other chronic obstructive pulmonary disease, including that due to cigarette smoking. As a result, byssinosis may be under-diagnosed more frequently than the radiographically apparent pneumoconioses.

! Categorization of lung diseases for which mortality data is presented in this report is limited by the ICD coding system used for the NCHS multiple cause of death data. Also, ICD-8 and ICD-9 disease rubrics differ somewhat for all types of pneumoconiosis except for asbestosis (see Appendix C). However, the effect of these changes is not considered substantial (e.g., there is no indication in the yearly trend in national silicosis mortality, despite a change in the ICD disease category related to silicosis).

! The intent of presenting data on mortality associated with “malignant neoplasm of the pleura” is to provide some indication of malignant mesothelioma, a disease strongly associated with exposure to asbestos. However, deaths coded to the available ICD-9 category are not entirely specific for mesothelioma, as an informal review of underlying causes of deaths with “malignant neoplasm of the pleura” indicates that this disease category includes other cancers that have metastasized to the pleura.

! A general assumption of work-relatedness of all pneumoconiosis deaths is reasonable for surveillance purposes. However, a very small proportion of pneumoconiosis decedents may have developed their disease as a result of non-occupational (e.g., avocational) exposure to pneumoconiotic agents.

! For individual decedents with respiratory diseases other than the pneumoconioses, it is generally unreasonable to assume an occupational etiology solely on the basis of ICD-coded cause of death, though these other diseases can be caused by occupational exposure to respiratory hazards. As a result, readers will note that the types of mortality tables presented in this report differ depending on the specific condition. More comprehensive tables are presented for those conditions that are highly specific for occupational etiology, and a more limited set of tables is presented for conditions that are less likely to be caused solely by occupational exposure.

! Compared to individuals affected by acute diseases characterized by short-latency, individuals affected by long latency chronic diseases have much more time to change residences prior to death. Thus, state of residence at death does not necessarily represent the location of a decedent's occupational exposure, even for death that result directly from occupational respiratory disease.

! Readers are reminded that only about half the states provide quality data on usual occupation and industry of decedents to the National Center for Health Statistics for inclusion in the national death data files used to develop many of the tables presented in this report (see Appendix E).

! Denominators used to calculate mortality rates presented in this report are based on general population estimates for the location (e.g., national or state) and for the years in which the deaths occurred. The resulting rates have clear public health significance. However, as suggested by some very high proportionate mortality ratios presented in this report for specific industrial and occupational groups, general population rates typically represent a dilution of very high rates experienced by exposed groups of workers by very low rates experienced by the rest of the population that is not significantly exposed. Apparent changes in mortality rates may reflect, in part or in whole, changes in employment patterns affecting the number of workers at risk due to exposure at work to various respiratory hazards.

! Over the period covered by data presented in this report, median ages at death have been

generally increasing for all pneumoconioses. The reader is cautioned to realize that this increase is the result of many factors, only one of which may be a general lessening of disease severity (e.g., due to enhanced diagnostic sensitivity and fewer severe cases). Another possible factor is a reduced number of younger workers at risk due to changing employment patterns. Less mortality pressure from competing causes of death, in general, is undoubtedly another important factor.

! The main usefulness of the Bureau of Labor Statistics (BLS) Annual Survey of Injuries and Illnesses is to assess occupational injuries, because work-attribution of traumatic injuries is typically quite clear. In contrast, work-related diseases are generally under-recognized and under-reported in this BLS survey, for which employers serve as respondents. Nevertheless, the BLS survey does ascertain information on employer-reported work-related respiratory diseases, and findings of relevance to work-related lung and other respiratory diseases are included in this report.

Exposure Data

! Industrial hygiene inspection records maintained by OSHA and MSHA were used in this report as a gauge of the range of exposures to pneumoconiotic agents in U.S. industry. These data are considered provisional and subject to revision as additional information becomes available. The inspector samples were gathered for regulatory compliance purposes, rather than for the surveillance of worker exposures. Nonetheless, the inspector data reported herein are the best available information for assessing the range of exposures encountered by U.S. workers on a national scale.

! MSHA and OSHA inspection data for similar exposure agents are presented in this report in a parallel format. The reader is cautioned that MSHA and OSHA are separate agencies with separate regulatory jurisdictions. Thus, the number of samples gathered by one agency versus the other, or by one agency from year to year, is not necessarily a valid basis for comparison. A variety of factors (e.g., Congressional actions, regulatory policies, and changes in analytical methods) can affect the number of samples and the exposure levels being reported by the inspectors.

! The list of pneumoconiotic agents used to select inspection sample records from available OSHA and MSHA data files was defined based on the agents that MSHA and OSHA have included in their computerized data systems. It is not a complete list of all agents associated with pneumoconiosis. Nevertheless, the listed agents are associated with what are widely recognized as the most prevalent types of pneumoconiosis. Some agents for which an association with pneumoconiosis is less clear-cut (e.g., OSHA data for "particulates not otherwise regulated") were not included in the analyzed data.

! The exposure data analyzed in this report include 87,237 MSHA inspector samples for respirable particulates not otherwise regulated, from non-coal mines. MSHA inspector sampling policies indicate that these samples were, in fact, originally obtained due to the potential for silica exposures. For that reason, the report includes those 87,237 samples as a part of the silica exposure dataset. The reader is cautioned that this inclusion marks a departure from the analytical approach used in previous *WoRLD Surveillance Reports*.

! Due to complexities related to determination of enforceable PELs associated with respirable coal mine dust samples and with respirable coal mine quartz samples, surrogate PELs (2.0 mg/m^3 MRE and 0.1 mg/m^3 MRE, respectively) were used in this report to estimate the percent of these samples exceeding the PEL and the severity levels these samples (see Appendix B). The effect of using the surrogate PELs is to underestimate both the true percent of samples that exceed the enforceable PELs and the true severity levels.

! Until April, 1995, MSHA's respirable coal mine dust inspector samples with less than 0.45 mg net

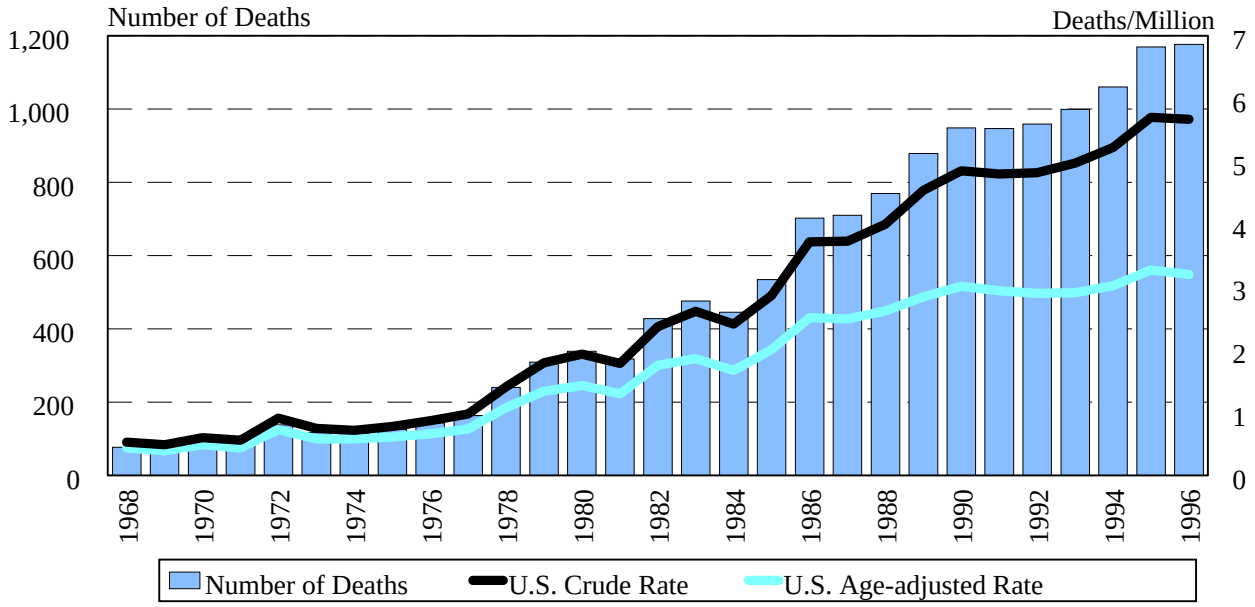
weight gain were not analyzed for quartz. Since April, 1995, those samples with less than 0.45 mg net weight gain have been analyzed for quartz.

! Available exposure data for agents associated with each type of pneumoconiosis are presented in this report following the presentation of mortality data for that same condition. The reader is reminded that the time period over which the exposure data were collected is not expected to correspond to the time period during which most of the decedents represented in the mortality data acquired their disease. For most pneumoconiosis deaths, there is a latency period of at least several years between first occupational exposure and onset of disease. Subsequent death typically occurs many years after disease onset.

Section 1

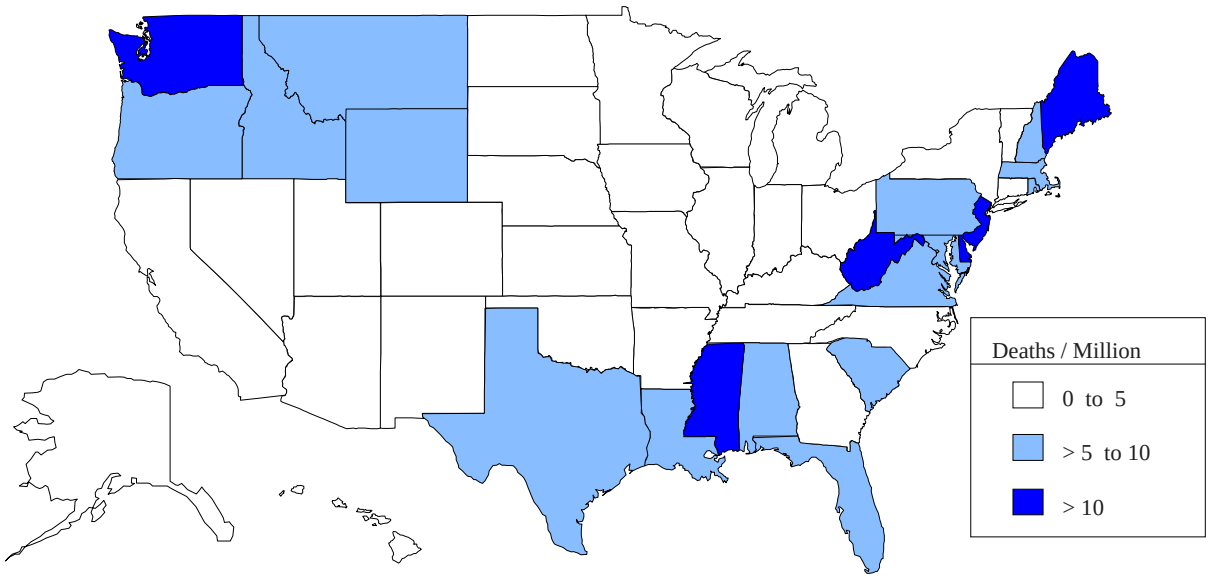
ASBESTOSIS and RELATED EXPOSURES

Figure 1-1. Asbestosis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 1-2. Asbestosis: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-1. Asbestosis: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Median Age (yrs)
1987	683	27	676	31	3	-	-	3	23	134	283	219	48	710	72.0
1988	742	27	717	48	4	-	-	1	20	141	310	235	62	769	72.0
1989	849	29	807	62	9	-	-	4	18	116	364	307	69	878	73.0
1990	901	47	864	78	6	-	-	4	18	142	359	336	89	948	74.0
1991	908	38	877	63	6	1	-	1	25	114	370	358	77	946	74.0
1992	923	36	898	57	4	-	-	3	13	124	371	355	93	959	74.0
1993	969	30	934	58	7	-	-	1	20	110	365	396	107	999	75.0
1994	1,026	34	993	62	5	-	-	2	21	94	410	422	111	1,060	75.0
1995	1,138	31	1,095	69	5	-	-	3	24	118	411	477	136	1,169	75.0
1996	1,123	53	1,088	84	4	-	-	3	16	104	428	480	145	1,176	75.0
Total	**9,262**	**352**	**8,949**	**612**	**53**	**1**	**-**	**25**	**198**	**1,197**	**3,671**	**3,585**	**937**	**9,614**	**74.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 1-2. Asbestosis: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

Year	Overall rate	White		Black	
		Males	Females	Males	Females
	Crude mortality rate				
1987	3.73	8.27	0.31	3.03	0.09
1988	4.00	8.76	0.28	4.49	0.26
1989	4.54	9.83	0.29	5.72	0.34
1990	4.85	10.23	0.51	7.40	0.17
1991	4.80	10.42	0.42	5.86	0.16
1992	4.82	10.63	0.37	5.00	0.32
1993	4.97	11.03	0.32	5.19	0.16
1994	5.22	11.62	0.35	5.38	0.23
1995	5.70	12.74	0.35	6.19	-
1996	5.67	12.26	0.57	7.22	0.15
1987-1996	**4.83**	**10.58**	**0.38**	**5.55**	**0.19**
	Age-adjusted mortality rate				
1987	2.49	5.95	0.17	3.13	0.05
1988	2.62	6.21	0.14	4.56	0.24
1989	2.84	6.70	0.14	5.75	0.21
1990	3.01	6.90	0.25	7.41	0.15
1991	2.94	6.91	0.20	5.79	0.14
1992	2.90	6.93	0.17	4.99	0.28
1993	2.91	7.01	0.16	4.92	0.09
1994	3.02	7.25	0.15	5.50	0.13
1995	3.27	7.91	0.15	5.68	-
1996	3.20	7.46	0.24	7.11	0.14
1987-1996	**2.91**	**6.91**	**0.18**	**5.49**	**0.14**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-3. Asbestosis: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	1,090	980	30	80	-
1988	1,030	935	30	60	5
1989	950	840	5	80	15
1990	1,080	930	25	90	25
1991	1,015	845	30	130	-
1992	890	780	15	50	30
1993	875	820	20	35	-
1994	835	710	15	110	-
1995	1,025	930	10	55	-
1996	835	715	25	70	-
Total	**9,625**	**8,485**	**205**	**760**	**75**
	Years of potential life lost to life expectancy				
1987	9,455	7,545	355	358	9
1988	9,992	7,900	303	471	48
1989	11,120	8,658	317	626	50
1990	11,949	9,038	558	771	51
1991	11,884	9,294	466	664	28
1992	11,975	9,419	392	546	81
1993	11,960	9,541	357	529	17
1994	12,636	10,074	353	657	29
1995	13,878	11,245	351	637	-
1996	13,743	10,741	571	840	28
Total	**118,591**	**93,453**	**4,023**	**6,097**	**340**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-4. Asbestosis: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	6	10	22	21	23	18	23	29	36	43	**231**
Alaska	-	-	2	1	1	1	2	2	-	2	**11**
Arizona	8	7	3	6	6	8	12	9	13	13	**85**
Arkansas	10	4	1	4	6	5	9	5	9	6	**59**
California	80	81	87	102	94	95	93	101	113	100	**946**
Colorado	3	6	3	4	5	4	7	12	6	13	**63**
Connecticut	9	10	14	11	14	17	8	7	13	18	**121**
Delaware	3	8	13	6	14	8	8	12	10	10	**92**
District of Columbia	1	-	-	-	1	-	1	2	-	1	**6**
Florida	41	59	56	43	54	52	39	60	67	84	**555**
Georgia	12	8	6	13	10	18	9	12	11	9	**108**
Hawaii	3	3	6	3	4	4	1	2	5	1	**32**
Idaho	6	4	5	4	6	3	2	3	4	4	**41**
Illinois	10	11	26	18	20	21	24	22	21	17	**190**
Indiana	3	5	5	8	4	4	4	6	6	7	**52**
Iowa	6	2	2	4	3	7	3	8	8	4	**47**
Kansas	5	3	5	2	3	7	9	5	10	6	**55**
Kentucky	3	4	4	1	5	5	11	5	3	9	**50**
Louisiana	7	12	20	20	20	14	20	15	18	20	**166**
Maine	9	12	8	17	8	8	13	12	8	6	**101**
Maryland	18	16	24	36	27	33	35	44	53	50	**336**
Massachusetts	31	30	43	36	27	48	25	45	40	39	**364**
Michigan	11	7	11	17	15	16	16	17	27	21	**158**
Minnesota	4	11	5	8	6	17	19	17	18	7	**112**
Mississippi	12	15	17	16	25	25	20	25	34	33	**222**
Missouri	7	11	7	9	11	14	18	13	11	11	**112**
Montana	1	2	8	6	2	4	4	4	-	4	**35**
Nebraska	5	2	2	3	3	2	6	4	4	2	**33**
Nevada	3	1	-	2	3	1	3	6	5	5	**29**
New Hampshire	6	8	2	2	1	4	8	6	6	4	**47**
New Jersey	80	83	102	115	93	80	80	81	93	109	**916**
New Mexico	4	2	5	2	3	1	3	6	8	2	**36**
New York	30	29	32	44	37	30	26	34	43	42	**347**
North Carolina	17	12	17	25	21	25	12	32	29	33	**223**
North Dakota	-	-	1	-	3	-	2	3	-	3	**12**
Ohio	21	12	23	27	24	32	29	31	35	43	**277**
Oklahoma	5	5	8	6	6	5	1	5	5	5	**51**
Oregon	18	21	17	12	22	22	29	26	18	30	**215**
Pennsylvania	65	79	101	67	83	100	114	90	114	106	**919**
Rhode Island	-	11	5	7	1	5	4	6	5	2	**46**
South Carolina	8	14	18	11	8	13	21	13	17	18	**141**
South Dakota	-	-	-	-	-	-	-	-	-	3	**3**
Tennessee	4	12	5	6	8	4	8	13	12	14	**86**
Texas	48	46	49	91	95	54	72	80	93	87	**715**
Utah	2	1	2	3	-	4	5	2	4	5	**28**
Vermont	2	1	-	1	-	3	3	-	2	2	**14**
Virginia	22	35	35	47	36	43	47	38	44	37	**384**
Washington	40	34	37	34	50	40	59	60	44	48	**446**
West Virginia	15	15	6	17	20	28	18	20	32	32	**203**
Wisconsin	4	4	7	9	11	6	10	9	10	3	**73**
Wyoming	2	1	1	1	4	1	4	1	2	3	**20**
TOTAL	**710**	**769**	**878**	**948**	**946**	**959**	**999**	**1,060**	**1,169**	**1,176**	**9,614**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-5. Asbestosis: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	231	12	7.19	12	4.49	11	3,064	12	13.3	11
Alaska	11	49	2.59	36	4.03	12	172	48	15.6	1
Arizona	85	28	2.88	31	1.66	34	1,056	28	12.4	24
Arkansas	59	31	3.18	28	1.93	31	842	30	14.3	3
California	946	1	3.95	24	2.64	24	11,174	2	11.8	41
Colorado	63	30	2.37	39	1.69	33	785	31	12.5	23
Connecticut	121	21	4.54	22	2.65	23	1,485	22	12.3	33
Delaware	92	26	16.91	1	10.77	1	1,201	25	13.1	13
District of Columbia	6	50	1.20	49	0.80	49	77	50	12.8	17
Florida	555	5	5.04	20	2.25	25	6,638	5	12.0	40
Georgia	108	24	2.07	45	1.66	35	1,522	21	14.1	4
Hawaii	32	43	3.54	25	2.21	26	378	44	11.8	42
Idaho	41	39	5.26	18	3.17	19	501	39	12.2	35
Illinois	190	17	2.10	44	1.30	44	2,392	16	12.6	21
Indiana	52	33	1.18	50	0.74	50	663	33	12.8	18
Iowa	47	36	2.16	43	1.09	47	563	37	12.0	39
Kansas	55	32	2.85	32	1.47	40	632	35	11.5	43
Kentucky	50	35	1.71	48	1.06	48	637	34	12.7	19
Louisiana	166	18	5.17	19	3.43	17	2,147	19	12.9	15
Maine	101	25	10.33	6	5.39	7	1,126	27	11.1	46
Maryland	336	10	8.62	9	6.39	6	4,521	8	13.5	8
Massachusetts	364	8	7.50	11	3.98	13	4,073	10	11.2	45
Michigan	158	19	2.16	42	1.49	38	2,212	18	14.0	6
Minnesota	112	22	3.25	26	2.10	27	1,457	23	13.0	14
Mississippi	222	14	11.28	4	6.77	4	2,796	14	12.6	20
Missouri	112	22	2.76	33	1.54	37	1,382	24	12.3	28
Montana	35	41	5.66	14	3.13	20	430	41	12.3	32
Nebraska	33	42	2.69	35	1.41	41	379	43	11.5	44
Nevada	29	44	2.76	34	2.02	29	397	42	13.7	7
New Hampshire	47	36	5.37	16	3.60	15	580	36	12.3	26
New Jersey	916	3	14.63	2	8.32	2	11,041	3	12.1	37
New Mexico	36	40	3.08	30	2.01	30	443	40	12.3	31
New York	347	9	2.40	38	1.38	43	4,277	9	12.3	29
North Carolina	223	13	4.11	23	2.76	22	2,980	13	13.4	10
North Dakota	12	48	2.47	37	1.61	36	187	47	15.6	2
Ohio	277	11	3.23	27	2.10	28	3,901	11	14.1	5
Oklahoma	51	34	2.06	46	1.29	45	683	32	13.4	9
Oregon	215	15	9.28	8	4.54	10	2,336	17	10.9	50
Pennsylvania	919	2	9.57	7	4.91	9	11,321	1	12.3	30
Rhode Island	46	38	5.64	15	2.96	21	552	38	12.0	38
South Carolina	141	20	5.03	21	3.29	18	1,723	20	12.2	34
South Dakota	3	51	0.56	51	0.30	51	37	51	12.2	36
Tennessee	86	27	2.18	41	1.40	42	1,135	26	13.2	12
Texas	715	4	5.37	17	3.81	14	8,918	4	12.5	22
Utah	28	45	2.27	40	1.47	39	298	45	10.6	51
Vermont	14	47	3.13	29	1.81	32	153	49	10.9	49
Virginia	384	7	7.60	10	5.33	8	4,751	7	12.4	25
Washington	446	6	11.24	5	6.43	5	4,905	6	11.0	48
West Virginia	203	16	14.16	3	7.42	3	2,505	15	12.3	27
Wisconsin	73	29	1.89	47	1.15	46	944	29	12.9	16
Wyoming	20	46	5.81	13	3.49	16	221	46	11.1	47

NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 1-6. Asbestosis: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
585	Plumbers, pipefitters, and steamfitters	237	9.2
593	Insulation workers	124	4.8
019	Managers and administrators, n.e.c.	113	4.4
575	Electricians	106	4.1
567	Carpenters	97	3.8
889	Laborers, except construction	88	3.4
783	Welders and cutters	73	2.8
633	Supervisors, production occupations	72	2.8
453	Janitors and cleaners	67	2.6
637	Machinists	67	2.6
	All other occupations	1,441	56.0
	Occupation not reported	90	3.5
	TOTAL	**2,575**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-7. Asbestosis: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
060	Construction	638	24.8
360	Ship and boat building and repairing	195	7.6
192	Industrial and miscellaneous chemicals	105	4.1
400	Railroads	81	3.1
262	Miscellaneous nonmetallic mineral and stone products	67	2.6
392	Not specified manufacturing industries	66	2.6
901	General government, n.e.c.	51	2.0
460	Electric light and power	45	1.7
270	Blast furnaces, steelworks, rolling and finishing mills	44	1.7
961	Non-paid worker or non-worker	43	1.7
	All other industries	1,145	44.5
	Industry not reported	95	3.7
	TOTAL	**2,575**	**100.0**

CIC - Census Industry Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-8 (page 1 of 2). Asbestosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
593	Insulation workers	124	192.27	160.23	229.99
643	Boilermakers	61	44.69	34.11	57.52
585	Plumbers, pipefitters, and steamfitters	237	19.98	17.37	22.94
646	Lay-out workers	8	18.20	7.84	35.83
653	Sheet metal workers	55	13.54	10.03	17.86
058	Marine and naval architects	5	12.26	3.97	28.64
584	Plasterers	9	11.20	5.14	21.25
534	Heating, air conditioning, and refrigeration mechanics	17	9.86	5.73	15.78
575	Electricians	106	7.60	6.18	9.25
829	Sailors and deckhands	10	6.90	3.32	12.68
544	Millwrights	25	6.67	4.30	9.84
757	Separating, filtering, and clarifying machine operators	13	6.02	3.20	10.29
783	Welders and cutters	73	5.96	4.66	7.53
224	Chemical technicians	5	5.68	1.84	13.27
759	Painting and paint spraying machine operators	13	5.42	2.88	9.26
555	Supervisors, electricians and power transmission installers	6	5.38	1.97	11.72
547	Specified mechanics and repairers, n.e.c.	21	5.37	3.31	8.21
518	Industrial machinery repairers	27	3.90	2.57	5.68
849	Crane and tower operators	14	3.80	2.08	6.38
876	Stevedores	5	3.66	1.18	8.55
507	Bus, truck, and stationary engine mechanic	14	3.64	1.99	6.11
696	Stationary engineers	23	3.52	2.23	5.29
056	Industrial engineers	9	3.25	1.49	6.17
057	Mechanical engineers	15	3.18	1.78	5.25
756	Mixing and blending machine operators	7	3.15	1.27	6.49
563	Brickmasons and stonemasons	21	3.10	1.91	4.74
567	Carpenters	97	3.01	2.43	3.70
549	Not specified mechanics and repairers	17	2.86	1.66	4.58
856	Industrial truck and tractor equipment operators	13	2.82	1.50	4.82
766	Furnace, kiln, and oven operators, except food	10	2.75	1.32	5.06
516	Heavy equipment mechanics	9	2.70	1.24	5.12
503	Supervisors, mechanics and repairers	12	2.63	1.36	4.59
558	Supervisors, construction, n.e.c.	35	2.63	1.83	3.66
637	Machinists	67	2.60	1.98	3.35
777	Miscellaneous machine operators, n.e.c.	41	2.55	1.82	3.47

See footnotes at end of table.

Table 1-8 (page 2 of 2). Asbestosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
779	Machine operators, not specified	52	2.47	1.83	3.26
579	Painters, construction and maintenance	26	2.37	1.55	3.48
633	Supervisors, production occupations	72	2.31	1.80	2.92
365	Stock and inventory clerks	13	2.15	1.14	3.68
869	Construction laborers	48	1.83	1.34	2.45
453	Janitors and cleaners	67	1.52	1.16	1.96

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-9. Asbestosis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
360	Ship and boat building and repairing	195	33.95	29.27	39.29
262	Miscellaneous nonmetallic mineral and stone products	67	24.97	19.06	32.14
502	Lumber and construction materials	18	11.33	6.70	17.90
192	Industrial and miscellaneous chemicals	105	8.32	6.76	10.12
200	Petroleum refining	32	5.85	3.95	8.36
211	Other rubber products, and plastics footwear and belting	34	5.48	3.70	7.83
282	Fabricated structural metal products	35	5.26	3.65	7.32
272	Primary aluminum industries	18	5.11	3.02	8.07
462	Electric and gas, and other combinations	12	4.98	2.57	8.69
420	Water transportation	25	4.51	2.91	6.65
180	Plastics, synthetics, and resins	13	4.48	2.38	7.66
521	Hardware, plumbing and heating supplies	11	4.31	2.15	7.71
060	Construction	638	4.21	3.90	4.56
460	Electric light and power	45	4.08	2.98	5.46
210	Tires and inner tubes	15	3.66	2.04	6.04
881	Membership organizations	14	3.13	1.71	5.25
181	Drugs	11	3.05	1.52	5.46
472	Not specified utilities	7	3.03	1.22	6.25
250	Glass and glass products	21	2.95	1.82	4.51
400	Railroads	81	2.79	2.21	3.47
050	Nonmetallic mining and quarrying, except fuel	7	2.62	1.05	5.40
212	Miscellaneous plastics products	7	2.60	1.04	5.36
350	Not specified electrical machinery, equipment, and supplies	12	2.10	1.08	3.66
580	Lumber and building material retailing	13	2.06	1.10	3.52
160	Pulp, paper, and paperboard mills	23	1.97	1.25	2.96
270	Blast furnaces, steelworks, rolling and finishing mills	44	1.61	1.15	2.19
392	Not specified manufacturing industries	66	1.60	1.22	2.06

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 1-10. Asbestosis: Estimated number of discharges from short-stay nonfederal hospitals, 1970-1996

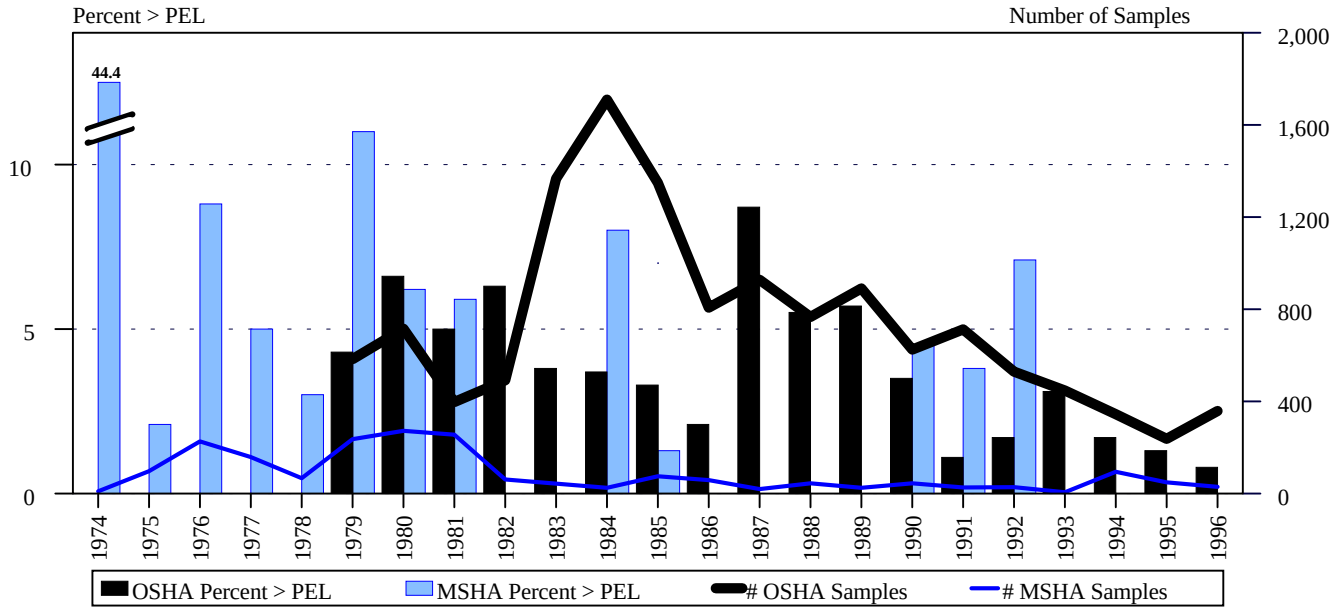
Year	Number of discharges
1970	300
1971	400
1972	100
1973	2,000
1974	1,000
1975	1,000
1976	1,000
1977	1,000
1978	3,000
1979	3,000
1980	4,000
1981	-
1982	2,000
1983	4,000
1984	6,000
1985	6,000
1986	6,000
1987	11,000
1988	8,000
1989	8,000
1990	-
1991	7,000
1992	11,000
1993	8,000
1994	10,000
1995	9,000
1996	13,000

- no estimates are available for 1981 and 1990.

NOTE: Number of discharges has been rounded. NCHS recommends that in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution. See appendices for source description and methods.

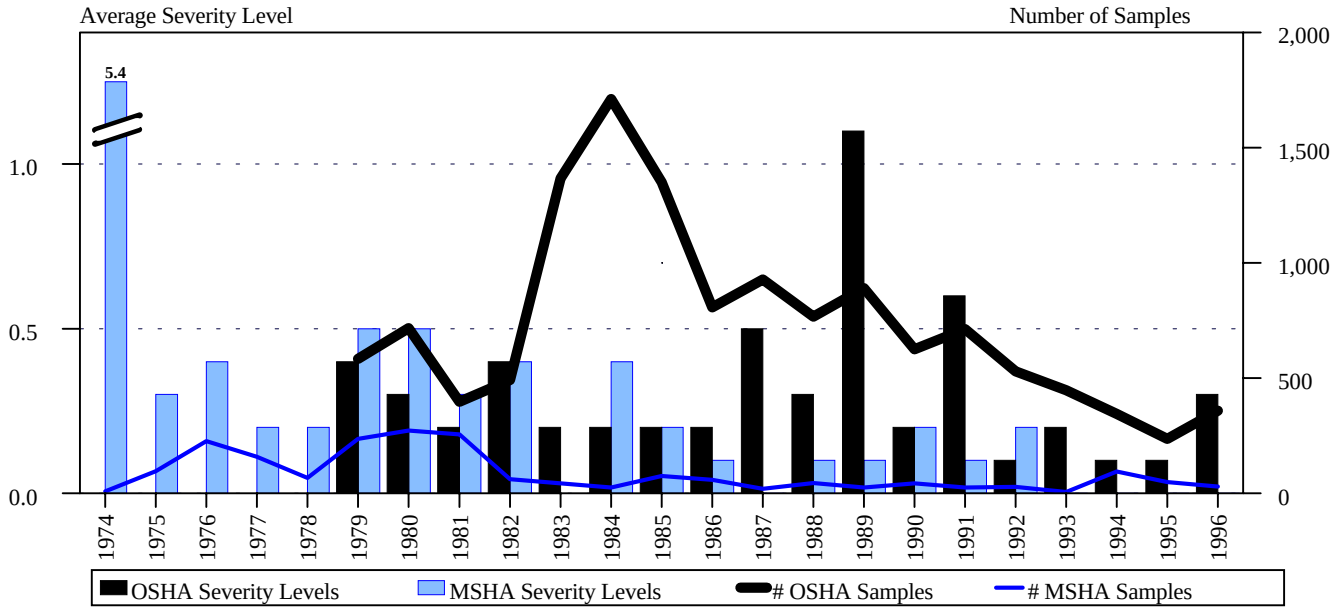
SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

Figure 1-3. Asbestos: Number of MSHA and OSHA inspector samples and percent exceeding the permissible exposure limit (PEL), 1974-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Figure 1-4. Asbestos: Number of MSHA and OSHA inspector samples and average severity levels, 1974-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 1-11. Asbestos: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently recorded on death certificates with asbestosis, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	1,613	26.0	6.8	0.47
360	Ship and boat building and repairing	29	0.5	0.0	0.06
192	Industrial and miscellaneous chemicals	30	0.5	0.0	0.10
400	Railroads	17	0.3	0.0	0.01
262	Miscellaneous nonmetallic mineral and stone products	212	3.4	31.6	1.81
392	Not specified manufacturing industries	0	0.0	-	-
901	General government, n.e.c.	138	2.2	0.0	0.02
460	Electric light and power	70	1.1	2.9	0.29
270	Blast furnaces, steelworks, rolling and finishing mills	44	0.7	0.0	0.02
961	Non-paid worker or non-worker	0	0.0	-	-
	All other industries	4,027	64.9	1.6	0.33
	Industry not reported	23	0.4	0.0	0.03
	TOTAL	**6,203**	**100.0**	**3.9**	**0.40**

CIC - Census Industry Code n.e.c. - not elsewhere classified - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 1-12. Asbestos: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently sampled, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	1,613	26.0	6.8	0.47
351	Motor vehicles and motor vehicle equipment	281	4.5	10.3	2.13
910	Justice, public order, and safety	213	3.4	0.0	0.02
262	Miscellaneous nonmetallic mineral and stone products	212	3.4	31.6	1.81
040	Metal mining	201	3.2	0.0	0.00
050	Nonmetallic mining and quarrying, except fuel	165	2.7	3.0	0.12
831	Hospitals	155	2.5	0.0	0.02
842	Elementary and secondary schools	145	2.3	0.0	0.06
901	General government, n.e.c.	138	2.2	0.0	0.02
751	Automotive repair and related services	137	2.2	0.0	0.01
	All other industries	2,920	47.1	1.1	0.24
	Industry not reported	23	0.4	0.0	0.03
	TOTAL	**6,203**	**100.0**	**3.9**	**0.40**

CIC - Census Industry Code. n.e.c. - not elsewhere classified
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 1-13. Asbestos: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently recorded on death certificates with asbestosis, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	126	18.7	1.6	0.13
192	Industrial and miscellaneous chemicals	6	0.9	0.0	0.00
360	Ship and boat building and repairing	5	0.7	0.0	0.00
400	Railroads	0	0.0	-	-
270	Blast furnaces, steelworks, rolling and finishing mills	6	0.9	0.0	0.00
392	Not specified manufacturing industries	0	0.0	-	-
842	Elementary and secondary schools	33	4.9	0.0	0.02
460	Electric light and power	5	0.7	0.0	0.00
262	Miscellaneous nonmetallic mineral and stone products	16	2.4	12.5	0.22
901	General government, n.e.c.	7	1.0	0.0	0.09
942	Military	0	0.0	-	-
961	Non-paid worker or non-worker	0	0.0	-	-
	All other industries	469	69.7	0.4	0.26
	Industry not reported	0	0.0	-	-
	TOTAL	**673**	**100.0**	**0.9**	**0.21**

CIC - Census Industry Code n.e.c. - not elsewhere classified - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 1-14. Asbestos: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	126	18.7	1.6	0.13
142	Yarn, thread, and fabric mills	53	7.9	0.0	0.03
040	Metal mining	42	6.2	0.0	0.00
140	Dyeing and finishing textiles, except wool and knit goods	41	6.1	0.0	0.02
050	Nonmetallic mining and quarrying, except fuel	36	5.3	0.0	0.01
842	Elementary and secondary schools	33	4.9	0.0	0.02
910	Justice, public order, and safety	32	4.8	0.0	0.03
712	Real estate, including real estate-insurance offices	20	3.0	0.0	0.00
351	Motor vehicles and motor vehicle equipment	19	2.8	5.3	0.14
262	Miscellaneous nonmetallic mineral and stone products	16	2.4	12.5	0.22
	All other industries	255	37.9	0.4	0.46
	TOTAL	**673**	**100.0**	**0.9**	**0.21**

CIC - Census Industry Code.
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 1-15 (page 1 of 2). Asbestos: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

State	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	0	-	-	-	1	0.01	0.0	-	0	-	-	-
Alaska	0	-	-	-	0	-	-	-	0	-	-	-
Arizona	68	0.52	14.7	1.38	0	-	-	-	0	-	-	-
Arkansas	0	-	-	-	0	-	-	-	0	-	-	-
California	122	0.72	19.7	2.33	41	0.14	0.0	-	10	0.03	0.0	-
Colorado	36	0.12	0.0	-	6	0.00	0.0	-	0	-	-	-
Connecticut	0	-	-	-	0	-	-	-	0	-	-	-
Delaware	0	-	-	-	0	-	-	-	0	-	-	-
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	4	0.03	0.0	-	0	-	-	-	0	-	-	-
Georgia	6	3.63	66.7	5.45	5	0.00	0.0	-	3	0.00	0.0	-
Hawaii	0	-	-	-	1	0.00	0.0	-	0	-	-	-
Idaho	3	0.01	0.0	-	2	0.00	0.0	-	0	-	-	-
Illinois	55	0.05	0.0	-	2	0.00	0.0	-	0	-	-	-
Indiana	1	0.01	0.0	-	0	-	-	-	0	-	-	-
Iowa	0	-	-	-	0	-	-	-	0	-	-	-
Kansas	0	-	-	-	0	-	-	-	0	-	-	-
Kentucky	0	-	-	-	0	-	-	-	0	-	-	-
Louisiana	4	0.00	0.0	-	36	0.00	0.0	-	1	0.00	0.0	-
Maine	0	-	-	-	0	-	-	-	0	-	-	-
Maryland	33	0.17	0.0	-	14	0.00	0.0	-	1	0.00	0.0	-
Massachusetts	0	-	-	-	1	0.00	0.0	-	0	-	-	-
Michigan	2	0.00	0.0	-	95	0.00	0.0	-	21	0.00	0.0	-
Minnesota	162	0.09	0.6	1.20	42	0.01	0.0	-	14	0.00	0.0	-
Mississippi	0	-	-	-	0	-	-	-	0	-	-	-
Missouri	3	0.00	0.0	-	1	0.00	0.0	-	0	-	-	-
Montana	120	0.30	4.2	1.42	12	0.07	0.0	-	0	-	-	-

See footnotes at end of table.

Table 1-15 (page 2 of 2). Asbestos: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	0	-	-	-	0	-	-	-	0	-	-	-
Nevada	0	-	-	-	4	0.00	0.0	-	0	-	-	-
New Hampshire	0	-	-	-	0	-	-	-	0	-	-	-
New Jersey	14	0.13	0.0	-	0	-	-	-	0	-	-	-
New Mexico	99	0.19	2.0	3.30	2	0.00	0.0	-	1	0.00	0.0	-
New York	33	0.34	0.0	-	5	0.00	0.0	-	0	-	-	-
North Carolina	3	0.00	0.0	-	0	-	-	-	0	-	-	-
North Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Ohio	1	0.00	0.0	-	0	-	-	-	0	-	-	-
Oklahoma	21	0.17	0.0	-	0	-	-	-	0	-	-	-
Oregon	0	-	-	-	0	-	-	-	0	-	-	-
Pennsylvania	7	0.12	0.0	-	15	0.00	0.0	-	5	0.00	0.0	-
Rhode Island	0	-	-	-	0	-	-	-	0	-	-	-
South Carolina	55	0.05	0.0	-	12	0.00	0.0	-	2	0.00	0.0	-
South Dakota	52	0.18	0.0	-	13	0.02	0.0	-	0	-	-	-
Tennessee	0	-	-	-	0	-	-	-	0	-	-	-
Texas	72	1.12	1.4	75.63	19	0.00	0.0	-	17	0.00	0.0	-
Utah	1	0.01	0.0	-	1	0.00	0.0	-	0	-	-	-
Vermont	183	0.55	13.1	1.81	22	0.63	22.7	2.12	0	-	-	-
Virginia	12	0.15	0.0	-	8	0.00	0.0	-	0	-	-	-
Washington	11	0.00	0.0	-	1	0.00	0.0	-	1	0.00	0.0	-
West Virginia	0	-	-	-	2	0.00	0.0	-	0	-	-	-
Wisconsin	21	0.15	0.0	-	3	0.00	0.0	-	2	0.00	0.0	-
Wyoming	7	0.00	0.0	-	0	-	-	-	0	-	-	-
TOTAL	**1,211**	**0.37**	**5.9**	**3.18**	**366**	**0.06**	**1.4**	**2.12**	**78**	**0.00**	**0.0**	**-**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: metal/nonmetal mine inspection data.

Table 1-16 (page 1 of 2). Asbestos: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

State	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	80	0.18	5.0	2.27	53	0.00	0.0	-	3	0.00	0.0	-
Alaska	139	0.08	1.4	4.95	47	0.12	2.1	3.65	0	-	-	-
Arizona	31	0.02	0.0	-	39	0.12	2.6	1.90	0	-	-	-
Arkansas	85	1.19	4.7	24.75	176	0.23	6.8	1.91	10	0.00	0.0	-
California	12	0.03	0.0	-	177	0.49	5.6	7.13	22	0.06	0.0	-
Colorado	236	0.07	0.8	3.57	76	0.22	5.3	3.23	10	0.00	0.0	-
Connecticut	211	0.11	1.4	3.25	151	0.04	0.0	-	18	0.00	0.0	-
Delaware	7	0.10	0.0	-	2	0.00	0.0	-	0	-	-	-
District of Columbia	49	0.10	2.0	2.04	10	0.06	0.0	-	0	-	-	-
Florida	69	2.05	8.7	23.09	156	0.15	2.6	4.73	9	0.00	0.0	-
Georgia	163	0.47	12.9	3.25	114	0.12	3.5	1.91	7	0.00	0.0	-
Hawaii	14	0.01	0.0	-	11	0.00	0.0	-	2	0.00	0.0	-
Idaho	26	0.03	0.0	-	68	0.02	0.0	-	2	0.00	0.0	-
Illinois	235	0.06	1.7	1.58	345	0.02	0.0	-	15	0.00	0.0	-
Indiana	163	0.12	2.5	1.85	157	0.01	0.0	-	32	0.00	0.0	-
Iowa	187	0.11	2.1	3.51	97	0.02	0.0	-	1	0.00	0.0	-
Kansas	35	0.24	11.4	1.74	23	0.04	0.0	-	0	-	-	-
Kentucky	117	0.04	0.9	1.94	125	0.08	0.0	-	32	0.03	0.0	-
Louisiana	64	0.10	3.1	1.91	54	0.06	1.9	1.02	0	-	-	-
Maine	68	0.06	0.0	-	8	0.00	0.0	-	0	-	-	-
Maryland	40	0.02	0.0	-	42	0.39	11.9	2.64	17	0.05	0.0	-
Massachusetts	322	0.42	12.1	2.15	148	0.32	9.5	2.97	20	0.11	5.0	1.30
Michigan	14	0.00	0.0	-	357	0.10	2.2	3.18	29	0.11	3.4	1.90
Minnesota	8	0.31	25.0	1.15	23	0.00	0.0	-	0	-	-	-
Mississippi	17	0.26	5.9	1.05	103	0.01	0.0	-	14	0.00	0.0	-
Missouri	371	0.14	0.8	16.02	110	0.05	1.8	1.66	2	0.00	0.0	-
Montana	148	0.11	2.0	1.40	25	0.04	0.0	-	2	0.00	0.0	-

See footnotes at end of table.

Table 1-16 (page 2 of 2). Asbestos: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

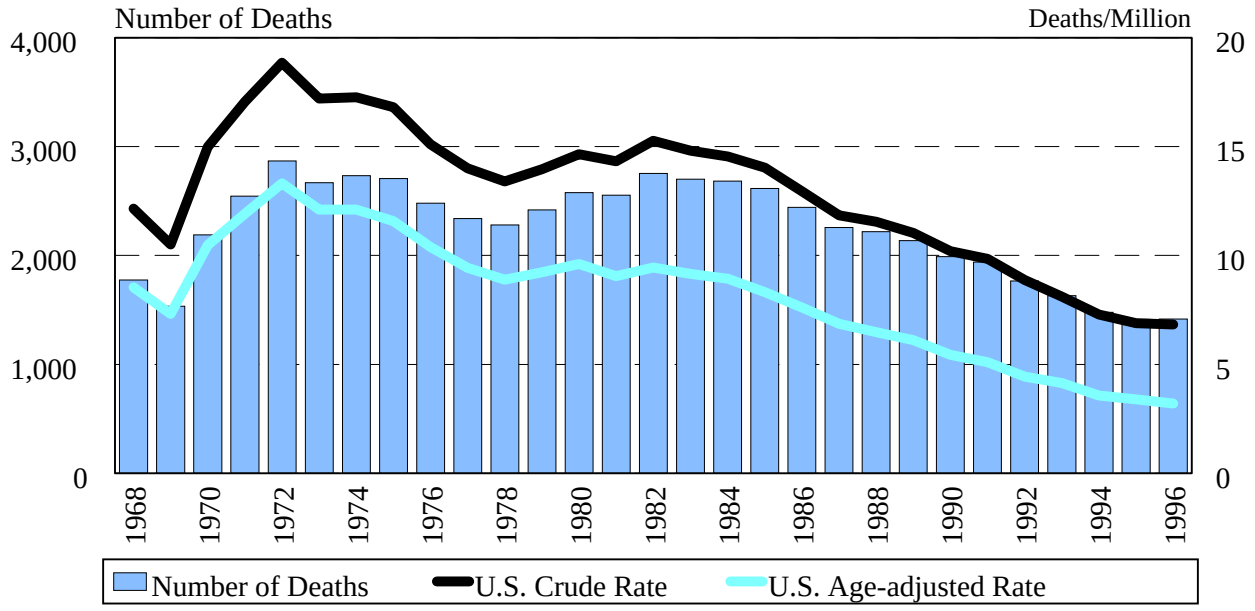
State	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	69	0.01	0.0	-	74	0.01	0.0	-	2	0.00	0.0	-
Nevada	32	0.04	0.0	-	38	0.37	7.9	3.90	4	0.18	0.0	-
New Hampshire	103	0.30	4.9	4.24	47	0.04	2.1	1.50	4	0.00	0.0	-
New Jersey	301	0.15	2.7	2.77	193	1.25	21.2	5.49	2	0.00	0.0	-
New Mexico	0	-	-	-	22	0.02	0.0	-	0	-	-	-
New York	404	0.07	2.0	1.37	856	0.37	1.8	18.60	74	1.53	1.4	110.00
North Carolina	97	0.23	4.1	2.09	337	0.15	3.0	3.34	116	0.02	0.0	-
North Dakota	2	0.00	0.0	-	3	0.01	0.0	-	3	0.01	0.0	-
Ohio	282	0.15	2.8	3.97	443	1.00	5.6	16.86	28	0.01	0.0	-
Oklahoma	86	0.07	3.5	1.40	51	0.13	3.9	2.48	2	0.00	0.0	-
Oregon	128	0.10	3.1	1.37	32	0.47	3.1	10.50	6	1.75	16.7	10.50
Pennsylvania	496	0.38	5.0	5.49	206	0.76	7.8	9.21	13	0.02	0.0	-
Rhode Island	89	0.25	9.0	2.30	12	4.32	58.3	7.39	0	-	-	-
South Carolina	33	0.07	0.0	-	46	0.29	8.7	2.70	11	0.13	0.0	-
South Dakota	2	0.00	0.0	-	30	0.00	0.0	-	1	0.00	0.0	-
Tennessee	30	0.02	0.0	-	125	4.11	2.4	167.46	32	0.15	6.3	1.20
Texas	305	0.05	1.3	1.20	317	0.38	5.7	5.90	26	0.00	0.0	-
Utah	2	0.02	0.0	-	4	0.00	0.0	-	1	0.00	0.0	-
Vermont	0	-	-	-	1	0.00	0.0	-	0	-	-	-
Virginia	127	0.18	3.9	1.23	69	0.83	24.6	2.71	0	-	-	-
Washington	4	0.21	0.0	-	82	0.03	0.0	-	13	0.00	0.0	-
West Virginia	55	0.32	3.6	5.80	15	2.33	40.0	5.81	0	-	-	-
Wisconsin	152	0.22	9.2	1.70	136	0.77	2.9	24.50	9	0.00	0.0	-
Wyoming	15	0.00	0.0	-	1	0.00	0.0	-	1	0.00	0.0	-
TOTAL	**5,725**	**0.21**	**3.6**	**3.99**	**5,837**	**0.42**	**4.1**	**9.24**	**595**	**0.24**	**1.0**	**21.02**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Section 2

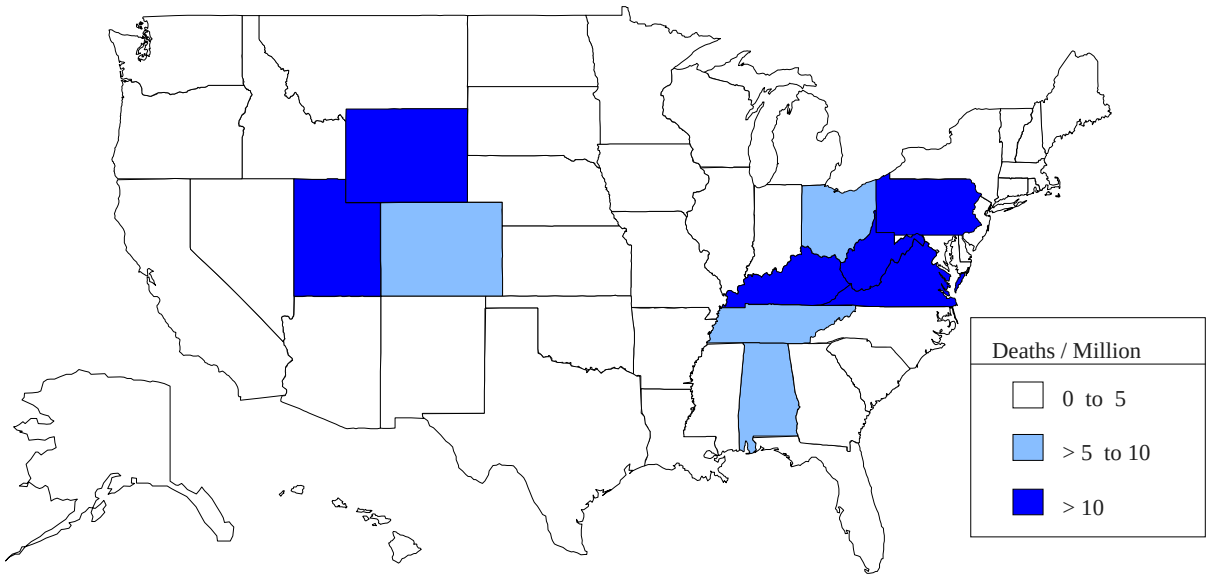
COAL WORKERS' PNEUMOCONIOSIS and RELATED EXPOSURES

Figure 2-1. Coal workers' pneumoconiosis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 2-2. Coal workers' pneumoconiosis: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 2-1. Coal workers' pneumoconiosis: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Median Age (yrs)
1987	2,243	14	2,169	87	1	1	1	7	31	213	763	942	299	2,257	75.0
1988	2,202	17	2,145	73	1	-	-	4	28	186	720	953	328	2,219	76.0
1989	2,127	9	2,060	74	2	-	1	5	25	166	677	960	302	2,136	76.0
1990	1,975	15	1,912	72	6	-	-	6	30	120	607	893	334	1,990	77.0
1991	1,920	18	1,877	60	1	1	2	14	23	110	536	884	368	1,938	77.0
1992	1,761	5	1,707	55	4	-	2	6	14	90	457	858	339	1,766	78.0
1993	1,616	15	1,567	62	2	-	2	4	24	111	404	777	309	1,631	78.0
1994	1,465	13	1,434	42	2	-	-	6	15	78	345	741	293	1,478	79.0
1995	1,407	6	1,372	41	-	-	3	4	28	75	354	614	335	1,413	79.0
1996	1,407	10	1,375	39	3	-	-	4	22	51	327	673	340	1,417	79.0
Total	**18,123**	**122**	**17,618**	**605**	**22**	**2**	**11**	**60**	**240**	**1,200**	**5,190**	**8,295**	**3,247**	**18,245**	**77.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 2-2. Coal workers' pneumoconiosis: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall rate**	**Males**	**Females**	**Males**	**Females**
	Crude mortality rate				
1987	11.85	27.46	0.13	8.49	0.26
1988	11.55	26.94	0.17	6.98	0.26
1989	11.03	25.79	0.09	7.20	0.08
1990	10.19	23.70	0.14	6.82	0.17
1991	9.84	23.03	0.21	5.76	-
1992	8.87	20.89	0.06	5.19	-
1993	8.11	18.90	0.17	5.75	-
1994	7.28	17.16	0.15	3.83	-
1995	6.89	16.35	0.07	3.68	-
1996	6.83	16.15	0.10	3.43	-
1987-1996	**9.16**	**21.49**	**0.13**	**5.62**	**0.07**
	Age-adjusted mortality rate				
1987	6.86	17.97	0.05	7.51	0.22
1988	6.48	17.15	0.08	6.35	0.19
1989	6.11	16.16	0.04	6.50	0.02
1990	5.44	14.43	0.05	5.91	0.14
1991	5.09	13.58	0.12	4.79	-
1992	4.44	11.94	0.04	4.42	-
1993	4.14	10.86	0.07	5.06	-
1994	3.57	9.55	0.06	3.02	-
1995	3.39	9.05	0.03	2.98	-
1996	3.20	8.57	0.05	2.74	-
1987-1996	**4.78**	**12.68**	**0.06**	**4.85**	**0.05**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 2-3. Coal workers' pneumoconiosis: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	1,785	1,665	40	60	15
1988	1,450	1,365	10	70	5
1989	1,365	1,260	-	90	-
1990	1,200	1,145	-	25	5
1991	1,360	1,205	115	35	-
1992	880	810	20	50	-
1993	1,085	990	5	65	-
1994	765	745	5	15	-
1995	1,000	960	5	35	-
1996	685	650	30	5	-
Total	**11,575**	**10,795**	**230**	**450**	**25**
	Years of potential life lost to life expectancy				
1987	25,545	21,164	146	732	45
1988	24,243	20,114	168	625	37
1989	23,663	19,772	83	676	7
1990	21,481	17,883	126	548	29
1991	20,878	17,780	336	472	-
1992	18,518	15,428	89	463	-
1993	17,227	14,298	157	540	-
1994	15,117	12,828	137	306	-
1995	14,796	12,663	66	331	-
1996	14,222	12,135	124	296	-
Total	**195,689**	**164,065**	**1,433**	**4,988**	**118**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-4. Coal workers' pneumoconiosis: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	23	33	33	29	28	23	19	21	15	14	**238**
Alaska	-	-	-	-	-	1	-	1	-	-	**2**
Arizona	2	4	5	5	4	2	4	6	6	7	**45**
Arkansas	7	3	4	9	7	6	7	3	3	5	**54**
California	18	16	7	28	41	22	27	28	13	12	**212**
Colorado	15	21	17	15	15	19	18	6	10	7	**143**
Connecticut	3	1	6	2	1	3	1	7	1	-	**25**
Delaware	1	2	1	4	4	1	2	3	-	-	**18**
District of Columbia	-	1	-	-	-	-	-	-	1	-	**2**
Florida	34	35	35	25	33	23	25	15	21	28	**274**
Georgia	2	6	7	4	3	2	7	3	5	3	**42**
Hawaii	-	-	-	-	-	-	-	-	-	-	**-**
Idaho	1	-	-	-	-	1	1	-	-	1	**4**
Illinois	63	53	38	49	43	46	30	24	36	41	**423**
Indiana	25	25	27	19	33	19	15	16	19	16	**214**
Iowa	3	6	9	6	6	6	7	1	4	7	**55**
Kansas	2	-	4	2	2	2	4	3	6	4	**29**
Kentucky	161	168	137	115	112	116	114	81	84	129	**1,217**
Louisiana	2	-	3	1	3	-	2	2	1	2	**16**
Maine	-	-	1	-	-	-	1	-	-	-	**2**
Maryland	8	6	5	12	5	13	6	10	7	8	**80**
Massachusetts	-	2	1	2	2	2	-	-	-	-	**9**
Michigan	21	20	14	21	15	10	11	11	6	10	**139**
Minnesota	-	-	-	-	-	-	-	-	-	-	**-**
Mississippi	1	2	-	2	3	1	1	2	6	1	**19**
Missouri	7	8	7	4	6	11	7	5	3	1	**59**
Montana	1	-	-	-	-	-	-	1	3	2	**7**
Nebraska	-	-	-	-	-	-	-	-	-	-	**-**
Nevada	-	-	1	1	1	1	1	1	-	1	**7**
New Hampshire	-	1	-	-	-	-	1	-	-	-	**2**
New Jersey	18	24	22	11	8	14	7	3	8	8	**123**
New Mexico	2	2	4	3	3	4	4	4	5	7	**38**
New York	13	13	13	9	4	2	9	11	1	4	**79**
North Carolina	12	6	11	12	13	10	7	8	15	9	**103**
North Dakota	1	-	1	1	-	-	-	1	-	-	**4**
Ohio	91	102	90	79	83	74	64	57	71	64	**775**
Oklahoma	8	4	3	5	4	1	4	3	4	1	**37**
Oregon	3	7	2	1	1	1	2	-	1	1	**19**
Pennsylvania	1,211	1,153	1,082	1,030	961	836	730	681	592	622	**8,898**
Rhode Island	-	1	-	-	-	-	1	-	-	1	**3**
South Carolina	2	1	3	1	-	5	3	5	4	3	**27**
South Dakota	-	2	1	-	-	-	-	-	-	-	**3**
Tennessee	39	45	33	37	23	30	25	28	30	25	**315**
Texas	1	7	5	5	7	9	4	6	2	8	**54**
Utah	12	16	14	18	12	13	12	16	13	6	**132**
Vermont	1	2	1	-	1	-	-	-	1	-	**6**
Virginia	150	157	146	131	134	147	151	100	118	124	**1,358**
Washington	6	4	3	6	1	1	6	4	3	5	**39**
West Virginia	284	255	333	279	308	283	287	289	291	228	**2,837**
Wisconsin	1	1	2	3	1	-	1	1	1	-	**11**
Wyoming	2	4	5	4	7	6	3	11	3	2	**47**
TOTAL	**2,257**	**2,219**	**2,136**	**1,990**	**1,938**	**1,766**	**1,631**	**1,478**	**1,413**	**1,417**	**18,245**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-5. Coal workers' pneumoconiosis: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality Rate	Crude mortality Rank	Age-adjusted mortality Rate	Age-adjusted mortality Rank	YPLL to life expectancy Total	YPLL to life expectancy Rank	YPLL/death	YPLL/death Rank
Alabama	238	9	7.41	9	3.27	9	2,283	11	9.6	33
Alaska	2	45	0.47	41	0.73	23	17	48	8.4	44
Arizona	45	24	1.52	22	0.67	24	420	25	9.3	37
Arkansas	54	21	2.91	15	1.05	16	486	22	9.0	40
California	212	11	0.89	32	0.62	28	3,127	8	14.7	4
Colorado	143	12	5.38	10	2.84	10	1,272	14	8.9	42
Connecticut	25	31	0.94	31	0.35	37	208	34	8.3	45
Delaware	18	34	3.31	13	1.60	14	163	35	9.1	39
District of Columbia	2	45	0.40	43	0.24	41	22	47	10.9	18
Florida	274	8	2.49	17	1.00	19	3,005	9	11.0	17
Georgia	42	25	0.81	35	0.54	31	466	23	11.1	15
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	4	41	0.51	39	0.14	46	27	44	6.7	48
Illinois	423	6	4.67	12	2.32	12	4,444	6	10.5	23
Indiana	214	10	4.88	11	2.58	11	2,365	10	11.1	16
Iowa	55	20	2.52	16	0.87	22	494	21	9.0	41
Kansas	29	29	1.50	23	0.87	21	440	24	15.2	3
Kentucky	1,217	4	41.69	3	23.22	3	14,393	4	11.8	9
Louisiana	16	35	0.50	40	0.32	38	252	32	15.7	2
Maine	2	45	0.20	47	0.11	47	22	46	11.1	12
Maryland	80	17	2.05	18	1.20	15	808	17	10.1	27
Massachusetts	9	37	0.19	48	0.10	48	113	37	12.6	6
Michigan	139	13	1.90	20	1.03	17	1,497	12	10.8	20
Minnesota	-	-	-	-	-	-	-	-	-	-
Mississippi	19	32	0.97	29	0.63	27	342	30	18.0	1
Missouri	59	19	1.46	25	0.61	29	593	20	10.1	29
Montana	7	38	1.13	27	0.35	36	51	40	7.3	47
Nebraska	-	-	-	-	-	-	-	-	-	-
Nevada	7	38	0.67	36	0.41	34	68	38	9.7	32
New Hampshire	2	45	0.23	46	0.18	43	29	42	14.4	5
New Jersey	123	15	1.96	19	1.00	20	1,365	13	11.1	13
New Mexico	38	27	3.25	14	1.62	13	347	29	9.1	38
New York	79	18	0.55	38	0.25	39	776	18	9.8	31
North Carolina	103	16	1.90	21	1.02	18	1,087	16	10.6	22
North Dakota	4	41	0.82	33	0.38	35	43	41	10.8	19
Ohio	775	5	9.04	7	4.43	7	8,015	5	10.3	26
Oklahoma	37	28	1.50	24	0.66	25	385	28	10.4	25
Oregon	19	32	0.82	34	0.43	33	234	33	12.3	8
Pennsylvania	8,898	1	92.67	2	38.94	2	89,786	1	10.1	28
Rhode Island	3	43	0.37	44	0.14	45	28	43	9.3	36
South Carolina	27	30	0.96	30	0.56	30	289	31	10.7	21
South Dakota	3	43	0.56	37	0.19	42	24	45	8.2	46
Tennessee	315	7	7.98	8	3.98	8	3,296	7	10.5	24
Texas	54	21	0.41	42	0.24	40	599	19	11.1	14
Utah	132	14	10.71	6	6.18	6	1,241	15	9.4	34
Vermont	6	40	1.34	26	0.64	26	56	39	9.3	35
Virginia	1,358	3	26.89	4	18.52	4	16,786	3	12.4	7
Washington	39	26	0.98	28	0.47	32	386	27	9.9	30
West Virginia	2,837	2	197.86	1	96.55	1	33,007	2	11.6	10
Wisconsin	11	36	0.28	45	0.15	44	126	36	11.4	11
Wyoming	47	23	13.66	5	6.60	5	410	26	8.7	43

- indicates no deaths listed.
NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 2-6. Coal workers' pneumoconiosis: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
616	Mining machine operators	3,811	70.0
889	Laborers, except construction	172	3.2
019	Managers and administrators, n.e.c.	73	1.3
804	Truck drivers	66	1.2
453	Janitors and cleaners	59	1.1
575	Electricians	55	1.0
869	Construction laborers	52	1.0
567	Carpenters	46	0.8
779	Machine operators, not specified	46	0.8
473	Farmers, except horticulture	45	0.8
	All other occupations	801	14.7
	Occupation not reported	221	4.1
	TOTAL	**5,447**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-7. Coal workers' pneumoconiosis: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
041	Coal mining	4,124	75.7
060	Construction	196	3.6
270	Blast furnaces, steelworks, rolling and finishing mills	65	1.2
392	Not specified manufacturing industries	58	1.1
010	Agricultural production, crops	41	0.8
410	Trucking service	38	0.7
351	Motor vehicles and motor vehicle equipment	37	0.7
400	Railroads	36	0.7
842	Elementary and secondary schools	29	0.5
192	Industrial and miscellaneous chemicals	27	0.5
	All other industries	582	10.7
	Industry not reported	214	3.9
	TOTAL	**5,447**	**100.0**

CIC - Census Industry Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-8. Coal workers' pneumoconiosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
616	Mining machine operators	3,811	108.75	105.58	112.46
613	Supervisors, extractive occupations	35	21.58	14.99	30.01
615	Explosives workers	5	14.91	4.83	34.84
046	Mining engineers	6	9.95	3.64	21.68
617	Mining occupations, n.e.c.	13	5.80	3.09	9.91
853	Excavating and loading machine operators	6	5.26	1.93	11.46
843	Supervisors, material moving equipment operators	5	4.34	1.40	10.14
855	Grader, dozer, and scraper operators	7	4.30	1.73	8.87
824	Locomotive operating occupations	19	3.12	1.88	4.87
859	Miscellaneous material moving equipment operators	11	2.94	1.47	5.26
768	Crushing and grinding machine operators	6	2.87	1.05	6.25
516	Heavy equipment mechanics	16	2.36	1.35	3.83
575	Electricians	55	1.99	1.47	2.63
844	Operating engineers	38	1.94	1.35	2.70

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-9. Coal workers' pneumoconiosis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
041	Coal mining	4,124	110.92	107.69	114.47
040	Metal mining	26	3.95	2.58	5.79

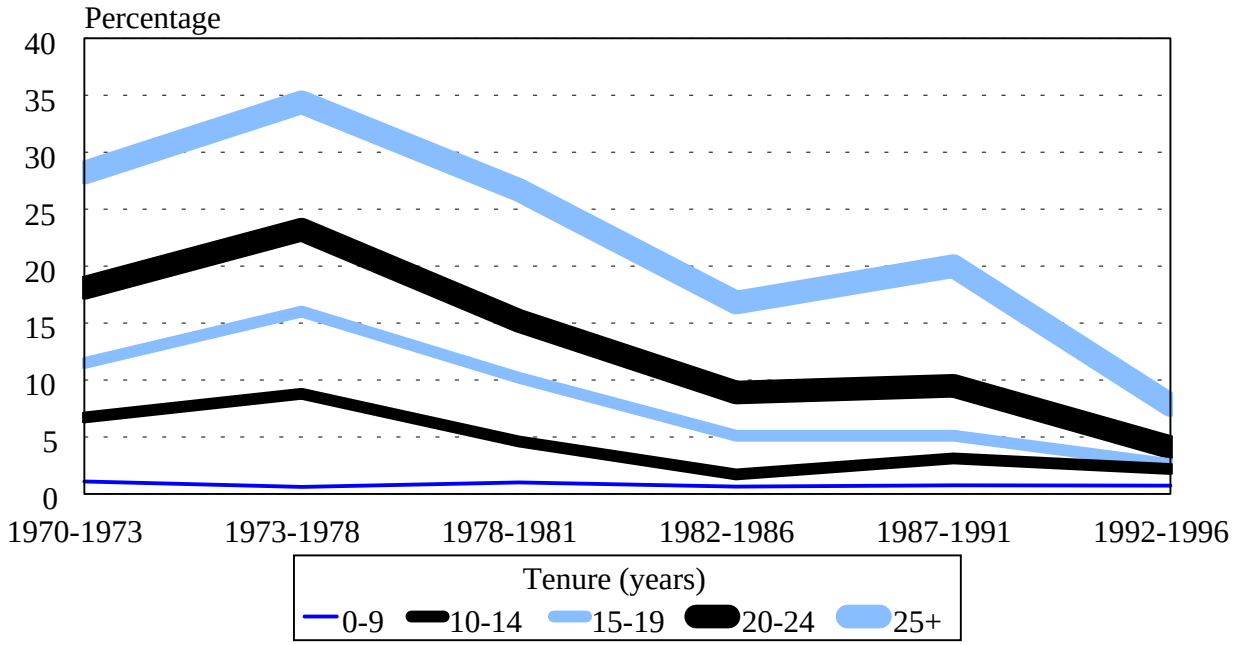
CIC - Census Industry Code LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 2-10. Coal workers' pneumoconiosis: Estimated number of discharges from short-stay nonfederal hospitals, 1970-1996

Year	Number of discharges
1970	6,000
1971	8,000
1972	11,000
1973	13,000
1974	14,000
1975	17,000
1976	18,000
1977	18,000
1978	13,000
1979	18,000
1980	17,000
1981	14,000
1982	17,000
1983	22,000
1984	23,000
1985	18,000
1986	16,000
1987	17,000
1988	15,000
1989	11,000
1990	7,000
1991	11,000
1992	10,000
1993	8,000
1994	9,000
1995	16,000
1996	11,000

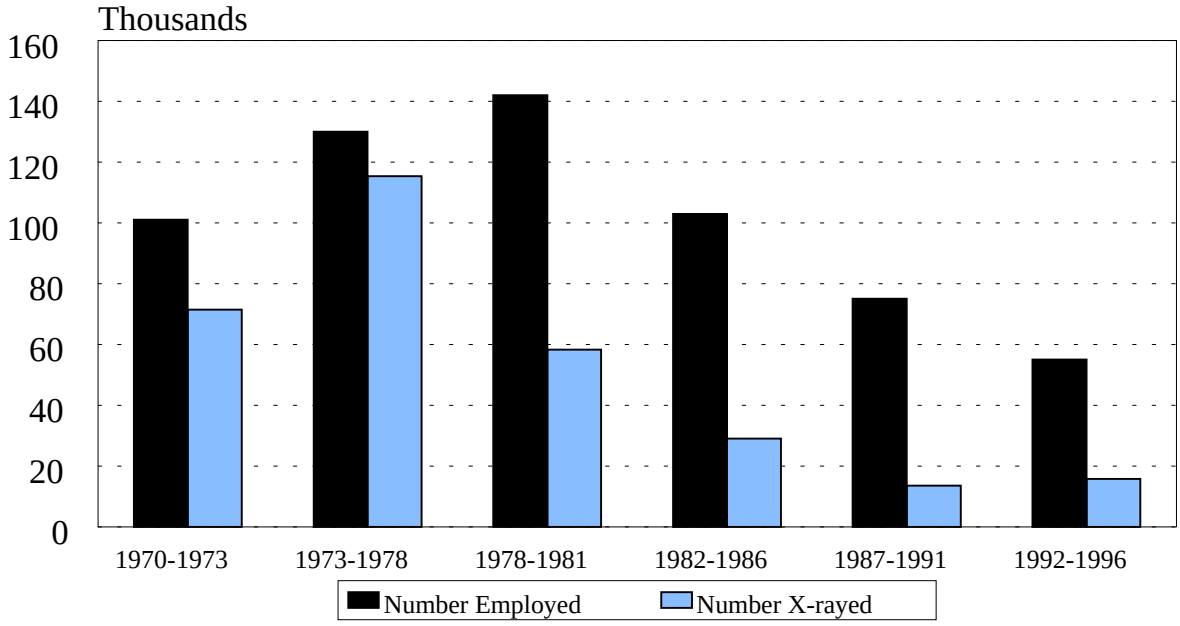
NOTE: Number of discharges has been rounded. NCHS recommends that in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution. See appendices for source description and methods.
SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

Figure 2-3. CWXSP: Percentage of examined miners with coal workers' pneumoconiosis (category 1/0 +), by tenure in mining, 1970-1996



NOTE: See appendices for source description.
SOURCE: NIOSH Coal Workers' Chest X-ray Surveillance Program.

Figure 2-4. CWXSP: Estimated number of actively employed underground coal miners and number examined, 1970-1996



NOTE: See appendices for source description.
SOURCE: NIOSH Coal Workers' X-ray Surveillance Program. Coal mine employment data from MSHA.

Table 2-11. CWXSP: Number and percentage of examined miners with coal workers' pneumoconiosis (category 1/0+), by round and tenure, 1970-1996

Tenure	Round 1 1970-1973			Round 2 1973-1978			Round 3 1978-1981			Round 4 1982-1986			Round 5 1987-1991			Round 6 1992-1996		
Years in mining	No. miners examined	No. Cat. 1/0+	%	No. miners examined	No. Cat. 1/0+	%	No. miners examined	No. Cat. 1/0+	%	No. miners examined	No. Cat. 1/0+	%	No. miners examined	No. Cat. 1/0+	%	No. miners examined	No. Cat. 1/0+	%
0	15,844	100	0.6	50,341	31	0.1	14,528	94	0.6	3,577	18	0.5	2,007	10	0.5	1,812	13	0.7
1	5,287	49	0.9	9,579	13	0.1	3,719	18	0.5	742	1	0.1	356	0	0.0	238	2	0.8
2-4	8,274	73	0.9	18,432	137	0.7	12,059	103	0.8	3,786	25	0.7	1,057	6	0.6	791	2	0.3
5-9	6,706	182	2.7	13,528	386	2.8	14,157	215	1.5	7,434	57	0.8	2,763	30	1.1	1,235	12	1.0
10-14	4,451	298	6.7	5,282	466	8.8	5,318	246	4.6	5,435	93	1.7	4,120	123	3.0	2,522	56	2.2
15-19	4,743	546	11.5	3,380	542	16.0	2,168	221	10.2	1,824	93	5.1	2,279	114	5.0	4,646	119	2.6
20-24	7,279	1,316	18.1	3,214	745	23.2	1,505	228	15.2	711	63	8.9	769	71	9.2	3,220	132	4.1
25-29	6,260	1,368	21.8	4,437	1,279	28.8	1,294	257	19.9	491	64	13.0	257	52	20.2	938	51	5.4
30+	12,602	3,947	31.3	7,193	2,722	37.8	3,546	1,034	29.2	1,154	213	18.5	312	61	19.6	365	51	14.0
TOTAL	71,446	7,897	11.0	115,386	6,321	5.5	58,294	2,416	4.1	25,154	627	2.5	13,920	467	3.4	15,767	438	2.8

NOTE: Tabulations are based on one chest x-ray per round for each participating miner.
Round 1: Jan. 1970 - July 1973
Round 2: Aug. 1973 - July 1978
Round 3: Aug. 1978 - Dec. 1981
Round 4: Jan. 1982 - Dec. 1986
Round 5: Jan. 1987 - Dec. 1991
Round 6: Jan. 1992 - Dec. 1996
See appendices for source description.
SOURCE: NIOSH Coal Workers' X-ray Surveillance Program.

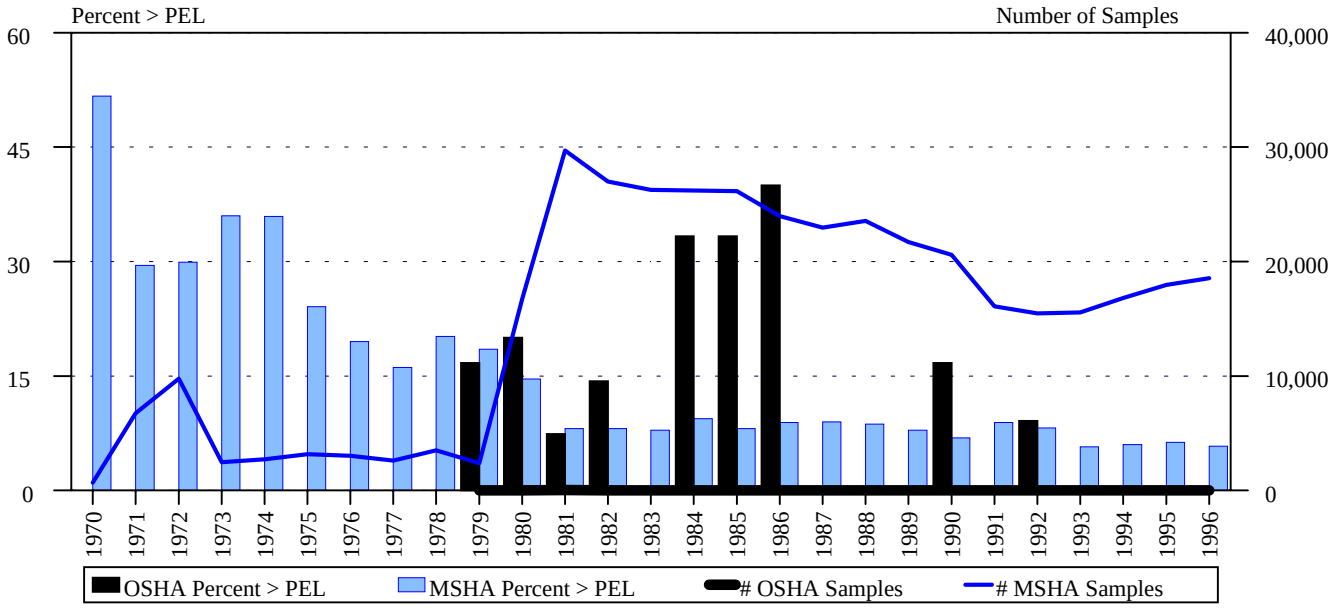
Table 2-12. Federal Black Lung Program: Number of beneficiaries and total payments by the Social Security Administration and Department of Labor, 1980-1996

	Social Security Administration		Department of Labor		SSA and DOL
Year	Total beneficiaries	Total amount (dollars)	Total beneficiaries	Total amount (dollars)	Total amount (dollars)
1980	399,477	1,032,000,000	139,073	813,205,000	1,845,205,000
1981	376,505	1,081,300,000	163,401	805,627,000	1,886,927,000
1982	354,569	1,076,000,000	173,972	784,085,000	1,860,085,000
1983	333,358	1,055,800,000	166,043	858,854,000	1,914,654,000
1984	313,822	1,038,000,000	163,166	873,932,000	1,911,932,000
1985	294,846	1,025,000,000	160,441	905,517,000	1,930,517,000
1986	275,783	971,000,000	156,892	629,075,000	1,600,075,000
1987	258,988	940,000,000	153,769	655,290,000	1,595,290,000
1988	241,626	904,000,000	150,123	656,689,000	1,560,689,000
1989	225,764	882,000,000	145,289	650,123,000	1,532,123,000
1990	210,678	863,400,000	139,854	626,521,000	1,489,921,000
1991	196,419	844,400,000	134,205	942,428,000	1,786,828,000
1992	182,396	822,500,000	128,761	973,636,000	1,796,136,000
1993	168,365	794,300,000	123,213	984,666,000	1,778,966,000
1994	155,122	751,900,000	117,569	994,655,000	1,746,555,000
1995	143,011	696,700,000	111,769	995,722,000	1,692,422,000
1996	131,143	654,600,000	105,923	992,128,000	1,646,728,000

NOTE: The Social Security Administration (SSA) was assigned initial responsibility for administering the Black Lung benefits program. The Department of Labor (DOL) assumed responsibility for processing and paying claims on July 1, 1973. Most claims filed prior to July 1, 1973 remain within the jurisdiction of SSA, which also continues to be responsible for processing and paying claims filed by the survivors of these miners. The dollar amounts from the Department of Labor are for fiscal years. See appendices for source description.

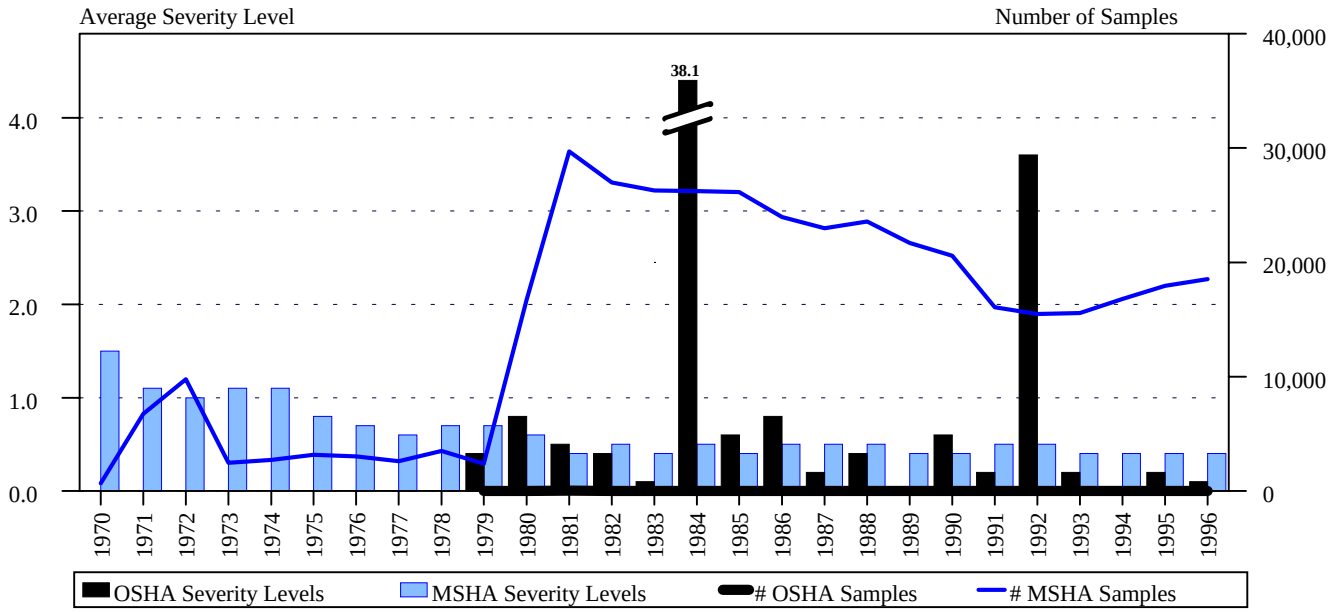
SOURCE: Social Security Bulletin Annual Statistical Supplement: 1998 and Black Lung Benefits Act Annual Report to Congress: FY 1996.

Figure 2-5. Coal and coal mine dust: Number of MSHA and OSHA inspector samples and percent exceeding the permissible exposure limit (PEL), 1970-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System.

Figure 2-6. Coal and coal mine dust: Number of MSHA and OSHA inspector samples and average severity levels, 1970-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 2-13. Coal and coal mine dust: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently recorded on death certificates with coal workers' pneumoconiosis, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	189,209	100.0	7.4	0.42
060	Construction	2	0.0	50.0	19.47
270	Blast furnaces, steelworks, rolling and finishing mills	2	0.0	0.0	0.26
392	Not specified manufacturing industries	0	0.0	-	-
010	Agricultural production, crops	0	0.0	-	-
410	Trucking service	0	0.0	-	-
351	Motor vehicles and motor vehicle equipment	2	0.0	0.0	0.38
400	Railroads	0	0.0	-	-
842	Elementary and secondary schools	0	0.0	-	-
192	Industrial and miscellaneous chemicals	2	0.0	0.0	0.07
	All other industries	69	0.0	1.4	0.23
	Industry not reported	4	0.0	0.0	0.11
	TOTAL	**189,290**	**100.0**	**7.4**	**0.42**

CIC - Census Industry Code - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 2-14. Coal and coal mine dust: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently sampled, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	189,209	100.0	7.4	0.42
460	Electric light and power	11	0.0	0.0	0.29
160	Pulp, paper, and paperboard mills	10	0.0	0.0	0.23
112	Sugar and confectionery products	7	0.0	0.0	0.43
271	Iron and steel foundries	5	0.0	0.0	0.00
891	Research, development and testing services	5	0.0	0.0	0.24
040	Metal mining	4	0.0	0.0	0.22
050	Nonmetallic mining and quarrying, except fuel	4	0.0	0.0	0.17
180	Plastics, synthetics, and resins	4	0.0	0.0	0.00
211	Other rubber products, and plastics footwear and belting	4	0.0	0.0	0.00
	All other industries	23	0.0	8.7	1.97
	Industry not reported	4	0.0	0.0	0.11
	TOTAL	**189,290**	**100.0**	**7.4**	**0.42**

CIC - Census Industry Code
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 2-15. Coal and coal mine dust: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently recorded on death certificates with coal workers' pneumoconiosis, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	36,490	99.9	6.0	0.37
060	Construction	0	0.0	-	-
270	Blast furnaces, steelworks, rolling and finishing mills	0	0.0	-	-
392	Not specified manufacturing industries	0	0.0	-	-
010	Agricultural production, crops	0	0.0	-	-
400	Railroads	0	0.0	-	-
410	Trucking service	0	0.0	-	-
961	Non-paid worker or non-worker	0	0.0	-	-
192	Industrial and miscellaneous chemicals	0	0.0	-	-
331	Machinery, except electrical, n.e.c.	0	0.0	-	-
351	Motor vehicles and motor vehicle equipment	0	0.0	-	-
842	Elementary and secondary schools	0	0.0	-	-
	All other industries	26	0.1	0.0	0.15
	Industry not reported	0	0.0	-	-
	TOTAL	**36,516**	**100.0**	**6.0**	**0.37**

CIC - Census Industry Code n.e.c. - not elsewhere classified - indicates incalculable field

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 2-16. Coal and coal mine dust: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	36,490	99.9	6.0	0.37
460	Electric light and power	10	0.0	0.0	0.32
271	Iron and steel foundries	5	0.0	0.0	0.00
211	Other rubber products, and plastics footwear and belting	4	0.0	0.0	0.00
722	Services to dwellings and other buildings	4	0.0	0.0	0.06
050	Nonmetallic mining and quarrying, except fuel	2	0.0	0.0	0.04
850	Colleges and universities	1	0.0	0.0	0.26
	TOTAL	**36,516**	**100.0**	**6.0**	**0.37**

CIC - Census Industry Code

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 2-17 (page 1 of 2). Coal and coal mine dust: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	4,338	0.52	12.4	1.73	7,217	0.44	7.3	1.73	1,650	0.38	4.5	1.43
Alaska	32	0.26	0.0	-	17	0.38	5.9	4.30	1	0.06	0.0	-
Arizona	83	0.28	3.6	1.47	173	0.20	2.9	1.23	52	0.12	1.9	1.12
Arkansas	125	0.14	0.8	2.70	100	0.18	4.0	1.65	12	0.06	0.0	-
California	0	-	-	-	1	0.20	0.0	-	0	-	-	-
Colorado	2,191	0.89	25.8	2.22	2,597	0.64	14.1	1.87	402	0.47	7.2	1.67
Connecticut	0	-	-	-	0	-	-	-	0	-	-	-
Delaware	0	-	-	-	0	-	-	-	0	-	-	-
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	0	-	-	-	0	-	-	-	0	-	-	-
Georgia	29	0.20	0.0	-	0	-	-	-	0	-	-	-
Hawaii	0	-	-	-	0	-	-	-	0	-	-	-
Idaho	1	0.40	0.0	-	0	-	-	-	0	-	-	-
Illinois	5,348	0.58	9.9	1.83	8,612	0.55	9.9	1.48	1,419	0.57	13.8	1.39
Indiana	2,714	0.24	2.7	2.62	2,270	0.38	6.1	2.38	324	0.35	7.4	1.40
Iowa	171	0.37	7.0	1.98	85	0.65	20.0	1.97	0	-	-	-
Kansas	127	0.21	3.9	2.00	94	0.14	0.0	-	14	0.11	0.0	-
Kentucky	39,481	0.50	10.3	2.23	54,128	0.45	8.4	2.02	11,162	0.39	6.3	1.55
Louisiana	6	0.05	0.0	-	57	0.17	0.0	-	7	0.18	0.0	-
Maine	0	-	-	-	0	-	-	-	0	-	-	-
Maryland	810	0.47	6.7	2.44	1,155	0.35	4.5	1.82	453	0.36	5.5	1.80
Massachusetts	0	-	-	-	0	-	-	-	0	-	-	-
Michigan	1	0.24	0.0	-	0	-	-	-	0	-	-	-
Minnesota	0	-	-	-	3	0.15	0.0	-	0	-	-	-
Mississippi	0	-	-	-	0	-	-	-	0	-	-	-
Missouri	295	0.24	2.4	2.88	328	0.17	0.9	1.68	68	0.12	0.0	-
Montana	206	0.38	4.4	4.24	313	0.18	1.6	1.96	110	0.19	0.9	1.15

See footnotes at end of table.

Table 2-17 (page 2 of 2). Coal and coal mine dust: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	0	-	-	-	0	-	-	-	0	-	-	-
Nevada	0	-	-	-	0	-	-	-	0	-	-	-
New Hampshire	0	-	-	-	0	-	-	-	0	-	-	-
New Jersey	0	-	-	-	0	-	-	-	0	-	-	-
New Mexico	434	0.63	17.5	1.95	514	0.37	8.6	1.77	116	0.22	3.4	2.51
New York	0	-	-	-	0	-	-	-	0	-	-	-
North Carolina	0	-	-	-	9	0.10	0.0	-	0	-	-	-
North Dakota	359	0.22	2.2	3.06	384	0.13	0.5	1.13	44	0.06	0.0	-
Ohio	9,124	0.49	10.8	1.76	9,120	0.29	3.3	1.58	1,522	0.24	2.2	1.49
Oklahoma	1,026	0.28	4.5	2.55	914	0.33	4.6	2.65	103	0.20	0.0	-
Oregon	0	-	-	-	0	-	-	-	0	-	-	-
Pennsylvania	32,995	0.39	6.7	1.79	20,514	0.33	4.9	1.72	5,696	0.30	3.6	1.53
Rhode Island	0	-	-	-	0	-	-	-	0	-	-	-
South Carolina	0	-	-	-	0	-	-	-	0	-	-	-
South Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Tennessee	4,590	0.46	7.1	2.22	3,748	0.37	6.1	1.87	548	0.35	7.5	1.49
Texas	798	0.17	2.3	2.06	1,124	0.13	1.4	2.06	172	0.09	0.0	-
Utah	1,765	0.82	22.7	1.90	3,325	0.73	17.6	1.83	507	0.64	16.6	1.38
Vermont	0	-	-	-	0	-	-	-	0	-	-	-
Virginia	26,068	0.44	8.9	1.79	21,865	0.44	8.4	1.78	3,266	0.37	5.8	1.51
Washington	42	0.18	0.0	-	110	0.18	1.8	2.45	50	0.12	0.0	-
West Virginia	50,715	0.50	10.1	1.88	49,147	0.42	6.8	1.75	8,490	0.40	6.8	1.52
Wisconsin	0	-	-	-	0	-	-	-	0	-	-	-
Wyoming	658	0.39	6.5	2.20	1,293	0.33	8.1	1.50	304	0.27	4.6	1.26
TOTAL	**184,532**	**0.47**	**9.4**	**1.95**	**189,217**	**0.42**	**7.4**	**1.84**	**36,492**	**0.37**	**6.0**	**1.51**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data.

Table 2-18 (page 1 of 2). Coal and coal mine dust: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	0	-	-	-	0	-	-	-	0	-	-	-
Alaska	0	-	-	-	0	-	-	-	0	-	-	-
Arizona	0	-	-	-	0	-	-	-	0	-	-	-
Arkansas	0	-	-	-	0	-	-	-	0	-	-	-
California	0	-	-	-	0	-	-	-	0	-	-	-
Colorado	0	-	-	-	16	0.38	0.0	-	10	0.32	0.0	-
Connecticut	0	-	-	-	0	-	-	-	0	-	-	-
Delaware	0	-	-	-	0	-	-	-	0	-	-	-
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	0	-	-	-	0	-	-	-	0	-	-	-
Georgia	0	-	-	-	0	-	-	-	0	-	-	-
Hawaii	0	-	-	-	0	-	-	-	0	-	-	-
Idaho	0	-	-	-	0	-	-	-	0	-	-	-
Illinois	8	42.93	50.0	85.29	0	-	-	-	0	-	-	-
Indiana	0	-	-	-	6	0.00	0.0	-	4	0.00	0.0	-
Iowa	3	0.08	0.0	-	8	0.49	12.5	2.62	0	-	-	-
Kansas	0	-	-	-	0	-	-	-	0	-	-	-
Kentucky	3	0.22	0.0	-	3	0.14	0.0	-	0	-	-	-
Louisiana	0	-	-	-	0	-	-	-	0	-	-	-
Maine	0	-	-	-	0	-	-	-	0	-	-	-
Maryland	0	-	-	-	12	0.25	0.0	-	0	-	-	-
Massachusetts	0	-	-	-	0	-	-	-	0	-	-	-
Michigan	0	-	-	-	7	5.65	14.3	38.50	4	0.06	0.0	-
Minnesota	0	-	-	-	0	-	-	-	0	-	-	-
Mississippi	0	-	-	-	0	-	-	-	0	-	-	-
Missouri	3	0.14	0.0	-	0	-	-	-	0	-	-	-
Montana	0	-	-	-	2	0.10	0.0	-	0	-	-	-

See footnotes at end of table.

Table 2-18 (page 2 of 2). Coal and coal mine dust: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

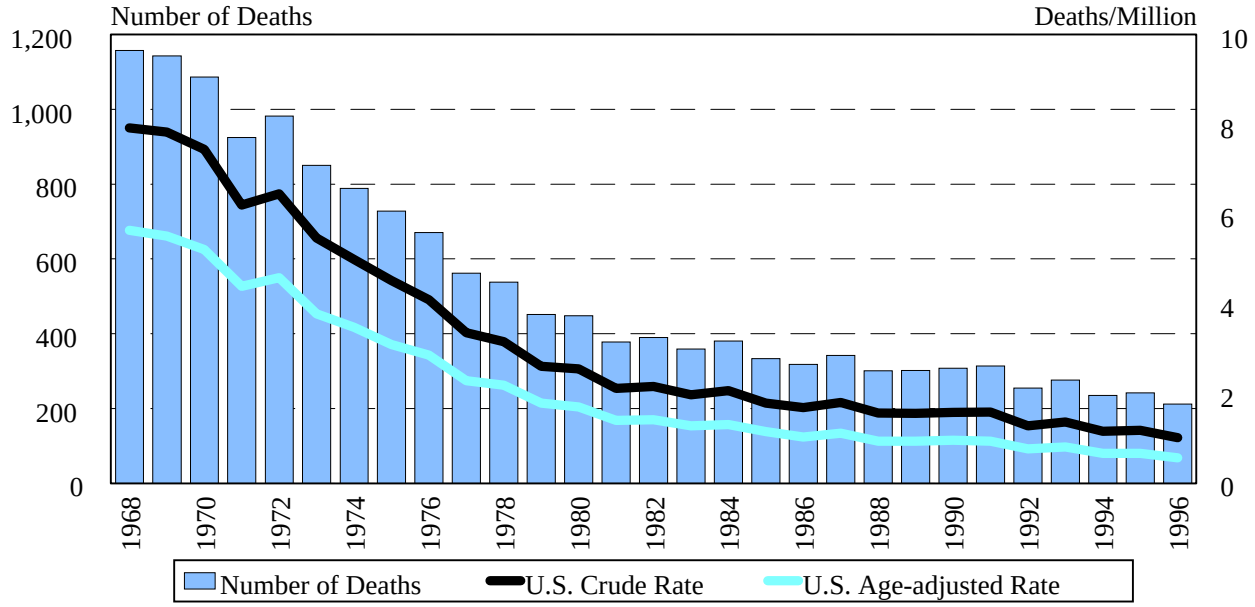
	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	0	-	-	-	0	-	-	-	0	-	-	-
Nevada	0	-	-	-	0	-	-	-	0	-	-	-
New Hampshire	0	-	-	-	0	-	-	-	0	-	-	-
New Jersey	0	-	-	-	0	-	-	-	0	-	-	-
New Mexico	0	-	-	-	0	-	-	-	0	-	-	-
New York	1	1.11	100.0	1.11	1	0.26	0.0	-	1	0.26	0.0	-
North Carolina	0	-	-	-	0	-	-	-	0	-	-	-
North Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Ohio	7	0.61	28.6	1.43	3	0.32	0.0	-	0	-	-	-
Oklahoma	0	-	-	-	1	0.45	0.0	-	0	-	-	-
Oregon	0	-	-	-	0	-	-	-	0	-	-	-
Pennsylvania	0	-	-	-	0	-	-	-	0	-	-	-
Rhode Island	0	-	-	-	0	-	-	-	0	-	-	-
South Carolina	0	-	-	-	0	-	-	-	0	-	-	-
South Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Tennessee	0	-	-	-	4	0.11	0.0	-	0	-	-	-
Texas	0	-	-	-	0	-	-	-	0	-	-	-
Utah	0	-	-	-	0	-	-	-	0	-	-	-
Vermont	0	-	-	-	0	-	-	-	0	-	-	-
Virginia	0	-	-	-	4	0.00	0.0	-	0	-	-	-
Washington	0	-	-	-	5	0.00	0.0	-	5	0.00	0.0	-
West Virginia	2	0.17	0.0	-	0	-	-	-	0	-	-	-
Wisconsin	0	-	-	-	1	0.23	0.0	-	0	-	-	-
Wyoming	2	0.71	0.0	-	0	-	-	-	0	-	-	-
TOTAL	**29**	**12.14**	**24.1**	**49.30**	**73**	**0.76**	**2.7**	**20.56**	**24**	**0.15**	**0.0**	**-**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Section 3

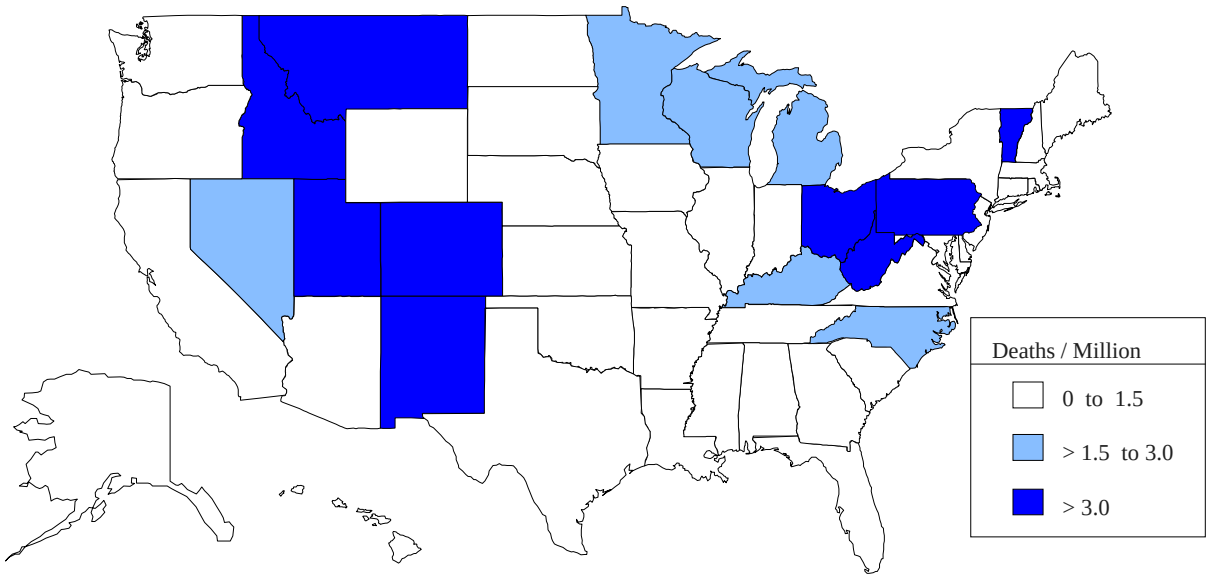
SILICOSIS and RELATED EXPOSURES

Figure 3-1. Silicosis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 3-2. Silicosis: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 3-1. Silicosis: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

Year	Sex		Race			Age Group (yrs)								Total	Median Age (yrs)
	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+		
1987	326	16	290	50	2	-	1	7	15	48	104	119	48	342	74.0
1988	290	11	246	55	-	-	1	6	10	32	96	115	41	301	75.0
1989	287	15	253	47	2	2	1	4	14	33	86	122	40	302	76.0
1990	298	10	261	46	1	-	2	6	11	46	81	125	37	308	75.0
1991	305	9	257	56	1	1	1	4	12	40	78	135	43	314	76.0
1992	240	15	212	39	4	-	1	3	8	36	79	96	32	255	75.0
1993	268	8	240	32	4	-	1	5	10	32	88	96	44	276	75.0
1994	222	13	206	27	2	-	-	1	7	35	59	100	33	235	77.0
1995	232	10	198	42	2	-	-	2	8	28	70	98	36	242	76.0
1996	206	6	184	26	2	-	1	2	7	25	54	83	40	212	76.0
Total	**2,674**	**113**	**2,347**	**420**	**20**	**3**	**9**	**40**	**102**	**355**	**795**	**1,089**	**394**	**2,787**	**75.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 3-2. Silicosis: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

Year	Overall rate	White		Black	
		Males	Females	Males	Females
	Crude mortality rate				
1987	1.80	3.50	0.18	4.95	0.09
1988	1.57	3.00	0.11	5.29	0.17
1989	1.56	3.03	0.14	4.34	0.25
1990	1.58	3.14	0.11	4.38	0.08
1991	1.59	3.08	0.09	5.28	0.08
1992	1.28	2.46	0.14	3.49	0.16
1993	1.37	2.85	0.07	2.78	0.16
1994	1.16	2.34	0.14	2.37	0.08
1995	1.18	2.27	0.09	3.59	0.15
1996	1.02	2.10	0.07	2.29	-
1987-1996	**1.40**	**2.76**	**0.11**	**3.82**	**0.12**
	Age-adjusted mortality rate				
1987	1.12	2.38	0.08	5.19	0.03
1988	0.94	1.96	0.05	5.27	0.14
1989	0.94	1.98	0.07	4.31	0.26
1990	0.96	2.06	0.04	4.54	0.08
1991	0.94	1.96	0.05	5.21	0.02
1992	0.77	1.62	0.09	3.15	0.12
1993	0.81	1.80	0.03	2.70	0.12
1994	0.67	1.46	0.05	2.44	0.07
1995	0.67	1.38	0.04	3.44	0.13
1996	0.57	1.25	0.02	2.27	-
1987-1996	**0.83**	**1.76**	**0.05**	**3.79**	**0.10**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 3-3. Silicosis: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

Year	Overall	White		Black	
		Males	Females	Males	Females
	Years of potential life lost to age 65				
1987	675	480	40	115	-
1988	495	285	5	190	15
1989	600	360	20	170	50
1990	615	430	-	160	25
1991	560	415	50	90	-
1992	410	325	15	45	25
1993	470	325	5	115	25
1994	305	230	5	40	25
1995	310	220	5	65	15
1996	315	240	-	60	-
Total	**4,755**	**3,310**	**145**	**1,050**	**180**
	Years of potential life lost to life expectancy				
1987	4,406	3,015	191	570	7
1988	3,698	2,417	106	639	35
1989	3,859	2,569	153	549	90
1990	3,987	2,758	92	557	37
1991	3,940	2,732	136	571	6
1992	3,293	2,278	188	348	46
1993	3,491	2,545	69	365	45
1994	2,845	2,044	127	279	37
1995	2,918	1,995	100	405	37
1996	2,564	1,875	57	301	-
Total	**35,000**	**24,228**	**1,219**	**4,584**	**339**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-4. Silicosis: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	6	6	4	3	9	3	1	3	4	3	**42**
Alaska	-	-	-	1	-	-	1	-	-	-	**2**
Arizona	5	1	6	5	2	1	4	7	6	3	**40**
Arkansas	2	-	2	-	2	1	1	-	3	1	**12**
California	17	19	16	15	16	12	13	9	14	13	**144**
Colorado	8	8	16	10	15	9	11	6	9	10	**102**
Connecticut	2	5	1	2	2	3	5	4	2	3	**29**
Delaware	-	1	1	1	-	1	-	-	1	1	**6**
District of Columbia	-	-	-	1	-	1	-	-	1	-	**3**
Florida	11	13	14	12	7	4	5	6	6	5	**83**
Georgia	6	6	7	4	3	3	3	3	6	4	**45**
Hawaii	-	-	-	-	-	-	-	-	-	-	**-**
Idaho	4	4	5	2	-	2	3	-	2	3	**25**
Illinois	15	12	9	10	8	11	9	6	5	7	**92**
Indiana	8	6	6	8	4	4	4	4	1	2	**47**
Iowa	5	2	1	2	2	2	4	1	2	1	**22**
Kansas	5	1	-	-	1	1	1	2	3	-	**14**
Kentucky	2	11	3	6	2	6	3	5	5	3	**46**
Louisiana	5	3	2	6	5	2	8	2	2	2	**37**
Maine	3	1	-	2	2	-	2	2	-	1	**13**
Maryland	2	2	-	3	4	1	2	2	2	4	**22**
Massachusetts	5	5	4	4	3	1	1	4	2	2	**31**
Michigan	16	15	14	12	9	14	15	7	12	16	**130**
Minnesota	2	8	3	5	3	9	5	5	6	6	**52**
Mississippi	1	-	1	3	1	1	-	-	1	1	**9**
Missouri	7	2	8	5	7	4	2	7	6	3	**51**
Montana	3	6	3	2	-	3	2	-	2	2	**23**
Nebraska	-	-	-	-	3	1	-	-	-	1	**5**
Nevada	3	1	6	3	-	-	3	4	2	-	**22**
New Hampshire	1	2	1	1	2	1	-	1	-	-	**9**
New Jersey	12	12	12	10	11	5	5	5	3	3	**78**
New Mexico	1	2	4	6	4	5	3	8	4	1	**38**
New York	27	12	16	15	18	6	13	12	9	10	**138**
North Carolina	12	9	7	5	14	8	11	7	12	6	**91**
North Dakota	-	1	-	-	-	-	-	-	-	1	**2**
Ohio	29	26	35	33	35	24	23	21	20	16	**262**
Oklahoma	4	-	1	4	4	5	1	3	-	-	**22**
Oregon	2	2	5	3	3	3	2	2	2	2	**26**
Pennsylvania	52	45	47	61	53	53	54	44	43	38	**490**
Rhode Island	1	-	-	1	-	2	-	-	-	2	**6**
South Carolina	2	2	3	5	3	1	3	3	-	3	**25**
South Dakota	-	1	1	1	-	-	-	1	-	1	**5**
Tennessee	6	5	6	3	3	2	6	3	2	2	**38**
Texas	10	12	4	7	11	11	12	8	11	9	**95**
Utah	2	1	6	2	5	4	10	4	4	-	**38**
Vermont	3	2	4	5	1	4	1	1	-	1	**22**
Virginia	11	2	4	3	2	3	5	4	3	2	**39**
Washington	6	6	4	-	7	5	3	2	2	2	**37**
West Virginia	7	5	2	6	12	4	6	10	8	6	**66**
Wisconsin	10	16	7	10	16	9	10	7	14	10	**109**
Wyoming	1	-	1	-	-	-	-	-	-	-	**2**
TOTAL	**342**	**301**	**302**	**308**	**314**	**255**	**276**	**235**	**242**	**212**	**2,787**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-5. Silicosis: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	42	19	1.31	18	0.77	18	577	19	13.7	12
Alaska	2	48	0.47	47	0.75	19	22	49	11.2	35
Arizona	40	20	1.35	16	0.70	21	435	23	10.9	40
Arkansas	12	40	0.65	41	0.44	39	201	37	16.7	4
California	144	3	0.60	43	0.38	45	1,655	4	11.5	30
Colorado	102	7	3.84	4	2.61	2	1,161	10	11.4	32
Connecticut	29	28	1.09	24	0.56	31	325	28	11.2	34
Delaware	6	43	1.10	23	0.62	25	68	44	11.4	33
District of Columbia	3	47	0.60	44	0.49	38	52	45	17.3	3
Florida	83	11	0.75	37	0.38	43	1,136	11	13.7	13
Georgia	45	18	0.86	35	0.62	26	573	20	12.7	24
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	25	30	3.21	7	1.41	10	226	35	9.1	49
Illinois	92	9	1.02	27	0.65	24	1,235	8	13.4	16
Indiana	47	16	1.07	25	0.68	22	710	14	15.1	9
Iowa	22	33	1.01	28	0.54	34	280	31	12.7	25
Kansas	14	38	0.73	39	0.38	42	178	39	12.7	22
Kentucky	46	17	1.58	14	1.06	13	701	15	15.2	7
Louisiana	37	25	1.15	21	0.97	14	649	17	17.5	2
Maine	13	39	1.33	17	0.82	16	171	40	13.1	19
Maryland	22	33	0.56	46	0.35	46	264	32	12.0	27
Massachusetts	31	27	0.64	42	0.32	48	324	29	10.5	43
Michigan	130	5	1.78	12	0.97	15	1,435	7	11.0	37
Minnesota	52	14	1.51	15	0.79	17	594	18	11.4	31
Mississippi	9	41	0.46	48	0.34	47	137	41	15.2	8
Missouri	51	15	1.26	19	0.72	20	696	16	13.6	14
Montana	23	32	3.72	5	1.64	9	222	36	9.7	48
Nebraska	5	45	0.41	50	0.16	50	49	47	9.8	47
Nevada	22	33	2.09	11	1.39	11	243	34	11.0	36
New Hampshire	9	41	1.03	26	0.55	32	92	42	10.2	44
New Jersey	78	12	1.25	20	0.65	23	845	13	10.8	41
New Mexico	38	22	3.25	6	1.81	6	404	26	10.6	42
New York	138	4	0.95	30	0.56	30	1,758	3	12.7	23
North Carolina	91	10	1.68	13	1.07	12	1,196	9	13.1	18
North Dakota	2	48	0.41	49	0.23	49	44	48	21.8	1
Ohio	262	2	3.06	9	1.79	7	3,470	2	13.2	17
Oklahoma	22	33	0.89	34	0.51	36	283	30	12.9	21
Oregon	26	29	1.12	22	0.50	37	257	33	9.9	46
Pennsylvania	490	1	5.10	1	2.44	3	5,703	1	11.6	29
Rhode Island	6	43	0.74	38	0.39	41	75	43	12.5	26
South Carolina	25	30	0.89	33	0.61	28	383	27	15.3	6
South Dakota	5	45	0.94	31	0.39	40	50	46	10.0	45
Tennessee	38	22	0.96	29	0.61	27	538	21	14.1	11
Texas	95	8	0.71	40	0.60	29	1,577	5	16.6	5
Utah	38	22	3.08	8	2.01	5	415	25	10.9	39
Vermont	22	33	4.92	2	2.36	4	199	38	9.0	50
Virginia	39	21	0.77	36	0.54	33	512	22	13.1	19
Washington	37	25	0.93	32	0.53	35	435	24	11.7	28
West Virginia	66	13	4.60	3	2.77	1	955	12	14.5	10
Wisconsin	109	6	2.82	10	1.73	8	1,472	6	13.5	15
Wyoming	2	48	0.58	45	0.38	44	22	50	10.9	38

- indicates no deaths listed.
NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 3-6. Silicosis: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
616	Mining machine operators	155	14.7
889	Laborers, except construction	117	11.1
019	Managers and administrators, n.e.c.	39	3.7
633	Supervisors, production occupations	36	3.4
453	Janitors and cleaners	33	3.1
719	Molding and casting machine operators	30	2.8
869	Construction laborers	29	2.8
768	Crushing and grinding machine operators	27	2.6
473	Farmers, except horticulture	25	2.4
779	Machine operators, not specified	25	2.4
	All other occupations	513	48.7
	Occupation not reported	25	2.4
	TOTAL	**1,054**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-7. Silicosis: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
060	Construction	114	10.8
040	Metal mining	105	10.0
041	Coal mining	68	6.5
270	Blast furnaces, steelworks, rolling and finishing mills	68	6.5
262	Miscellaneous nonmetallic mineral and stone products	65	6.2
050	Nonmetallic mining and quarrying, except fuel	59	5.6
271	Iron and steel foundries	53	5.0
392	Not specified manufacturing industries	43	4.1
331	Machinery, except electrical, n.e.c.	28	2.7
010	Agricultural production, crops	22	2.1
252	Structural clay products	22	2.1
261	Pottery and related products	22	2.1
961	Non-paid worker or non-worker	22	2.1
	All other industries	334	31.7
	Industry not reported	29	2.8
	TOTAL	**1,054**	**100.0**

CIC - Census Industry Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-8. Silicosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
725	Miscellaneous metal and plastic processing machine operators	14	190.36	104.02	319.40
675	Hand molders and shapers, except jewelers	19	69.94	42.13	109.28
768	Crushing and grinding machine operators	27	65.30	42.96	95.05
787	Hand molding, casting, and forming occupations	10	38.87	18.69	71.45
719	Molding and casting machine operators	30	32.46	21.93	46.37
616	Mining machine operators	155	22.73	19.26	26.84
613	Supervisors, extractive occupations	7	21.89	8.79	45.13
617	Mining occupations, n.e.c.	8	18.01	7.76	35.45
599	Construction trades, n.e.c.	8	9.35	4.03	18.41
849	Crane and tower operators	12	8.25	4.25	14.40
766	Furnace, kiln, and oven operators, except food	11	7.55	3.77	13.51
709	Grinding, abrading, buffing, and polishing machine operators	8	7.23	3.12	14.23
516	Heavy equipment mechanics	8	5.94	2.56	11.69
756	Mixing and blending machine operators	5	5.59	1.81	13.06
544	Millwrights	8	5.38	2.32	10.59
563	Brickmasons and stonemasons	11	4.07	2.03	7.28
844	Operating engineers	16	3.98	2.27	6.46
889	Laborers, except construction	117	3.66	2.98	4.45
579	Painters, construction and maintenance	16	3.56	2.03	5.78
783	Welders and cutters	16	3.25	1.86	5.28
779	Machine operators, not specified	25	2.95	1.90	4.35
633	Supervisors, production occupations	36	2.89	2.01	4.02
869	Construction laborers	29	2.67	1.79	3.84
777	Miscellaneous machine operators, n.e.c.	17	2.63	1.53	4.21
453	Janitors and cleaners	33	1.87	1.26	2.67

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-9. Silicosis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
040	Metal mining	105	81.30	66.10	98.91
262	Miscellaneous nonmetallic mineral and stone products	65	60.58	46.24	77.97
050	Nonmetallic mining and quarrying, except fuel	59	55.05	40.78	72.63
271	Iron and steel foundries	53	35.31	26.16	46.58
261	Pottery and related products	22	31.12	19.45	47.15
252	Structural clay products	22	30.15	18.84	45.68
041	Coal mining	68	9.41	7.18	12.11
300	Miscellaneous fabricated metal products	21	7.93	4.90	12.13
270	Blast furnaces, steelworks, rolling and finishing mills	68	6.29	4.80	8.10
280	Other primary metal industries	11	5.82	2.91	10.41
251	Cement, concrete, gypsum, and plaster products	6	4.63	1.70	10.09
331	Machinery, except electrical, n.e.c.	28	4.11	2.74	5.94
250	Glass and glass products	10	3.54	1.70	6.51
682	Miscellaneous retail stores	9	3.32	1.52	6.30
312	Construction and material handling machines	7	3.17	1.27	6.54
211	Other rubber products, and plastics footwear and belting	7	2.79	1.12	5.75
392	Not specified manufacturing industries	43	2.59	1.85	3.53
060	Construction	114	1.86	1.51	2.26

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 3-10. Silicosis: Estimated number of discharges from short-stay nonfederal hospitals, 1970-1996

Year	Number of discharges
1970	6,000
1971	7,000
1972	6,000
1973	5,000
1974	4,000
1975	4,000
1976	5,000
1977	4,000
1978	2,000
1979	3,000
1980	-
1981	2,000
1982	3,000
1983	2,000
1984	-
1985	3,000
1986	3,000
1987	3,000
1988	-
1989	-
1990	-
1991	-
1992	-
1993	-
1994	-
1995	-
1996	-

- no estimates are available for 1980, 1984, and 1988-1996.

NOTE: Number of discharges has been rounded. NCHS recommends that in statistical comparisons, estimates of less than 5,000 not be used and that estimates of 5,000 to 10,000 be used with caution. See appendices for source description and methods.

SOURCE: National Center for Health Statistics National Hospital Discharge Survey.

Table 3-11. Silicosis: Number of cases by ascertainment source and state, 1993-1995

Reporting Source	Illinois		Michigan		New Jersey		N. Carolina		Ohio		Texas		Wisconsin		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Physician report	2	2.6	39	23.8	-	0.0	1	7.7	5	3.8	7	8.3	11	11.7	65	10.8
Other health-care professional report	3	3.9	-	0.0	-	0.0	-	0.0	-	0.0	1	1.2	-	0.0	4	0.7
Hospital report	-	0.0	-	0.0	-	0.0	2	15.4	-	0.0	3	3.6	-	0.0	5	0.8
Hospital discharge data	62	80.5	90	54.9	34	87.2	-	0.0	123	92.5	-	0.0	75	79.8	384	63.6
Death certificate data	10	13.0	3	1.8	1	2.6	7	53.8	1	0.8	26	31.0	8	8.5	56	9.3
Workers' compensation files	-	0.0	32	19.5	-	0.0	1	7.7	2	1.5	-	0.0	-	0.0	35	5.8
Other state referral	-	0.0	-	0.0	-	0.0	-	0.0	2	1.5	-	0.0	-	0.0	2	0.3
Other source	-	0.0	-	0.0	4	10.3	2	15.4	-	0.0	47	56.0	-	0.0	53	8.8
Total	**77**	**100.0**	**164**	**100.0**	**39**	**100.0**	**13**	**100.0**	**133**	**100.0**	**84**	**100.0**	**94**	**100.0**	**604**	**100.0**

- indicates no cases reported.

NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.

SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Maxfield (Illinois); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); D Valiante and M Stanbury (New Jersey); W Jones and S Randolph (North Carolina); E Socie, K Gromen, and A Migliozzi (Ohio); T Willis and D Perrotta (Texas); and G Gruetzmacher and H Anderson (Wisconsin).

Table 3-12. Silicosis: Number of cases by duration of occupational exposure to silica and state, 1993-1995

Silica Exposure* (Years)	Illinois		Michigan		New Jersey		N. Carolina		Ohio		Texas		Wisconsin		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<10	11	14.3	4	2.4	3	7.7	2	15.4	8	6.0	13	15.5	6	6.4	47	7.8
10-20	19	24.7	25	15.2	10	25.6	3	23.1	23	17.3	13	15.5	15	16.0	108	17.9
21-30	24	31.2	63	38.4	10	25.6	4	30.8	33	24.8	3	3.6	15	16.0	152	25.2
>30	18	23.4	64	39.0	13	33.3	4	30.8	41	30.8	1	1.2	20	21.3	161	26.7
Unknown	5	6.5	8	4.9	3	7.7	-	0.0	28	21.1	54	64.3	38	40.4	136	22.5
Total	**77**	**100.0**	**164**	**100.0**	**39**	**100.0**	**13**	**100.0**	**133**	**100.0**	**84**	**100.0**	**94**	**100.0**	**604**	**100.0**

* Years of employment in jobs with silica exposure potential
- indicates no cases reported.
NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.
SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Maxfield (Illinois); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); D Valiante and M Stanbury (New Jersey); W Jones and S Randolph (North Carolina); E Socie, K Gromen, and A Migliozzi (Ohio); T Willis and D Perrotta (Texas); and G Gruetzmacher and H Anderson (Wisconsin).

Table 3-13. Silicosis: Primary industries associated with silica exposure of silicosis cases, by state, 1993-1995

	IL		MI		NJ		NC		OH		TX		WI		Total	
SIC Division/Major Group (SIC Code)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Agriculture, forestry, fishing (02)	**-**	**0.0**	**0**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**2**	**2.4**	**-**	**0.0**	**2**	**0.3**
Mining	**13**	**16.9**	**4**	**2.4**	**5**	**12.8**	**5**	**38.5**	**6**	**4.5**	**5**	**6.0**	**4**	**4.3**	**42**	**7.0**
Mining and quarry of nonmetal minerals, except fuel (14)	11	14.3	-	0.0	4	10.3	5	38.5	5	3.8	2	2.4	1	1.1	28	4.6
All other(10, 12, 13)	2	2.6	4	2.4	1	2.6	-	0.0	1	0.8	3	3.6	3	3.2	14	2.3
Construction	**5**	**6.5**	**12**	**7.3**	**4**	**10.3**	**1**	**7.7**	**8**	**6.0**	**22**	**26.2**	**3**	**3.2**	**55**	**9.1**
Construction, special trade contractors (17)	4	5.2	6	3.7	1	2.6	1	7.7	6	4.5	22	26.2	-	0.0	40	6.6
All other (15, 16)	1	1.3	6	3.7	3	7.7	-	0.0	2	1.5	-	0.0	3	3.2	15	2.5
Manufacturing	**49**	**63.6**	**148**	**90.2**	**29**	**74.4**	**6**	**46.2**	**111**	**83.5**	**30**	**35.7**	**79**	**84.0**	**452**	**74.8**
Primary metal industries (33)	23	29.9	131	79.9	4	10.3	2	15.4	55	41.4	4	4.8	57	60.6	276	45.7
Stone, clay, glass, and concrete products (32)	12	15.6	7	4.3	21	53.8	2	15.4	29	21.8	2	2.4	10	10.6	83	13.7
Industrial and commercial machinery and computer equipment (35)	3	3.9	2	1.2	-	0.0	-	0.0	11	8.3	7	8.3	7	7.4	30	5.0
Fabricated metal products except machinery and transportation equipment (34)	5	6.5	2	1.2	1	2.6	-	0.0	7	5.3	11	13.1	1	1.1	27	4.5
Transportation equipment (37)	1	1.3	6	3.7	1	2.6	-	0.0	1	0.8	1	1.2	2	2.1	12	2.0
All other (22, 26, 28, 30, 36, 38, 39)	5	6.5	-	0.0	2	5.1	2	15.4	8	6.0	5	6.0	2	2.1	24	4.0
Transportation (40, 42, 47, 49)	**3**	**3.9**	**-**	**0.0**	**1**	**2.6**	**-**	**0.0**	**1**	**0.8**	**-**	**0.0**	**-**	**0.0**	**5**	**0.8**
Wholesale trade (50)	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**1**	**7.7**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**1**	**0.2**
Retail trade (59)	**5**	**6.5**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**1**	**1.2**	**-**	**0.0**	**6**	**1.0**
Services (75, 76, 80)	**2**	**2.6**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**3**	**3.6**	**1**	**1.1**	**6**	**1.0**
Public administration (91, 92, 97)	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**1**	**0.8**	**3**	**3.6**	**-**	**0.0**	**4**	**0.7**
Unknown	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**6**	**4.5**	**18**	**21.4**	**7**	**7.4**	**31**	**5.1**
TOTAL	**77**	**100.0**	**164**	**100.0**	**39**	**100.0**	**13**	**100.0**	**133**	**100.0**	**84**	**100.0**	**94**	**100.0**	**604**	**100.0**

SIC - 1987 Standard Industrial Classification - indicates no cases reported.

NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.

SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Maxfield (Illinois); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); D Valiante and M Stanbury (New Jersey); W Jones and S Randolph (North Carolina); E Socie, K Gromen, and A Migliozzi (Ohio); T Willis and D Perrotta (Texas); and G Gruetzmacher and H Anderson (Wisconsin).

Table 3-14 (page 1 of 2). Silicosis: Primary occupations associated with silica exposure of silicosis cases, by state, 1993-1995

	IL		MI		NJ		NC		OH		TX		WI		Total	
Occupation (COC)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Managerial and professional specialty	**2**	**2.6**	**1**	**0.6**	**2**	**5.1**	**-**	**0.0**	**3**	**2.3**	**1**	**1.2**	**-**	**0.0**	**9**	**1.5**
Technical, sales, and administrative	**-**	**0.0**	**2**	**1.2**	**1**	**2.6**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**3**	**0.5**
Service	**2**	**2.6**	**-**	**0.0**	**-**	**0.0**	**1**	**7.7**	**-**	**0.0**	**4**	**4.8**	**-**	**0.0**	**7**	**1.2**
Farming, forestry, and fishing	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**2**	**2.4**	**-**	**0.0**	**2**	**0.3**
Precision production, craft, and repair	**28**	**36.4**	**41**	**25.0**	**8**	**20.5**	**7**	**53.8**	**15**	**11.3**	**25**	**29.8**	**11**	**11.7**	**135**	**22.4**
Hand molders and shapers, except jewelers (675)	8	10.4	21	12.8	1	2.6	-	0.0	-	0.0	-	0.0	-	0.0	30	5.0
Construction trades, n.e.c. (599)	4	5.2	1	0.6	-	0.0	-	0.0	1	0.8	13	15.5	-	0.0	19	3.1
Supervisors, production (628)	1	1.3	4	2.4	2	5.1	2	15.4	2	1.5	2	2.4	2	2.1	15	2.5
Mining machine operators (616)	1	1.3	1	0.6	1	2.6	3	23.1	3	2.3	2	2.4	1	1.1	12	2.0
Brickmasons and stonemasons (563)	1	1.3	3	1.8	-	0.0	1	7.7	4	3.0	-	0.0	1	1.1	10	1.7
Mining occupations, n.e.c. (617)	5	6.5	1	0.6	1	2.6	-	0.0	-	0.0	-	0.0	3	3.2	10	1.7
All other	8	10.4	10	6.1	3	7.7	1	7.7	5	3.8	8	9.5	4	4.3	39	6.5

See footnotes at end of table.

Table 3-14 (page 2 of 2). Silicosis: Primary occupations associated with silica exposure of silicosis cases, by state, 1993-1995

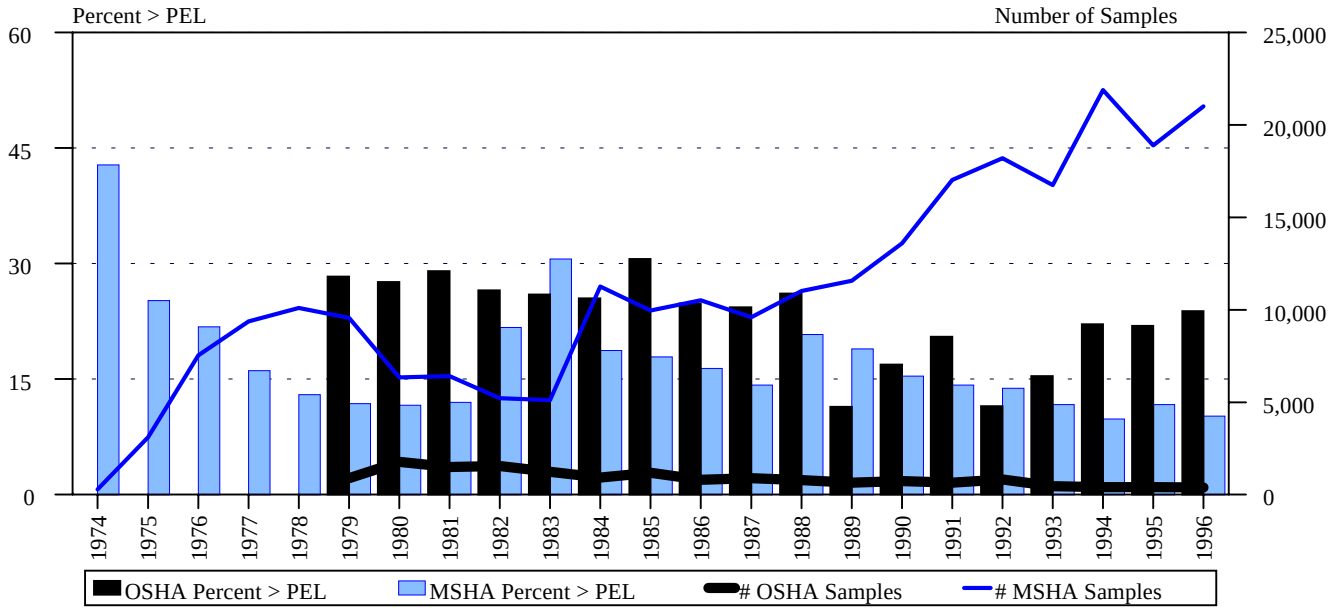
	IL		MI		NJ		NC		OH		TX		WI		Total	
Occupation (COC)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Operators, fabricators, and laborers	**41**	**53.2**	**100**	**61.0**	**27**	**69.2**	**5**	**38.5**	**101**	**75.9**	**33**	**39.3**	**64**	**68.1**	**371**	**61.4**
Laborers, except construction (889)	1	1.3	51	31.1	4	10.3	1	7.7	28	21.1	2	2.4	3	3.2	90	14.9
Miscellaneous metal and, plastic processing machine operators (725)	8	10.4	7	4.3	3	7.7	-	0.0	7	5.3	20	23.8	-	0.0	45	7.5
Crushing and grinding machine operators (768)	8	10.4	2	1.2	1	2.6	-	0.0	13	9.8	3	3.6	11	11.7	38	6.3
Molding and casting machine operators (719)	1	1.3	10	6.1	1	2.6	2	15.4	15	11.3	1	1.2	-	0.0	30	5.0
Miscellaneous hand working occupations (795)	-	0.0	14	8.5	-	0.0	-	0.0	-	0.0	-	0.0	15	16.0	29	4.8
Hand molding, casting, forming occupations (787)	-	0.0	-	0.0	3	7.7	-	0.0	3	2.3	1	1.2	15	16.0	22	3.6
Grinding, abrading, buffing, and polishing machine operators (709)	2	2.6	3	1.8	1	2.6	-	0.0	6	4.5	-	0.0	5	5.3	17	2.8
Furnace, kiln, and oven operators, excluding food (766)	1	1.3	2	1.2	1	2.6	-	0.0	5	3.8	-	0.0	4	4.3	13	2.2
Miscellaneous machine operators, n.e.c. (777)	4	5.2	2	1.2	1	2.6	-	0.0	4	3.0	-	0.0	-	0.0	11	1.8
Construction laborers (869)	-	0.0	1	0.6	3	7.7	-	0.0	3	2.3	4	4.8	-	0.0	11	1.8
All other	16	20.8	8	4.9	9	23.1	2	15.4	17	12.8	2	2.4	11	11.7	65	10.8
Unclassifiable and miscellaneous unemployed	**4**	**5.2**	**20**	**12.2**	**1**	**2.6**	**-**	**0.0**	**14**	**10.5**	**19**	**22.6**	**19**	**20.2**	**77**	**12.7**
Occupation not reported	-	0.0	20	12.2	-	0.0	-	0.0	14	10.5	19	22.6	19	20.2	72	11.9
All other	4	5.2	-	0.0	1	2.6	-	0.0	-	0.0	-	0.0	-	0.0	5	0.8
TOTAL	**77**	**100**	**164**	**100**	**39**	**100**	**13**	**100**	**133**	**100**	**84**	**100**	**94**	**100**	**604**	**100**

COC - 1990 Census Occupation Code n.e.c. - not elsewhere classified - indicates no cases reported.

NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.

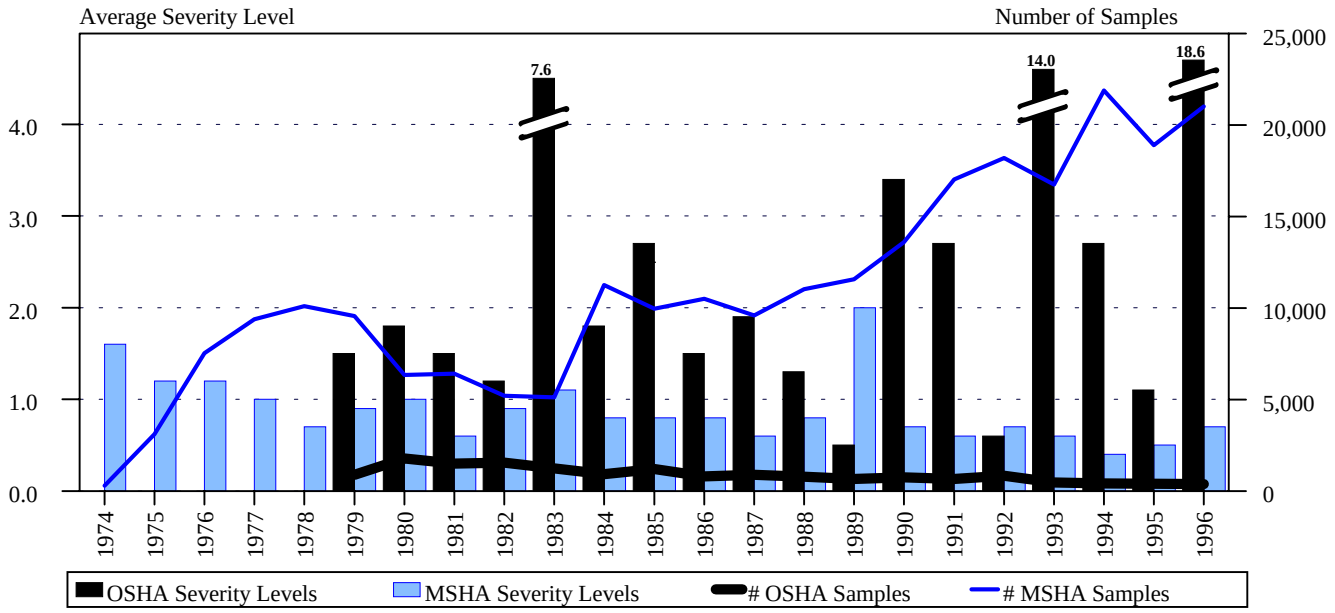
SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Maxfield (Illinois); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); D Valiante and M Stanbury (New Jersey); W Jones and S Randolph (North Carolina); E Socie, K Gromen, and A Migliozzi (Ohio); T Willis and D Perrotta (Texas); and G Gruetzmacher and H Anderson (Wisconsin).

Figure 3-3. Silica: Number of MSHA and OSHA inspector samples and percent exceeding the permissible exposure limit (PEL), 1974-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Figure 3-4. Silica: Number of MSHA and OSHA inspector samples and average severity levels, 1974-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 3-15. Silica: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently recorded on death certificates with silicosis, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
060	Construction	435	0.3	29.7	10.71
040	Metal mining	9,490	5.7	15.6	0.83
041	Coal mining	49,784	30.0	23.4	0.85
270	Blast furnaces, steelworks, rolling and finishing mills	101	0.1	9.9	3.75
262	Miscellaneous nonmetallic mineral and stone products	320	0.2	22.5	1.01
050	Nonmetallic mining and quarrying, except fuel	100,235	60.5	8.2	0.64
271	Iron and steel foundries	1,998	1.2	19.1	1.02
392	Not specified manufacturing industries	0	0.0	-	-
331	Machinery, except electrical, n.e.c.	153	0.1	22.9	1.53
010	Agricultural production, crops	0	0.0	-	-
252	Structural clay products	306	0.2	26.5	0.91
261	Pottery and related products	252	0.2	23.4	1.26
961	Non-paid worker or non-worker	0	0.0	-	-
	All other industries	2,620	1.6	16.0	5.59
	Industry not reported	29	0.0	17.2	0.68
	TOTAL	**165,723**	**100.0**	**13.6**	**0.83**

CIC - Census Industry Code n.e.c. - not elsewhere classified - indicates incalculable field

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.

SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 3-16. Silica: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently sampled, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
050	Nonmetallic mining and quarrying, except fuel	100,235	60.5	8.2	0.64
041	Coal mining	49,784	30.0	23.4	0.85
040	Metal mining	9,490	5.7	15.6	0.83
271	Iron and steel foundries	1,998	1.2	19.1	1.02
060	Construction	435	0.3	29.7	10.71
280	Other primary metal industries	420	0.3	7.4	0.58
262	Miscellaneous nonmetallic mineral and stone products	320	0.2	22.5	1.01
252	Structural clay products	306	0.2	26.5	0.91
300	Miscellaneous fabricated metal products	258	0.2	35.7	7.65
251	Cement, concrete, gypsum, and plaster products	252	0.2	17.9	0.80
	All other industries	2,196	1.3	16.1	5.99
	Industry not reported	29	0.0	17.2	0.68
	TOTAL	**165,723**	**100.0**	**13.6**	**0.83**

CIC - Census Industry Code

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.

SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 3-17. Silica: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently recorded on death certificates with silicosis, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
040	Metal mining	2,121	5.2	8.9	1.16
060	Construction	105	0.3	37.1	29.87
271	Iron and steel foundries	187	0.5	29.9	2.24
262	Miscellaneous nonmetallic mineral and stone products	21	0.1	42.9	1.06
050	Nonmetallic mining and quarrying, except fuel	26,152	64.3	5.7	0.47
041	Coal mining	11,627	28.6	23.1	0.79
270	Blast furnaces, steelworks, rolling and finishing mills	4	0.0	25.0	0.47
392	Not specified manufacturing industries	0	0.0	-	-
252	Structural clay products	24	0.1	8.3	0.31
300	Miscellaneous fabricated metal products	65	0.2	36.9	10.47
331	Machinery, except electrical, n.e.c.	7	0.0	42.9	1.14
	All other industries	370	0.9	12.2	8.81
	Industry not reported	4	0.0	0.0	0.03
	TOTAL	**40,687**	**100.0**	**11.1**	**0.77**

CIC - Census Industry Code n.e.c. - not elsewhere classified - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 3-18. Silica: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
050	Nonmetallic mining and quarrying, except fuel	26,152	64.3	5.7	0.47
041	Coal mining	11,627	28.6	23.1	0.79
040	Metal mining	2,121	5.2	8.9	1.16
271	Iron and steel foundries	187	0.5	29.9	2.24
060	Construction	105	0.3	37.1	29.87
300	Miscellaneous fabricated metal products	65	0.2	36.9	10.47
272	Primary aluminum industries	61	0.1	4.9	0.25
280	Other primary metal industries	46	0.1	13.0	0.52
251	Cement, concrete, gypsum, and plaster products	36	0.1	8.3	0.21
282	Fabricated structural metal products	27	0.1	33.3	7.19
	All other industries	256	0.6	15.2	11.95
	Industry not reported	4	0.0	0.0	0.03
	TOTAL	**40,687**	**100.0**	**11.1**	**0.77**

CIC - Census Industry Code
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 3-19 (page 1 of 2). Silica: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	1,512	0.57	12.8	2.89	4,109	0.53	14.1	2.25	982	0.47	12.7	1.97
Alaska	81	0.74	14.8	3.26	205	1.65	13.7	10.77	76	1.94	13.2	13.59
Arizona	2,898	1.37	16.2	6.89	2,757	0.62	13.5	3.09	1,048	0.47	9.7	2.91
Arkansas	554	1.49	33.2	3.76	1,679	8.32	14.5	56.03	449	1.26	6.9	16.49
California	2,068	1.57	14.6	9.11	4,803	0.64	11.0	3.91	1,042	0.85	8.8	7.53
Colorado	2,997	0.61	13.9	2.78	3,999	0.63	15.5	2.46	707	0.58	12.2	2.47
Connecticut	327	0.88	24.8	2.57	413	0.35	7.3	2.56	140	0.15	2.1	1.47
Delaware	15	0.20	0.0	-	59	0.31	3.4	2.92	24	0.38	8.3	2.92
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	792	0.29	5.1	2.12	1,990	0.13	1.9	2.55	545	0.08	1.3	1.97
Georgia	2,295	0.53	11.5	2.54	3,782	0.43	8.6	3.10	778	0.27	5.0	2.32
Hawaii	2	0.50	0.0	-	233	0.18	1.7	4.69	141	0.11	0.7	1.20
Idaho	1,233	1.55	16.5	7.54	1,477	0.73	11.2	4.67	457	0.71	7.0	7.40
Illinois	4,890	0.85	18.0	3.47	6,435	0.45	10.8	1.95	1,435	0.42	10.5	1.81
Indiana	2,120	0.38	6.4	2.79	2,871	0.32	6.7	2.21	779	0.24	5.4	1.67
Iowa	938	0.44	8.1	2.57	1,474	0.18	3.1	1.71	383	0.13	0.8	1.61
Kansas	1,551	0.53	13.2	1.99	1,424	0.45	9.5	2.49	316	0.34	8.9	1.69
Kentucky	4,775	1.05	27.1	3.07	15,822	0.91	25.4	2.54	4,051	0.80	24.0	2.09
Louisiana	237	0.93	14.8	4.81	2,002	0.21	4.0	2.33	577	0.19	3.5	2.20
Maine	344	0.57	14.5	1.96	403	0.26	4.0	1.66	175	0.25	3.4	1.69
Maryland	669	0.56	12.6	2.83	1,109	0.37	7.0	2.66	405	0.35	6.7	2.44
Massachusetts	431	1.68	16.9	8.27	727	0.34	7.0	2.40	246	0.21	2.8	1.65
Michigan	1,458	0.51	11.2	2.36	3,466	0.48	10.7	2.81	891	0.26	5.8	1.66
Minnesota	3,534	0.41	6.7	3.24	3,430	0.37	8.2	2.42	772	0.24	4.0	2.40
Mississippi	344	0.29	4.7	2.09	1,225	0.30	6.1	2.70	334	0.22	4.5	1.76
Missouri	2,721	1.11	13.5	6.35	5,103	0.90	9.0	7.76	1,032	0.19	3.0	1.58
Montana	1,272	0.49	11.2	2.56	1,655	0.80	16.1	3.53	308	0.47	12.7	2.07

See footnotes at end of table.

Table 3-19 (page 2 of 2). Silica: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	40	0.83	12.5	4.58	604	0.17	2.8	1.99	200	0.14	3.0	1.45
Nevada	1,007	2.17	23.5	8.21	2,173	0.87	19.8	3.14	513	0.76	16.2	3.34
New Hampshire	145	1.02	19.3	3.57	337	0.32	7.4	1.47	126	0.33	8.7	1.45
New Jersey	822	0.79	18.0	2.96	1,450	0.45	10.3	2.59	374	0.22	4.0	1.58
New Mexico	1,154	0.66	11.4	4.06	2,518	0.76	13.1	4.09	556	0.89	9.5	7.34
New York	1,423	0.52	12.9	2.26	4,255	0.38	6.3	3.26	1,337	0.26	5.0	1.93
North Carolina	3,134	0.68	8.6	5.59	4,709	0.48	5.4	6.37	906	0.73	3.5	16.91
North Dakota	254	0.52	11.8	2.16	340	0.22	2.1	1.58	116	0.25	2.6	1.93
Ohio	3,565	0.79	15.6	3.67	5,827	0.49	11.1	2.57	1,373	0.39	8.8	2.38
Oklahoma	1,327	0.77	16.3	3.58	3,321	0.55	8.4	4.56	811	0.26	5.2	2.40
Oregon	310	0.33	5.2	3.22	2,126	1.08	4.0	23.80	674	0.27	1.8	8.60
Pennsylvania	5,827	0.84	19.0	3.14	9,794	0.58	13.7	2.37	2,888	0.50	11.7	2.01
Rhode Island	52	0.99	25.0	2.71	86	0.69	15.1	3.34	21	0.98	23.8	3.53
South Carolina	965	1.40	21.2	5.40	2,825	0.39	6.8	3.59	629	0.53	4.8	8.07
South Dakota	1,412	0.76	14.2	3.42	1,038	0.38	8.8	2.18	269	0.40	8.6	2.21
Tennessee	2,969	0.43	9.7	2.43	5,072	0.53	12.4	2.65	1,089	0.60	11.6	3.50
Texas	1,237	1.16	14.2	6.52	7,839	0.86	6.0	12.01	1,902	1.41	3.9	33.40
Utah	1,665	0.74	13.8	3.57	3,749	0.57	13.3	2.65	786	0.51	10.2	2.83
Vermont	396	0.56	16.2	1.75	909	0.63	18.5	2.37	291	0.57	18.6	1.90
Virginia	4,296	1.09	29.7	2.93	8,296	0.86	24.1	2.54	2,039	0.66	18.7	2.23
Washington	878	0.67	14.7	3.13	2,093	1.18	8.4	12.11	687	2.43	4.1	55.69
West Virginia	6,930	0.93	26.2	2.65	12,956	0.83	23.6	2.37	3,019	0.79	23.9	2.13
Wisconsin	1,961	0.46	8.2	3.15	2,808	0.48	9.6	3.18	749	0.25	4.3	1.78
Wyoming	2,033	1.34	17.5	6.10	1,752	0.69	13.4	3.52	455	1.09	14.7	6.00
TOTAL	**83,860**	**0.84**	**16.4**	**3.74**	**159,529**	**0.72**	**13.4**	**3.81**	**39,903**	**0.60**	**10.9**	**3.64**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine quartz data and metal/nonmetal mine inspection data.

Table 3-20 (page 1 of 2). Silica: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	196	1.44	38.8	3.23	157	1.80	13.4	12.50	5	0.26	0.0	-
Alaska	2	17.29	50.0	34.59	9	0.80	33.3	2.11	0	-	-	-
Arizona	12	0.23	8.3	2.78	22	2.02	18.2	10.24	3	1.90	33.3	5.70
Arkansas	43	1.69	23.3	7.04	30	1.76	26.7	6.49	0	-	-	-
California	0	-	-	-	149	0.96	16.8	4.98	6	0.57	0.0	-
Colorado	190	3.36	20.5	15.46	203	0.78	13.8	4.78	10	1.23	10.0	12.29
Connecticut	146	0.76	18.5	3.15	106	0.57	9.4	4.52	4	0.04	0.0	-
Delaware	7	0.49	14.3	1.90	0	-	-	-	0	-	-	-
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	24	1.37	25.0	4.88	30	1.83	20.0	8.82	0	-	-	-
Georgia	233	1.33	33.9	3.40	210	15.15	18.6	80.55	8	375.50	87.5	429.10
Hawaii	2	0.00	0.0	-	2	0.02	0.0	-	2	0.02	0.0	-
Idaho	8	9.66	50.0	19.10	23	1.80	13.0	11.67	0	-	-	-
Illinois	223	2.36	30.5	7.18	279	5.26	17.2	29.34	38	0.93	28.9	2.62
Indiana	123	0.96	27.6	2.55	207	0.94	10.1	7.51	8	6.22	12.5	48.65
Iowa	247	0.83	13.0	4.21	198	0.93	18.2	4.22	9	0.69	22.2	2.80
Kansas	39	0.70	12.8	4.24	16	1.41	31.3	3.85	0	-	-	-
Kentucky	136	3.11	35.3	8.21	151	6.74	17.2	38.79	29	0.08	3.4	1.90
Louisiana	30	0.92	20.0	3.26	34	1.23	29.4	3.58	1	0.96	0.0	-
Maine	7	0.80	42.9	1.86	10	5.60	40.0	13.83	0	-	-	-
Maryland	67	2.09	29.9	6.62	138	10.09	24.6	40.48	9	116.56	44.4	261.87
Massachusetts	149	0.95	28.2	2.66	131	0.64	16.8	2.79	21	0.92	23.8	3.12
Michigan	0	-	-	-	711	7.48	5.5	134.45	141	1.09	7.1	13.73
Minnesota	30	1.94	63.3	2.74	0	-	-	-	0	-	-	-
Mississippi	23	1.54	21.7	5.97	44	46.73	31.8	146.46	4	431.25	25.0	1725.00
Missouri	92	1.23	38.0	2.76	119	0.30	4.2	2.06	0	-	-	-
Montana	53	2.23	15.1	12.81	30	3.00	36.7	7.92	4	0.39	25.0	1.54

See footnotes at end of table.

Table 3-20 (page 2 of 2). Silica: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

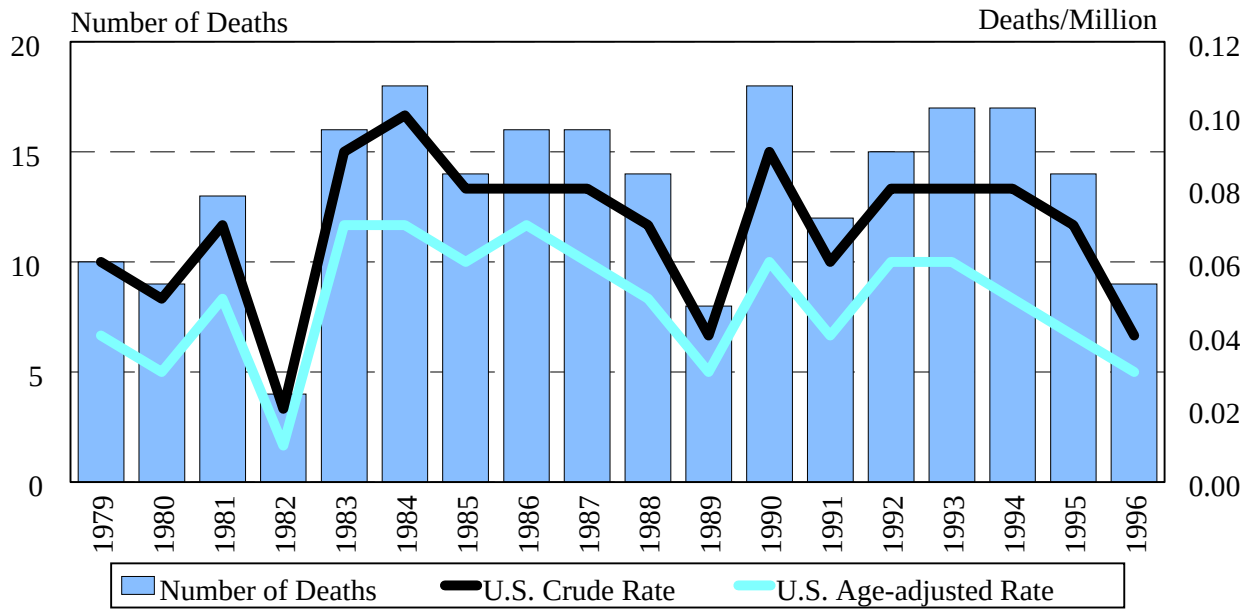
State	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	35	0.40	8.6	3.07	33	0.65	21.2	1.98	0	-	-	-
Nevada	22	31.65	77.3	40.90	109	2.84	56.9	4.79	7	0.79	42.9	1.64
New Hampshire	129	1.08	22.5	3.75	57	0.72	12.3	4.36	6	1.74	50.0	3.25
New Jersey	122	1.04	28.7	2.85	133	0.69	19.5	2.50	0	-	-	-
New Mexico	2	1.95	100.0	1.95	7	0.74	28.6	2.24	3	1.73	66.7	2.24
New York	301	1.02	29.9	2.63	218	1.07	21.6	4.11	22	0.85	31.8	2.08
North Carolina	144	56.22	12.5	447.51	195	1.98	15.4	12.14	78	0.66	15.4	3.81
North Dakota	46	1.26	23.9	4.41	24	0.57	16.7	1.49	1	1.33	100.0	1.33
Ohio	804	1.53	26.6	4.76	483	3.00	23.6	11.97	54	12.31	33.3	36.55
Oklahoma	88	2.10	23.9	7.61	37	0.84	21.6	2.69	2	0.41	0.0	-
Oregon	111	1.70	17.1	8.22	27	0.91	14.8	5.57	5	0.17	0.0	-
Pennsylvania	717	1.47	26.8	4.34	546	1.66	22.7	6.46	87	1.54	27.6	4.96
Rhode Island	139	2.12	17.3	11.34	1	0.00	0.0	-	0	-	-	-
South Carolina	34	0.30	11.8	2.19	58	1.08	13.8	7.03	10	0.00	0.0	-
South Dakota	23	0.10	4.3	1.08	12	1.74	75.0	2.03	0	-	-	-
Tennessee	98	1.11	25.5	3.39	168	2.26	19.0	10.78	44	7.16	29.5	23.28
Texas	253	1.32	26.5	4.45	312	6.22	34.0	17.96	10	0.36	10.0	2.04
Utah	4	1.13	25.0	4.52	43	0.31	4.7	3.60	0	-	-	-
Vermont	0	-	-	-	0	-	-	-	0	-	-	-
Virginia	129	1.49	31.0	3.94	104	1.14	21.2	4.26	0	-	-	-
Washington	0	-	-	-	205	2.14	24.4	8.12	100	1.91	27.0	6.41
West Virginia	141	3.21	43.3	6.94	45	0.54	17.8	2.33	0	-	-	-
Wisconsin	274	1.60	32.1	3.92	368	1.04	25.8	2.92	53	1.21	43.4	2.23
Wyoming	5	0.87	20.0	2.57	0	-	-	-	0	-	-	-
TOTAL	**5,703**	**3.06**	**26.9**	**10.52**	**6,194**	**3.69**	**19.2**	**18.39**	**784**	**9.61**	**22.8**	**41.45**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Section 4

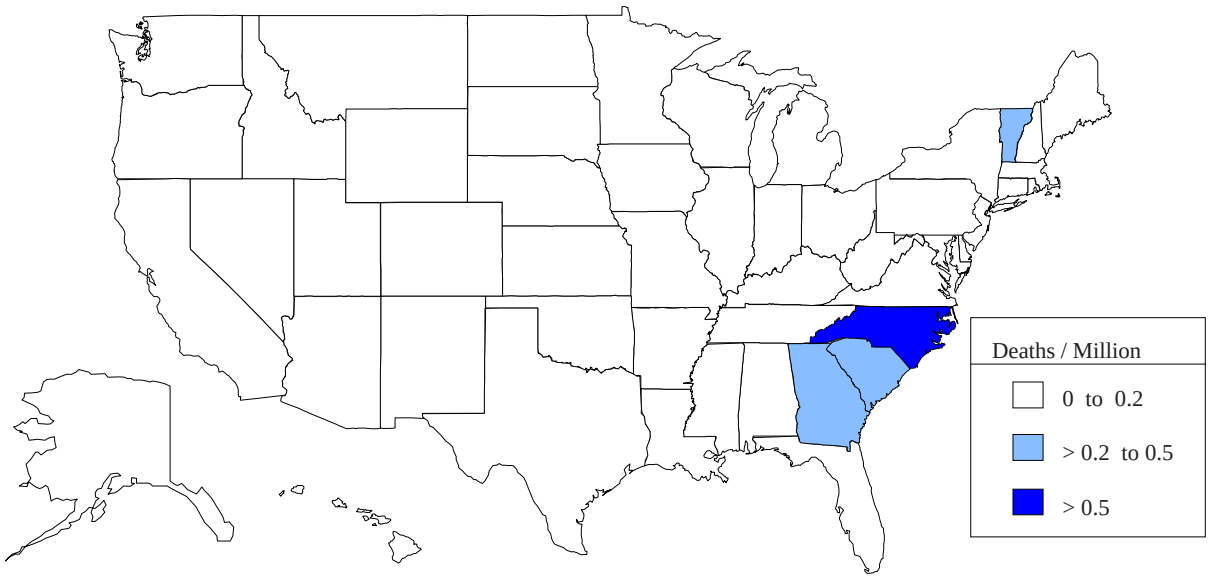
BYSSINOSIS and RELATED EXPOSURES

Figure 4-1. Byssinosis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1979-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 4-2. Byssinosis: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-1. Byssinosis: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Median Age (yrs)
1987	15	1	14	2	-	-	-	-	-	3	9	4	-	16	71.0
1988	12	2	14	-	-	-	-	-	-	4	4	6	-	14	69.5
1989	7	1	6	2	-	1	-	1	-	2	3	1	-	8	65.5
1990	13	5	17	1	-	-	1	-	-	4	7	4	2	18	71.0
1991	8	4	11	1	-	-	-	-	1	1	4	4	2	12	75.0
1992	9	6	10	5	-	3	1	-	-	1	8	2	-	15	67.0
1993	11	6	12	5	-	-	1	1	1	4	3	3	4	17	73.0
1994	11	6	15	2	-	-	-	1	1	3	4	5	3	17	72.0
1995	11	3	14	-	-	-	1	1	-	-	6	6	-	14	74.0
1996	4	5	9	-	-	-	-	-	1	2	2	4	-	9	71.0
Total	**101**	**39**	**122**	**18**	**-**	**4**	**4**	**4**	**4**	**24**	**50**	**39**	**11**	**140**	**71.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 4-2. Byssinosis: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	Overall rate	Males	Females	Males	Females
	Crude mortality rate				
1987	0.08	0.17	0.01	0.20	-
1988	0.07	0.15	0.02	-	-
1989	0.04	0.06	0.01	0.20	-
1990	0.09	0.15	0.06	0.10	-
1991	0.06	0.09	0.05	0.10	-
1992	0.08	0.06	0.06	0.38	0.08
1993	0.08	0.09	0.06	0.37	0.08
1994	0.08	0.11	0.07	0.18	-
1995	0.07	0.13	0.03	-	-
1996	0.04	0.05	0.06	-	-
1987-1996	**0.07**	**0.10**	**0.04**	**0.15**	**0.02**
	Age-adjusted mortality rate				
1987	0.06	0.12	0.01	0.21	-
1988	0.05	0.11	0.02	-	-
1989	0.03	0.06	0.01	0.18	-
1990	0.06	0.12	0.02	0.10	-
1991	0.04	0.05	0.04	0.08	-
1992	0.06	0.06	0.04	0.36	0.04
1993	0.06	0.07	0.02	0.42	0.02
1994	0.05	0.08	0.04	0.15	-
1995	0.04	0.09	0.02	-	-
1996	0.03	0.03	0.04	-	-
1987-1996	**0.05**	**0.08**	**0.03**	**0.15**	**0.01**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-3. Byssinosis: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	15	10	-	5	-
1988	20	15	5	-	-
1989	80	55	-	25	-
1990	55	55	-	-	-
1991	20	-	20	-	-
1992	175	50	35	90	-
1993	95	45	5	45	-
1994	55	25	30	-	-
1995	60	60	-	-	-
1996	25	5	20	-	-
Total	**600**	**320**	**115**	**165**	**-**
	Years of potential life lost to life expectancy				
1987	217	152	15	23	-
1988	185	131	38	-	-
1989	186	116	15	37	-
1990	273	187	55	11	-
1991	152	64	79	7	-
1992	370	111	113	112	9
1993	289	120	54	80	6
1994	247	117	104	16	-
1995	220	167	40	-	-
1996	134	47	88	-	-
Total	**2,273**	**1,211**	**601**	**286**	**15**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-4. Byssinosis: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	-	-	-	1	1	-	-	-	-	-	**2**
Alaska	-	-	-	-	-	-	-	-	-	-	**-**
Arizona	-	-	-	1	-	-	-	-	-	-	**1**
Arkansas	-	-	-	-	-	-	-	-	-	1	**1**
California	-	1	2	-	-	1	2	2	1	-	**9**
Colorado	-	-	-	-	-	-	-	1	-	-	**1**
Connecticut	-	-	-	-	-	-	-	-	-	-	**-**
Delaware	-	-	-	-	-	-	-	-	-	-	**-**
District of Columbia	-	-	-	-	-	-	-	-	-	-	**-**
Florida	-	-	-	1	-	1	-	1	-	-	**3**
Georgia	4	-	1	-	1	-	3	1	1	1	**12**
Hawaii	-	-	-	-	-	-	-	-	-	-	**-**
Idaho	-	-	-	-	-	-	-	-	-	-	**-**
Illinois	-	-	-	1	-	1	-	-	-	-	**2**
Indiana	-	-	-	-	1	-	-	-	-	-	**1**
Iowa	-	-	-	-	-	-	-	1	-	-	**1**
Kansas	-	-	-	1	-	-	-	-	-	-	**1**
Kentucky	-	-	-	-	-	-	-	-	1	-	**1**
Louisiana	-	-	-	-	-	1	-	-	-	-	**1**
Maine	-	-	-	-	-	-	-	-	-	-	**-**
Maryland	-	-	-	-	-	-	-	-	1	-	**1**
Massachusetts	-	-	-	1	-	1	1	-	-	-	**3**
Michigan	-	-	-	1	-	-	2	-	-	-	**3**
Minnesota	-	-	-	1	-	-	-	-	-	-	**1**
Mississippi	-	-	-	-	-	-	-	-	-	-	**-**
Missouri	-	-	-	-	-	-	-	-	1	-	**1**
Montana	-	-	-	-	-	-	-	-	-	-	**-**
Nebraska	-	-	-	-	-	-	-	-	-	-	**-**
Nevada	-	-	-	-	-	-	-	-	-	-	**-**
New Hampshire	-	-	-	-	1	-	-	-	-	-	**1**
New Jersey	-	-	-	-	-	-	-	-	-	-	**-**
New Mexico	-	-	-	-	-	-	-	-	-	-	**-**
New York	-	-	-	-	-	-	-	1	-	-	**1**
North Carolina	9	10	4	5	2	8	4	8	8	4	**62**
North Dakota	-	-	-	-	-	-	-	-	-	-	**-**
Ohio	-	2	-	1	-	-	-	-	-	-	**3**
Oklahoma	-	-	-	-	1	-	1	-	-	-	**2**
Oregon	-	-	-	-	-	-	-	-	-	-	**-**
Pennsylvania	-	-	-	1	1	-	-	1	-	-	**3**
Rhode Island	-	-	-	-	-	-	-	-	-	1	**1**
South Carolina	1	-	-	1	3	2	-	-	1	1	**9**
South Dakota	-	-	-	-	-	-	-	-	-	-	**-**
Tennessee	-	-	-	-	-	-	-	-	-	-	**-**
Texas	-	-	1	-	-	-	2	-	-	1	**4**
Utah	-	-	-	-	-	-	-	-	-	-	**-**
Vermont	1	-	-	-	-	-	-	-	-	-	**1**
Virginia	1	-	-	2	-	-	1	-	-	-	**4**
Washington	-	-	-	-	-	-	-	-	-	-	**-**
West Virginia	-	-	-	-	1	-	1	-	-	-	**2**
Wisconsin	-	1	-	-	-	-	-	1	-	-	**2**
Wyoming	-	-	-	-	-	-	-	-	-	-	**-**
TOTAL	**16**	**14**	**8**	**18**	**12**	**15**	**17**	**17**	**14**	**9**	**140**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-5. Byssinosis: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	2	12	0.06	10	0.03	19	17	21	8.4	26
Alaska	-	-	-	-	-	-	-	-	-	-
Arizona	1	17	0.03	21	0.04	11	21	19	20.8	10
Arkansas	1	17	0.05	12	0.02	26	8	26	8.4	24
California	9	3	0.04	18	0.03	16	210	2	23.3	8
Colorado	1	17	0.04	17	0.02	22	8	28	8.3	27
Connecticut	-	-	-	-	-	-	-	-	-	-
Delaware	-	-	-	-	-	-	-	-	-	-
District of Columbia	-	-	-	-	-	-	-	-	-	-
Florida	3	7	0.03	26	0.02	23	77	7	25.6	6
Georgia	12	2	0.23	3	0.19	3	202	3	16.8	14
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-
Illinois	2	12	0.02	30	0.03	18	104	5	52.1	1
Indiana	1	17	0.02	29	0.02	28	14	25	14.0	18
Iowa	1	17	0.05	15	0.03	17	14	23	14.1	16
Kansas	1	17	0.05	14	0.02	25	8	28	8.3	27
Kentucky	1	17	0.03	20	0.04	10	48	10	47.5	2
Louisiana	1	17	0.03	23	0.03	15	48	10	47.5	2
Maine	-	-	-	-	-	-	-	-	-	-
Maryland	1	17	0.03	27	0.02	24	14	23	14.1	16
Massachusetts	3	7	0.06	11	0.03	13	34	15	11.4	21
Michigan	3	7	0.04	16	0.03	12	83	6	27.5	5
Minnesota	1	17	0.03	25	0.03	14	21	19	20.8	10
Mississippi	-	-	-	-	-	-	-	-	-	-
Missouri	1	17	0.02	28	0.01	30	8	28	8.3	27
Montana	-	-	-	-	-	-	-	-	-	-
Nebraska	-	-	-	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-	-	-
New Hampshire	1	17	0.11	7	0.13	4	29	16	29.2	4
New Jersey	-	-	-	-	-	-	-	-	-	-
New Mexico	-	-	-	-	-	-	-	-	-	-
New York	1	17	0.01	31	0.01	31	21	18	21.1	9
North Carolina	62	1	1.14	1	0.77	1	841	1	13.6	19
North Dakota	-	-	-	-	-	-	-	-	-	-
Ohio	3	7	0.03	19	0.02	20	42	13	14.2	15
Oklahoma	2	12	0.08	8	0.02	21	14	22	7.2	31
Oregon	-	-	-	-	-	-	-	-	-	-
Pennsylvania	3	7	0.03	22	0.01	29	29	17	9.5	23
Rhode Island	1	17	0.12	6	0.05	9	8	26	8.4	24
South Carolina	9	3	0.32	2	0.24	2	164	4	18.2	12
South Dakota	-	-	-	-	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-	-	-	-	-
Texas	4	5	0.03	24	0.02	27	44	12	11.0	22
Utah	-	-	-	-	-	-	-	-	-	-
Vermont	1	17	0.22	4	0.10	6	8	31	8.2	30
Virginia	4	5	0.08	9	0.05	8	49	9	12.2	20
Washington	-	-	-	-	-	-	-	-	-	-
West Virginia	2	12	0.14	5	0.10	5	35	14	17.5	13
Wisconsin	2	12	0.05	13	0.06	7	50	8	24.9	7
Wyoming	-	-	-	-	-	-	-	-	-	-

- indicates no deaths listed.
NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 4-6. Byssinosis: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
749	Miscellaneous textile machine operators	19	19.2
738	Winding and twisting machine operators	10	10.1
914	Homemaker	8	8.1
518	Industrial machinery repairers	7	7.1
616	Mining machine operators	4	4.0
633	Supervisors, production occupations	3	3.0
739	Knitting, looping, taping, and weaving machine operators	3	3.0
779	Machine operators, not specified	3	3.0
889	Laborers, except construction	3	3.0
637	Machinists	2	2.0
754	Packaging and filling machine operators	2	2.0
768	Crushing and grinding machine operators	2	2.0
	All other occupations	30	30.3
	Occupation not reported	3	3.0
	TOTAL	**99**	**100.0**

COC - Census Occupation Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-7. Byssinosis: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
142	Yarn, thread, and fabric mills	56	56.6
961	Non-paid worker or non-worker	8	8.1
041	Coal mining	3	3.0
060	Construction	3	3.0
050	Nonmetallic mining and quarrying, except fuel	2	2.0
351	Motor vehicles and motor vehicle equipment	2	2.0
392	Not specified manufacturing industries	2	2.0
831	Hospitals	2	2.0
	All other industries	19	19.2
	Industry not reported	2	2.0
	TOTAL	**99**	**100.0**

CIC - Census Industry Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-8. Byssinosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
749	Miscellaneous textile machine operators	19	48.60	29.28	75.94
738	Winding and twisting machine operators	10	26.00	12.50	47.79
518	Industrial machinery repairers	7	25.08	10.07	51.71

COC - Census Occupation Code LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 4-9. Byssinosis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

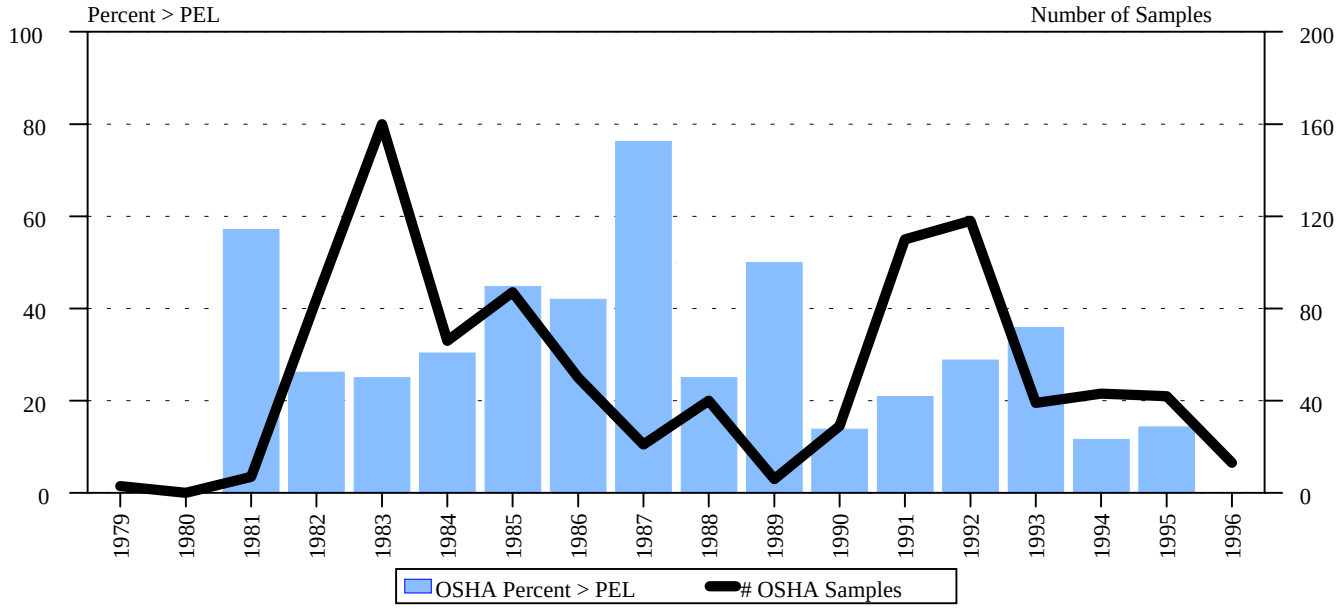
CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
142	Yarn, thread, and fabric mills	56	26.51	19.64	34.97

CIC - Census Industry Code LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

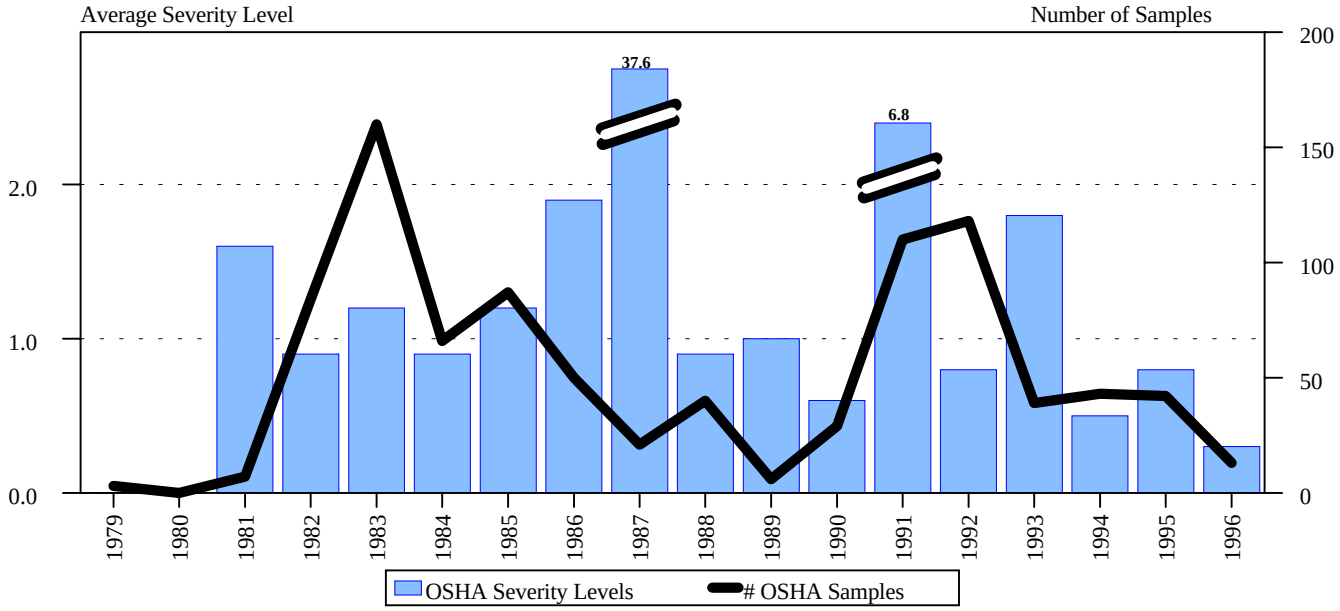
SOURCE: National Center for Health Statistics multiple cause of death data.

Figure 4-3. Cotton dust: Number of OSHA inspector samples and percent exceeding the permissible exposure limit (PEL), 1979-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Figure 4-4. Cotton dust: Number of OSHA inspector samples and average severity levels, 1979-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Table 4-10. Cotton dust: Number and percent of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently recorded on death certificates with byssinosis, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
142	Yarn, thread, and fabric mills	415	90.0	24.3	4.17
961	Non-paid worker or non-worker	0	0.0	-	-
041	Coal mining	0	0.0	-	-
060	Construction	0	0.0	-	-
050	Nonmetallic mining and quarrying, except fuel	0	0.0	-	-
351	Motor vehicles and motor vehicle equipment	0	0.0	-	-
392	Not specified manufacturing industries	0	0.0	-	-
831	Hospitals	0	0.0	-	-
	All other industries	46	10.0	30.4	1.74
	Industry not reported	0	0.0	-	-
	TOTAL	**461**	**100.0**	**24.9**	**3.93**

CIC - Census Industry Code - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 4-11. Cotton dust: Number and percent of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently sampled, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
142	Yarn, thread, and fabric mills	415	90.0	24.3	4.17
150	Miscellaneous textile mill products	15	3.3	66.7	3.51
140	Dyeing and finishing textiles, except wool and knit goods	12	2.6	0.0	0.23
152	Miscellaneous fabricated textile products	10	2.2	30.0	1.27
132	Knitting mills	7	1.5	0.0	0.33
242	Furniture and fixtures	1	0.2	100.0	9.79
300	Miscellaneous fabricated metal products	1	0.2	0.0	0.00
	TOTAL	**461**	**100.0**	**24.9**	**3.93**

CIC - Census Industry Code
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Table 4-12. Cotton dust: Number and percent of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently recorded on death certificates with byssinosis, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
142	Yarn, thread, and fabric mills	45	81.8	11.1	0.55
961	Non-paid worker or non-worker	0	0.0	-	-
	All other industries	10	18.2	10.0	1.09
	Industry not reported	0	0.0	-	-
	TOTAL	**55**	**100.0**	**10.9**	**0.65**

CIC - Census Industry Code - indicates incalculable field
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 4-13. Cotton dust: Number and percent of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
142	Yarn, thread, and fabric mills	45	81.8	11.1	0.55
152	Miscellaneous fabricated textile products	6	10.9	0.0	0.09
150	Miscellaneous textile mill products	2	3.6	0.0	0.19
140	Dyeing and finishing textiles, except wool and knit goods	1	1.8	0.0	0.11
242	Furniture and fixtures	1	1.8	100.0	9.79
	TOTAL	**55**	**100.0**	**10.9**	**0.65**

CIC - Census Industry Code
NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Table 4-14 (page 1 of 2). Cotton dust: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

State	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	22	1.05	40.9	1.49	37	1.16	37.8	2.02	0	-	-	-
Alaska	0	-	-	-	0	-	-	-	0	-	-	-
Arizona	0	-	-	-	0	-	-	-	0	-	-	-
Arkansas	0	-	-	-	0	-	-	-	0	-	-	-
California	0	-	-	-	0	-	-	-	0	-	-	-
Colorado	0	-	-	-	0	-	-	-	0	-	-	-
Connecticut	0	-	-	-	0	-	-	-	0	-	-	-
Delaware	0	-	-	-	0	-	-	-	0	-	-	-
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	0	-	-	-	0	-	-	-	0	-	-	-
Georgia	86	1.17	52.3	1.75	99	7.42	25.3	27.99	3	0.19	0.0	-
Hawaii	0	-	-	-	1	9.79	100.0	9.79	1	9.79	100.0	9.79
Idaho	0	-	-	-	0	-	-	-	0	-	-	-
Illinois	2	15.68	100.0	15.68	0	-	-	-	0	-	-	-
Indiana	0	-	-	-	0	-	-	-	0	-	-	-
Iowa	0	-	-	-	0	-	-	-	0	-	-	-
Kansas	0	-	-	-	0	-	-	-	0	-	-	-
Kentucky	0	-	-	-	0	-	-	-	0	-	-	-
Louisiana	0	-	-	-	0	-	-	-	0	-	-	-
Maine	0	-	-	-	0	-	-	-	0	-	-	-
Maryland	0	-	-	-	0	-	-	-	0	-	-	-
Massachusetts	0	-	-	-	0	-	-	-	0	-	-	-
Michigan	0	-	-	-	0	-	-	-	0	-	-	-
Minnesota	0	-	-	-	0	-	-	-	0	-	-	-
Mississippi	1	0.25	0.0	-	0	-	-	-	0	-	-	-
Missouri	0	-	-	-	0	-	-	-	0	-	-	-
Montana	0	-	-	-	0	-	-	-	0	-	-	-

See footnotes at end of table.

Table 4-14 (page 2 of 2). Cotton dust: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

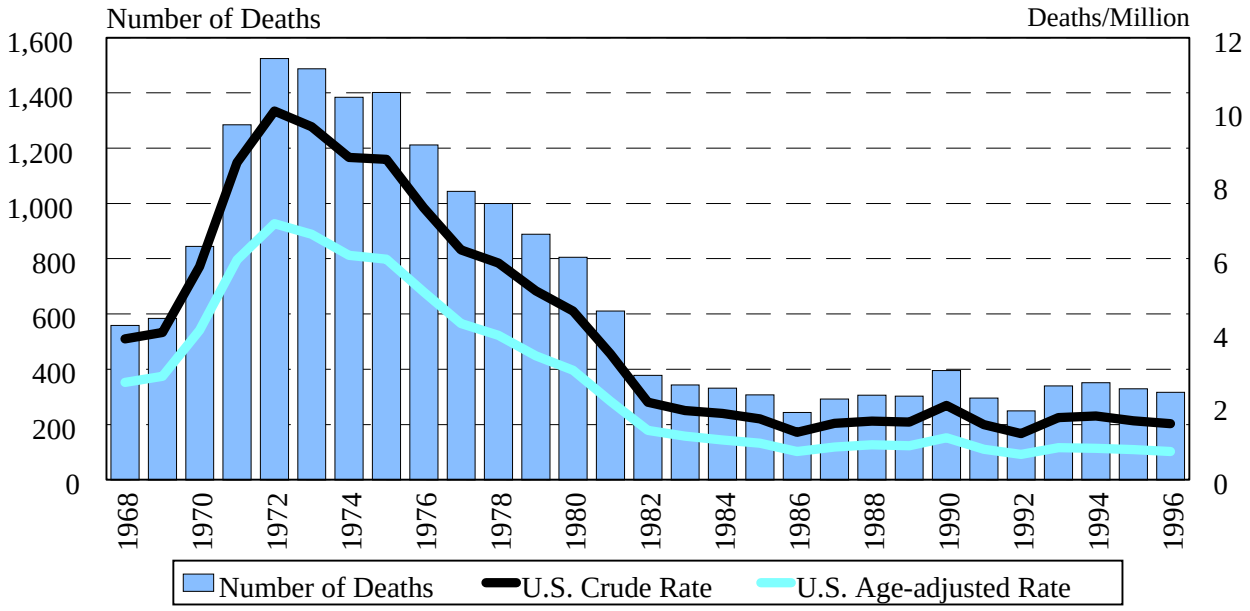
	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	0	-	-	-	0	-	-	-	0	-	-	-
Nevada	0	-	-	-	0	-	-	-	0	-	-	-
New Hampshire	0	-	-	-	2	0.00	0.0	-	2	0.00	0.0	-
New Jersey	1	1.93	100.0	1.93	0	-	-	-	0	-	-	-
New Mexico	0	-	-	-	0	-	-	-	0	-	-	-
New York	0	-	-	-	0	-	-	-	0	-	-	-
North Carolina	240	0.84	21.3	2.09	226	0.71	21.2	1.44	26	0.54	11.5	2.10
North Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Ohio	0	-	-	-	0	-	-	-	0	-	-	-
Oklahoma	0	-	-	-	0	-	-	-	0	-	-	-
Oregon	0	-	-	-	0	-	-	-	0	-	-	-
Pennsylvania	1	0.00	0.0	-	0	-	-	-	0	-	-	-
Rhode Island	0	-	-	-	0	-	-	-	0	-	-	-
South Carolina	39	0.70	12.8	1.61	74	1.22	27.0	3.51	20	0.56	10.0	1.54
South Dakota	0	-	-	-	0	-	-	-	0	-	-	-
Tennessee	1	37.00	100.0	37.00	12	0.00	0.0	-	3	0.00	0.0	-
Texas	54	1.58	51.9	2.47	10	77.57	70.0	110.60	0	-	-	-
Utah	0	-	-	-	0	-	-	-	0	-	-	-
Vermont	0	-	-	-	0	-	-	-	0	-	-	-
Virginia	0	-	-	-	0	-	-	-	0	-	-	-
Washington	0	-	-	-	0	-	-	-	0	-	-	-
West Virginia	0	-	-	-	0	-	-	-	0	-	-	-
Wisconsin	0	-	-	-	0	-	-	-	0	-	-	-
Wyoming	0	-	-	-	0	-	-	-	0	-	-	-
TOTAL	**447**	**1.14**	**31.8**	**2.44**	**461**	**3.93**	**24.9**	**14.36**	**55**	**0.65**	**10.9**	**3.19**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Section 5

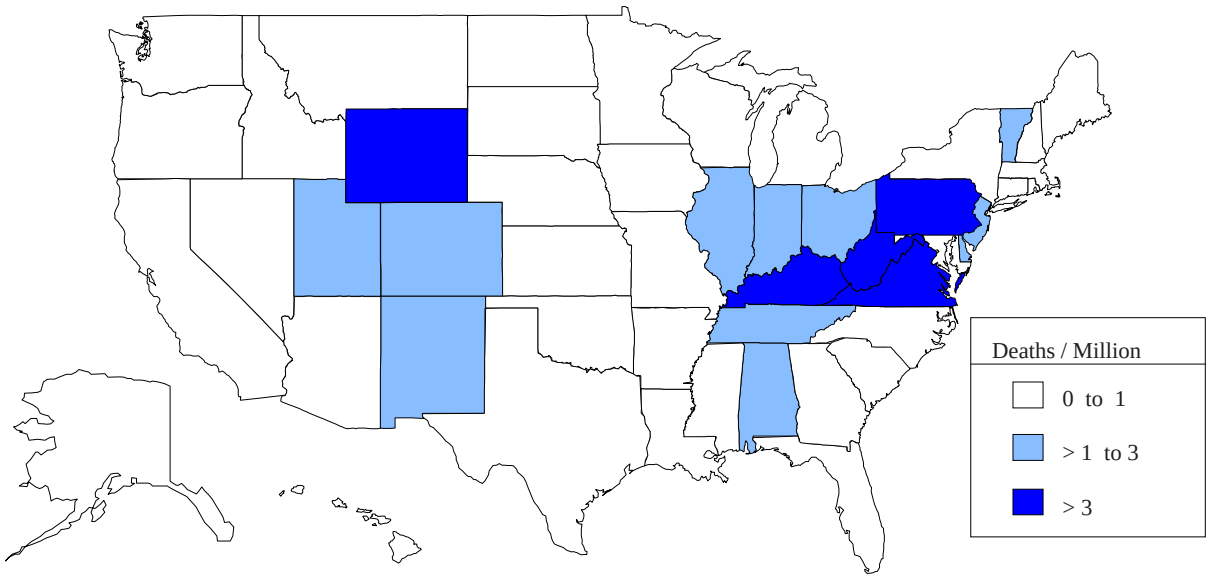
UNSPECIFIED AND OTHER PNEUMOCONIOSES

Figure 5-1. Unspecified/Other pneumoconioses: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 5-2. Unspecified/Other pneumoconioses: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 5-1. Unspecified/Other pneumoconioses: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									Median Age (yrs)
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	
1987	282	10	269	23	-	-	-	3	6	29	98	105	51	292	75.5
1988	297	9	279	26	1	-	-	2	9	37	99	111	48	306	75.0
1989	286	17	276	26	1	-	-	4	7	34	97	123	38	303	76.0
1990	385	10	367	26	2	-	2	1	7	48	114	152	71	395	76.0
1991	282	14	271	24	1	-	1	6	3	22	103	110	51	296	76.0
1992	234	15	231	18	-	1	-	-	8	19	76	104	41	249	76.0
1993	331	9	319	18	3	-	1	3	1	21	101	151	62	340	77.0
1994	343	8	330	21	-	-	-	-	1	25	81	173	71	351	78.0
1995	320	9	318	10	1	-	-	-	9	26	80	144	70	329	78.0
1996	306	10	295	16	5	-	-	2	5	28	76	132	73	316	78.0
Total	**3,066**	**111**	**2,955**	**208**	**14**	**1**	**4**	**21**	**56**	**289**	**925**	**1,305**	**576**	**3,177**	**77.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 5-2. Unspecified/Other pneumoconioses: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	Overall rate	Males	Females	Males	Females
	Crude mortality rate				
1987	1.53	3.31	0.11	2.22	0.09
1988	1.59	3.41	0.11	2.59	-
1989	1.57	3.25	0.20	2.56	-
1990	2.02	4.47	0.11	2.43	0.08
1991	1.50	3.20	0.15	2.21	0.08
1992	1.25	2.66	0.16	1.60	0.08
1993	1.69	3.77	0.10	1.67	-
1994	1.73	3.89	0.09	1.92	-
1995	1.60	3.70	0.10	0.90	-
1996	1.52	3.37	0.11	1.41	-
1987-1996	**1.60**	**3.50**	**0.12**	**1.92**	**0.03**
	Age-adjusted mortality rate				
1987	0.89	2.16	0.06	2.11	0.05
1988	0.95	2.24	0.06	2.50	-
1989	0.92	2.10	0.10	2.65	-
1990	1.14	2.83	0.04	2.28	0.07
1991	0.83	1.96	0.07	2.05	0.07
1992	0.69	1.64	0.07	1.47	0.07
1993	0.87	2.17	0.06	1.45	-
1994	0.85	2.16	0.04	1.72	-
1995	0.82	2.09	0.05	0.81	-
1996	0.77	1.88	0.06	1.23	-
1987-1996	**0.87**	**2.11**	**0.06**	**1.80**	**0.03**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 5-3. Unspecified/Other pneumoconioses: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	310	280	20	10	-
1988	370	265	20	85	-
1989	375	285	5	80	-
1990	440	365	10	65	-
1991	340	220	30	90	-
1992	260	235	15	10	-
1993	230	210	10	10	-
1994	140	125	-	15	-
1995	265	220	20	10	-
1996	265	205	40	5	-
Total	**2,995**	**2,410**	**170**	**380**	**-**
	Years of potential life lost to life expectancy				
1987	3,384	2,610	130	206	9
1988	3,625	2,719	134	298	-
1989	3,666	2,661	218	324	-
1990	4,613	3,635	100	263	14
1991	3,508	2,652	182	269	14
1992	2,910	2,226	176	148	14
1993	3,669	2,901	135	154	-
1994	3,568	2,860	89	183	-
1995	3,556	2,921	127	86	-
1996	3,444	2,700	164	140	-
Total	**35,941**	**27,885**	**1,454**	**2,070**	**51**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 5-4. Unspecified/Other pneumoconioses: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	10	6	8	7	10	5	8	1	3	5	**63**
Alaska	-	-	-	-	-	-	-	-	-	-	**-**
Arizona	3	1	2	3	1	2	3	-	3	2	**20**
Arkansas	4	-	1	1	2	1	-	1	-	1	**11**
California	10	10	11	7	4	4	8	7	5	3	**69**
Colorado	3	-	1	1	3	3	7	4	5	7	**34**
Connecticut	2	3	4	2	2	4	4	-	-	1	**22**
Delaware	2	2	-	-	-	-	1	-	4	1	**10**
District of Columbia	-	-	1	-	1	-	-	-	-	1	**3**
Florida	5	9	11	5	10	11	5	7	8	11	**82**
Georgia	6	4	1	2	1	2	3	1	3	5	**28**
Hawaii	1	-	-	-	-	-	-	-	-	1	**2**
Idaho	-	-	-	-	-	-	-	-	-	1	**1**
Illinois	18	18	36	16	19	13	14	13	10	20	**177**
Indiana	7	6	6	6	4	4	3	1	5	6	**48**
Iowa	-	-	-	-	-	4	1	1	4	-	**10**
Kansas	-	3	1	-	3	-	1	1	-	1	**10**
Kentucky	31	39	26	47	32	34	14	26	29	14	**292**
Louisiana	2	2	3	3	4	-	-	1	-	1	**16**
Maine	-	3	1	-	-	-	-	-	-	2	**6**
Maryland	5	6	4	4	4	1	1	5	6	3	**39**
Massachusetts	2	4	3	-	2	3	1	1	2	4	**22**
Michigan	5	10	7	8	3	7	5	4	3	4	**56**
Minnesota	-	1	2	1	1	1	1	-	-	-	**7**
Mississippi	-	-	1	-	-	-	-	2	1	-	**4**
Missouri	2	-	3	6	3	1	4	2	3	-	**24**
Montana	1	-	-	1	-	-	2	-	-	-	**4**
Nebraska	-	2	-	-	1	1	-	-	-	-	**4**
Nevada	-	-	1	-	-	-	3	-	-	-	**4**
New Hampshire	1	-	-	-	-	1	-	-	1	-	**3**
New Jersey	11	12	11	9	7	7	2	6	9	1	**75**
New Mexico	2	6	3	4	-	1	3	3	2	1	**25**
New York	9	9	12	10	3	9	7	6	3	8	**76**
North Carolina	1	8	4	4	2	4	2	3	1	2	**31**
North Dakota	-	-	-	1	-	-	-	-	-	-	**1**
Ohio	36	20	27	29	42	27	15	24	16	20	**256**
Oklahoma	1	4	2	2	1	2	2	1	1	-	**16**
Oregon	1	2	1	1	1	-	-	-	1	-	**7**
Pennsylvania	33	26	36	51	49	33	159	130	98	94	**709**
Rhode Island	3	1	1	-	-	-	-	-	-	-	**5**
South Carolina	-	-	-	-	3	-	-	-	-	-	**3**
South Dakota	-	-	-	1	-	-	-	-	-	-	**1**
Tennessee	6	9	13	11	8	3	5	5	6	-	**66**
Texas	4	2	6	6	1	3	4	-	3	6	**35**
Utah	1	1	2	5	1	2	3	7	6	7	**35**
Vermont	-	2	1	-	-	-	1	-	1	1	**6**
Virginia	14	16	10	17	7	4	10	36	32	15	**161**
Washington	-	-	3	4	3	3	1	1	-	1	**16**
West Virginia	46	56	33	118	58	44	36	49	50	60	**550**
Wisconsin	2	3	1	2	-	2	-	-	1	1	**12**
Wyoming	2	-	3	-	-	3	1	2	4	5	**20**
TOTAL	**292**	**306**	**303**	**395**	**296**	**249**	**340**	**351**	**329**	**316**	**3,177**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 5-5. Unspecified/Other pneumoconioses: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	63	12	1.96	9	0.94	11	660	13	10.5	37
Alaska	-	-	-	-	-	-	-	-	-	-
Arizona	20	25	0.68	21	0.33	25	207	27	10.3	40
Arkansas	11	31	0.59	27	0.27	31	117	31	10.6	36
California	69	10	0.29	42	0.19	40	858	10	12.4	18
Colorado	34	18	1.28	14	0.65	15	290	21	8.5	45
Connecticut	22	23	0.83	18	0.42	20	256	24	11.6	27
Delaware	10	32	1.84	11	0.98	9	102	34	10.2	41
District of Columbia	3	44	0.60	26	0.57	17	114	32	38.1	1
Florida	82	7	0.74	20	0.30	30	894	9	10.9	33
Georgia	28	20	0.54	30	0.38	22	372	19	13.3	11
Hawaii	2	47	0.22	44	0.14	46	22	47	11.2	30
Idaho	1	48	0.13	49	0.05	49	8	49	8.4	46
Illinois	177	5	1.95	10	0.95	10	1,763	6	10.0	43
Indiana	48	14	1.09	16	0.54	18	499	15	10.4	38
Iowa	10	32	0.46	34	0.17	42	98	36	9.8	44
Kansas	10	32	0.52	32	0.23	36	104	33	10.4	39
Kentucky	292	3	10.00	2	5.46	2	3,382	3	11.6	28
Louisiana	16	27	0.50	33	0.33	27	200	28	12.5	17
Maine	6	37	0.61	24	0.33	24	66	39	11.0	32
Maryland	39	15	1.00	17	0.63	16	473	16	12.1	22
Massachusetts	22	23	0.45	35	0.26	32	262	23	11.9	24
Michigan	56	13	0.77	19	0.45	19	717	12	12.8	16
Minnesota	7	35	0.20	46	0.14	44	101	35	14.4	4
Mississippi	4	40	0.20	47	0.12	47	49	42	12.4	19
Missouri	24	22	0.59	28	0.32	28	347	20	14.5	3
Montana	4	40	0.65	23	0.16	43	26	45	6.6	50
Nebraska	4	40	0.33	39	0.22	37	55	41	13.9	7
Nevada	4	40	0.38	37	0.25	33	45	43	11.2	30
New Hampshire	3	44	0.34	38	0.24	35	41	44	13.6	8
New Jersey	75	9	1.20	15	0.74	14	998	7	13.3	10
New Mexico	25	21	2.14	8	1.25	8	266	22	10.6	35
New York	76	8	0.53	31	0.30	29	905	8	11.9	25
North Carolina	31	19	0.57	29	0.37	23	402	17	13.0	15
North Dakota	1	48	0.21	45	0.14	45	14	48	13.9	6
Ohio	256	4	2.99	6	1.61	7	2,943	4	11.5	29
Oklahoma	16	27	0.65	22	0.33	26	217	25	13.6	9
Oregon	7	35	0.30	41	0.19	41	92	37	13.1	13
Pennsylvania	709	1	7.38	3	3.06	3	7,110	1	10.0	42
Rhode Island	5	39	0.61	25	0.38	21	66	40	13.2	12
South Carolina	3	44	0.11	50	0.05	50	23	46	7.7	49
South Dakota	1	48	0.19	48	0.06	48	8	50	8.3	47
Tennessee	66	11	1.67	12	0.92	12	802	11	12.2	21
Texas	35	16	0.26	43	0.20	39	501	14	14.3	5
Utah	35	16	2.84	7	1.82	6	375	18	10.7	34
Vermont	6	37	1.34	13	0.85	13	74	38	12.4	20
Virginia	161	6	3.19	5	2.10	5	1,888	5	11.7	26
Washington	16	27	0.40	36	0.25	34	208	26	13.0	14
West Virginia	550	2	38.36	1	19.18	1	6,570	2	11.9	23
Wisconsin	12	30	0.31	40	0.21	38	189	29	15.8	2
Wyoming	20	25	5.81	4	2.68	4	162	30	8.1	48

- indicates no deaths listed.
NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 5-6. Unspecified/Other pneumoconioses: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
616	Mining machine operators	621	45.0
889	Laborers, except construction	71	5.1
453	Janitors and cleaners	35	2.5
019	Managers and administrators, n.e.c.	33	2.4
575	Electricians	26	1.9
869	Construction laborers	26	1.9
473	Farmers, except horticulture	25	1.8
633	Supervisors, production occupations	23	1.7
804	Truck drivers	23	1.7
567	Carpenters	20	1.5
783	Welders and cutters	20	1.5
	All other occupations	425	30.8
	Occupation not reported	31	2.2
	TOTAL	**1,379**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 5-7. Unspecified/Other pneumoconioses: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
041	Coal mining	694	50.3
060	Construction	99	7.2
270	Blast furnaces, steelworks, rolling and finishing mills	41	3.0
351	Motor vehicles and motor vehicle equipment	26	1.9
392	Not specified manufacturing industries	24	1.7
400	Railroads	21	1.5
010	Agricultural production, crops	20	1.5
192	Industrial and miscellaneous chemicals	17	1.2
262	Miscellaneous nonmetallic mineral and stone products	15	1.1
040	Metal mining	14	1.0
842	Elementary and secondary schools	14	1.0
961	Non-paid worker or non-worker	14	1.0
	All other industries	339	24.6
	Industry not reported	41	3.0
	TOTAL	**1,379**	**100.0**

CIC - Census Industry Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 5-8. Unspecified/Other pneumoconioses: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
616	Mining machine operators	621	68.74	63.65	74.47
615	Explosives workers	5	57.80	18.71	135.05
613	Supervisors, extractive occupations	12	28.51	14.70	49.76
617	Mining occupations, n.e.c.	6	10.32	3.78	22.48
768	Crushing and grinding machine operators	5	9.17	2.97	21.43
719	Molding and casting machine operators	10	8.20	3.94	15.07
766	Furnace, kiln, and oven operators, except food	10	5.18	2.49	9.52
859	Miscellaneous material moving equipment operators	5	5.12	1.66	11.96
824	Locomotive operating occupations	7	4.49	1.80	9.26
516	Heavy equipment mechanics	7	3.96	1.59	8.16
575	Electricians	26	3.56	2.33	5.22
783	Welders and cutters	20	3.14	1.91	4.85
849	Crane and tower operators	6	3.11	1.14	6.78
563	Brickmasons and stonemasons	10	2.85	1.37	5.24
844	Operating engineers	14	2.66	1.45	4.46
869	Construction laborers	26	1.90	1.24	2.79
889	Laborers, except construction	71	1.71	1.34	2.16
453	Janitors and cleaners	35	1.52	1.06	2.11

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 5-9. Unspecified/Other pneumoconioses: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

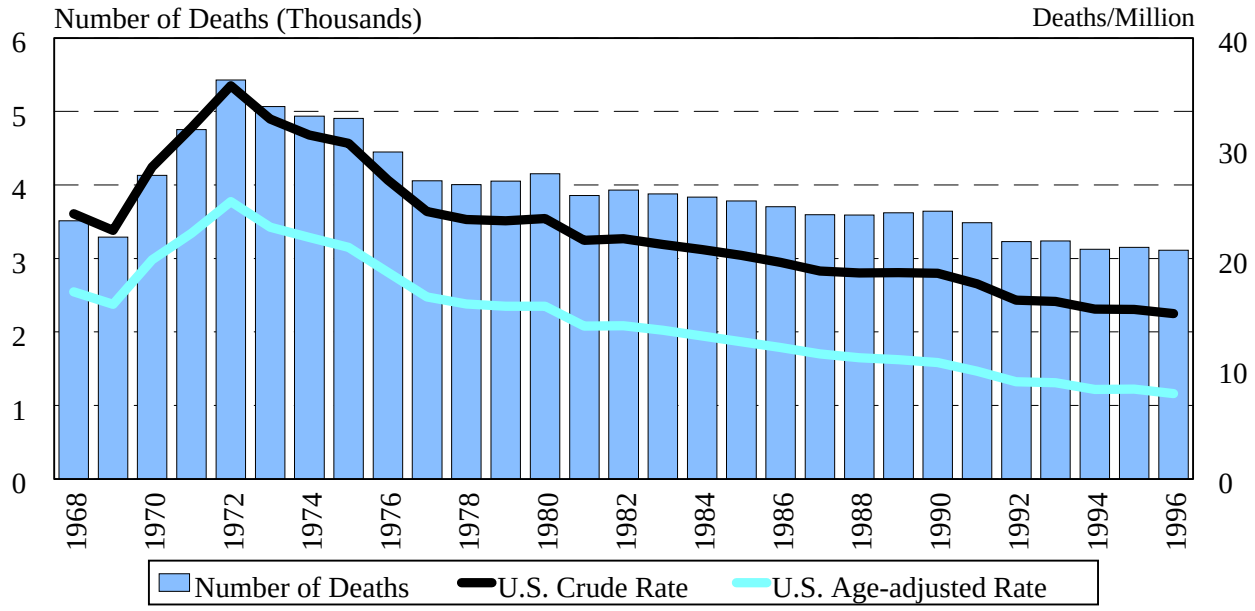
CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
041	Coal mining	694	72.91	67.51	78.99
262	Miscellaneous nonmetallic mineral and stone products	15	10.69	5.97	17.64
040	Metal mining	14	8.24	4.50	13.83
252	Structural clay products	7	7.30	2.93	15.05
261	Pottery and related products	5	5.36	1.73	12.52
271	Iron and steel foundries	10	5.06	2.43	9.30
050	Nonmetallic mining and quarrying, except fuel	6	4.26	1.56	9.28
280	Other primary metal industries	9	3.62	1.66	6.87
250	Glass and glass products	11	2.97	1.48	5.31
270	Blast furnaces, steelworks, rolling and finishing mills	41	2.87	2.05	3.91
192	Industrial and miscellaneous chemicals	17	2.57	1.49	4.11
351	Motor vehicles and motor vehicle equipment	26	1.69	1.10	2.48
060	Construction	99	1.25	1.01	1.54

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Section 6

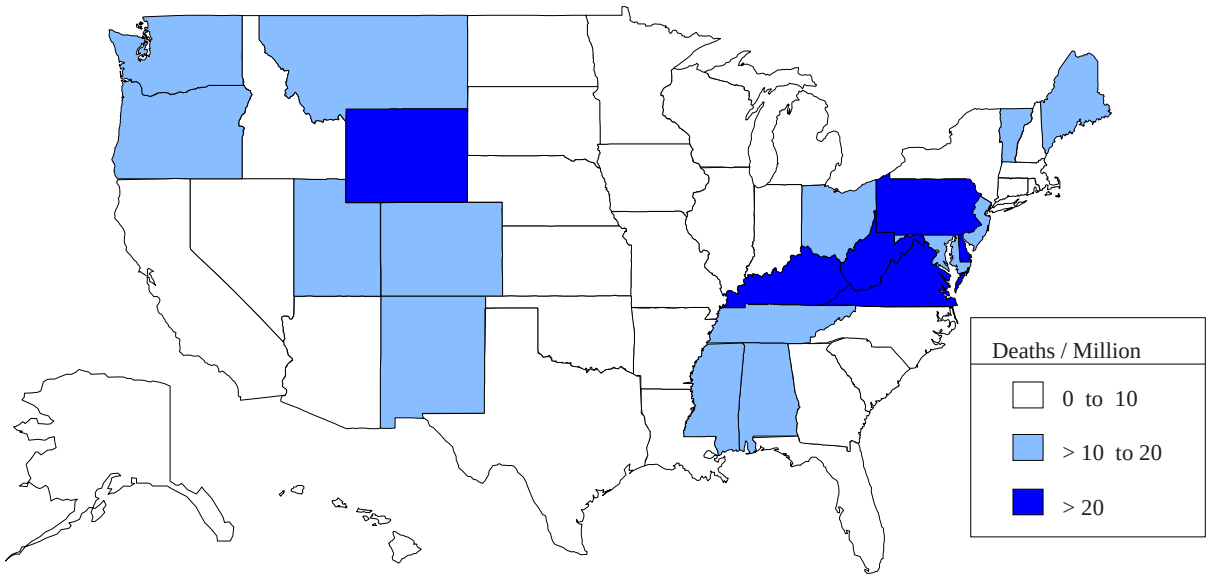
ALL PNEUMOCONIOSES and RELATED EXPOSURES

Figure 6-1. All pneumoconioses: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 6-2. All pneumoconioses: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 6-1. All pneumoconioses: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

Year	Sex		Race			Age Group (yrs)								Total	Median Age (yrs)
	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+		
1987	3,526	68	3,396	192	6	1	2	20	75	421	1,251	1,381	443	3,594	75.0
1988	3,524	65	3,381	202	6	-	1	13	67	399	1,220	1,412	477	3,589	75.0
1989	3,548	71	3,394	211	14	3	2	18	64	350	1,224	1,509	449	3,619	75.0
1990	3,557	87	3,407	222	15	-	5	17	66	358	1,162	1,503	533	3,644	76.0
1991	3,403	83	3,275	202	9	3	4	25	63	283	1,084	1,484	540	3,486	76.0
1992	3,153	77	3,044	174	12	4	4	12	42	265	989	1,409	505	3,230	77.0
1993	3,170	68	3,049	173	16	-	4	14	56	277	953	1,410	524	3,238	77.0
1994	3,052	74	2,963	154	9	-	-	10	45	233	893	1,434	511	3,126	77.0
1995	3,092	59	2,983	160	8	-	4	10	68	245	913	1,337	574	3,151	77.0
1996	3,030	84	2,936	164	14	-	1	11	51	210	883	1,364	594	3,114	78.0
Total	**33,055**	**736**	**31,828**	**1,854**	**109**	**11**	**27**	**150**	**597**	**3,041**	**10,572**	**14,243**	**5,150**	**33,791**	**76.0**

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data

Table 6-2. All pneumoconioses: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

Year	Overall rate	White		Black	
		Males	Females	Males	Females
		Crude mortality rate			
1987	18.87	42.42	0.74	18.79	0.52
1988	18.69	42.02	0.67	19.35	0.68
1989	18.70	41.86	0.74	20.02	0.67
1990	18.66	41.52	0.92	21.03	0.50
1991	17.69	39.59	0.92	19.02	0.33
1992	16.22	36.53	0.78	15.66	0.65
1993	16.11	36.36	0.72	15.57	0.40
1994	15.40	34.94	0.79	13.68	0.31
1995	15.37	35.03	0.64	14.17	0.15
1996	15.00	33.75	0.91	14.26	0.15
1987-1996	**16.97**	**38.24**	**0.78**	**16.99**	**0.43**
		Age-adjusted mortality rate			
1987	11.34	28.39	0.37	18.04	0.34
1988	10.98	27.52	0.34	18.69	0.58
1989	10.82	26.93	0.35	19.39	0.49
1990	10.57	26.22	0.41	20.14	0.45
1991	9.77	24.30	0.48	17.72	0.24
1992	8.81	22.06	0.41	14.39	0.52
1993	8.72	21.75	0.34	14.37	0.23
1994	8.12	20.38	0.33	12.82	0.20
1995	8.15	20.40	0.29	12.75	0.13
1996	7.75	19.11	0.40	13.25	0.14
1987-1996	**9.39**	**23.40**	**0.37**	**15.98**	**0.32**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 6-3. All pneumoconioses: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	3,845	3,390	130	265	15
1988	3,360	2,860	70	405	25
1989	3,365	2,795	30	445	65
1990	3,380	2,915	35	340	55
1991	3,260	2,655	245	340	-
1992	2,575	2,160	100	245	55
1993	2,715	2,350	45	270	25
1994	2,090	1,825	55	180	25
1995	2,635	2,365	40	165	15
1996	2,125	1,815	115	140	-
Total	**29,350**	**25,130**	**865**	**2,795**	**280**
	Years of potential life lost to life expectancy				
1987	42,718	34,252	838	1,872	69
1988	41,523	33,104	733	2,033	120
1989	42,398	33,692	786	2,212	146
1990	42,120	33,353	931	2,139	131
1991	40,085	32,303	1,199	1,959	49
1992	36,851	29,270	959	1,616	149
1993	36,336	29,159	772	1,651	69
1994	34,227	27,761	810	1,441	66
1995	35,149	28,815	684	1,440	37
1996	33,958	27,380	1,004	1,566	28
Total	**385,365**	**309,088**	**8,715**	**17,929**	**864**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-4. All pneumoconioses: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	44	55	67	61	71	49	51	54	57	65	**574**
Alaska	-	-	2	2	1	2	3	3	-	2	**15**
Arizona	16	13	16	20	13	13	23	22	28	25	**189**
Arkansas	23	7	8	14	17	13	17	9	15	14	**137**
California	125	125	123	151	155	134	142	147	145	127	**1,374**
Colorado	29	35	37	30	38	35	43	29	30	37	**343**
Connecticut	16	19	25	17	19	27	17	18	16	22	**196**
Delaware	6	12	15	10	18	10	11	15	15	12	**124**
District of Columbia	1	1	1	1	2	1	1	2	2	2	**14**
Florida	90	115	116	86	102	91	73	88	102	128	**991**
Georgia	30	24	22	23	18	25	24	20	26	22	**234**
Hawaii	4	3	6	3	4	4	1	2	5	2	**34**
Idaho	11	8	10	6	6	6	6	3	6	9	**71**
Illinois	105	93	108	94	90	91	77	65	72	85	**880**
Indiana	43	42	44	40	46	31	26	27	31	30	**360**
Iowa	14	10	12	12	11	19	15	12	18	12	**135**
Kansas	12	7	10	5	9	10	15	11	19	11	**109**
Kentucky	197	221	170	169	150	161	142	117	122	154	**1,603**
Louisiana	16	17	28	30	31	17	30	20	21	25	**235**
Maine	12	16	10	19	10	8	16	14	8	9	**122**
Maryland	33	30	33	55	40	48	44	60	68	65	**476**
Massachusetts	38	41	51	42	34	55	28	49	44	45	**427**
Michigan	53	52	45	59	42	47	48	39	47	49	**481**
Minnesota	6	20	10	15	10	26	24	22	24	13	**170**
Mississippi	14	17	19	21	29	27	21	29	42	35	**254**
Missouri	23	21	25	24	27	30	30	27	23	15	**245**
Montana	6	8	11	9	2	7	8	5	5	8	**69**
Nebraska	5	4	2	3	7	4	6	4	4	3	**42**
Nevada	6	2	8	6	4	2	10	10	7	6	**61**
New Hampshire	8	11	3	3	3	6	9	7	7	4	**61**
New Jersey	120	130	146	144	118	105	92	95	112	121	**1,183**
New Mexico	9	12	16	15	10	11	13	21	19	11	**137**
New York	76	63	73	77	61	46	55	64	56	64	**635**
North Carolina	51	45	43	50	52	54	36	58	65	54	**508**
North Dakota	1	1	2	2	3	-	2	4	-	4	**19**
Ohio	177	161	173	167	183	156	129	133	140	141	**1,560**
Oklahoma	18	13	14	17	16	13	9	12	10	6	**128**
Oregon	24	32	24	17	27	26	32	28	22	33	**265**
Pennsylvania	1,351	1,295	1,264	1,206	1,143	1,018	1,050	939	842	856	**10,964**
Rhode Island	4	13	6	8	1	7	5	6	5	5	**60**
South Carolina	13	17	24	18	17	21	27	21	22	25	**205**
South Dakota	-	3	2	2	-	-	-	1	-	4	**12**
Tennessee	55	70	57	57	42	39	44	49	50	41	**504**
Texas	63	65	65	108	112	76	93	92	109	109	**892**
Utah	17	19	24	28	18	22	29	29	27	18	**231**
Vermont	7	7	6	6	2	7	5	1	4	4	**49**
Virginia	196	210	195	200	179	196	213	178	197	178	**1,942**
Washington	52	44	47	44	60	48	69	67	48	56	**535**
West Virginia	350	330	374	420	395	359	345	366	379	324	**3,642**
Wisconsin	17	25	17	23	27	17	21	18	26	14	**205**
Wyoming	7	5	10	5	11	10	8	14	9	10	**89**
TOTAL	**3,594**	**3,589**	**3,619**	**3,644**	**3,486**	**3,230**	**3,238**	**3,126**	**3,151**	**3,114**	**33,791**

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-5. All pneumoconioses: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality Rate	Rank	Age-adjusted mortality Rate	Rank	YPLL to life expectancy Total	Rank	YPLL/death	Rank
Alabama	574	12	17.88	10	9.45	10	6,566	12	11.4	34
Alaska	15	49	3.54	48	5.52	21	211	50	14.1	3
Arizona	189	30	6.40	35	3.37	38	2,121	31	11.2	38
Arkansas	137	32	7.38	27	3.70	37	1,654	32	12.1	21
California	1,374	6	5.74	39	3.84	36	16,964	6	12.3	15
Colorado	343	20	12.91	12	7.81	13	3,516	20	10.2	47
Connecticut	196	29	7.36	28	3.95	32	2,260	29	11.5	32
Delaware	124	36	22.79	6	13.79	5	1,518	34	12.2	19
District of Columbia	14	50	2.79	50	2.09	49	265	49	18.9	1
Florida	991	8	9.00	24	3.93	34	11,678	8	11.8	27
Georgia	234	25	4.49	44	3.37	39	3,114	23	13.3	6
Hawaii	34	47	3.76	47	2.34	48	400	47	11.8	29
Idaho	71	40	9.11	23	4.78	26	762	40	10.7	42
Illinois	880	10	9.72	21	5.20	23	9,880	10	11.2	37
Indiana	360	19	8.20	26	4.52	30	4,222	19	11.7	30
Iowa	135	34	6.20	36	2.69	45	1,448	36	10.7	43
Kansas	109	38	5.65	40	2.98	43	1,362	38	12.5	13
Kentucky	1,603	4	54.91	3	30.76	3	19,112	4	11.9	26
Louisiana	235	24	7.32	30	5.07	24	3,287	22	14.0	4
Maine	122	37	12.47	15	6.65	17	1,385	37	11.4	36
Maryland	476	17	12.22	16	8.56	11	6,065	14	12.7	10
Massachusetts	427	18	8.80	25	4.66	28	4,784	18	11.2	39
Michigan	481	16	6.59	34	3.94	33	5,898	16	12.3	18
Minnesota	170	31	4.94	43	3.00	42	2,138	30	12.6	12
Mississippi	254	22	12.91	13	7.86	12	3,324	21	13.1	7
Missouri	245	23	6.05	37	3.16	41	2,957	24	12.1	22
Montana	69	41	11.16	19	5.28	22	730	43	10.6	45
Nebraska	42	46	3.42	49	1.79	50	483	46	11.5	33
Nevada	61	42	5.81	38	4.00	31	738	42	12.1	20
New Hampshire	61	42	6.97	32	4.58	29	750	41	12.3	17
New Jersey	1,183	7	18.90	7	10.64	8	14,161	7	12.0	25
New Mexico	137	32	11.71	17	6.69	16	1,459	35	10.7	44
New York	635	11	4.39	45	2.48	46	7,659	11	12.1	23
North Carolina	508	14	9.37	22	5.97	18	6,477	13	12.8	9
North Dakota	19	48	3.90	46	2.36	47	288	48	15.1	2
Ohio	1,560	5	18.19	9	9.87	9	18,224	5	11.7	31
Oklahoma	128	35	5.18	42	2.82	44	1,583	33	12.4	14
Oregon	265	21	11.44	18	5.62	20	2,902	25	11.0	41
Pennsylvania	10,964	1	114.18	2	49.07	2	113,304	1	10.3	46
Rhode Island	60	44	7.36	29	3.90	35	723	44	12.0	24
South Carolina	205	27	7.31	31	4.75	27	2,583	27	12.6	11
South Dakota	12	51	2.25	51	0.95	51	120	51	10.0	50
Tennessee	504	15	12.77	14	6.91	15	5,762	17	11.4	35
Texas	892	9	6.69	33	4.80	25	11,489	9	12.9	8
Utah	231	26	18.74	8	11.41	7	2,315	28	10.0	48
Vermont	49	45	10.97	20	5.76	19	490	45	10.0	49
Virginia	1,942	3	38.45	4	26.49	4	23,941	3	12.3	16
Washington	535	13	13.48	11	7.63	14	5,902	15	11.0	40
West Virginia	3,642	2	254.01	1	125.36	1	42,848	2	11.8	28
Wisconsin	205	27	5.31	41	3.24	40	2,730	26	13.3	5
Wyoming	89	39	25.86	5	13.14	6	814	39	9.2	51

NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 6-6. All pneumoconioses: Percent of deaths by condition and state, U.S. residents age 15 and over, 1987-1996

	Asbestosis	Silicosis	Coal workers' pneumoconiosis	Byssinosis	Unspecified/Other pneumoconioses
Alabama	40.2	7.3	41.5	0.3	11.0
Alaska	73.3	13.3	13.3	-	-
Arizona	45.0	21.2	23.8	0.5	10.6
Arkansas	43.1	8.8	39.4	0.7	8.0
California	68.9	10.5	15.4	0.7	5.0
Colorado	18.4	29.7	41.7	0.3	9.9
Connecticut	61.7	14.8	12.8	-	11.2
Delaware	74.2	4.8	14.5	-	8.1
District of Columbia	42.9	21.4	14.3	-	21.4
Florida	56.0	8.4	27.6	0.3	8.3
Georgia	46.2	19.2	17.9	5.1	12.0
Hawaii	94.1	-	-	-	5.9
Idaho	57.7	35.2	5.6	-	1.4
Illinois	21.6	10.5	48.1	0.2	20.1
Indiana	14.4	13.1	59.4	0.3	13.3
Iowa	34.8	16.3	40.7	0.7	7.4
Kansas	50.5	12.8	26.6	0.9	9.2
Kentucky	3.1	2.9	75.9	0.1	18.2
Louisiana	70.6	15.7	6.8	0.4	6.8
Maine	82.8	10.7	1.6	-	4.9
Maryland	70.6	4.6	16.8	0.2	8.2
Massachusetts	85.2	7.3	2.1	0.7	5.2
Michigan	32.8	27.0	28.9	0.6	11.6
Minnesota	65.9	30.6	-	0.6	4.1
Mississippi	87.4	3.5	7.5	-	1.6
Missouri	45.7	20.8	24.1	0.4	9.8
Montana	50.7	33.3	10.1	-	5.8
Nebraska	78.6	11.9	-	-	9.5
Nevada	47.5	36.1	11.5	-	6.6
New Hampshire	77.0	14.8	3.3	1.6	4.9
New Jersey	77.4	6.6	10.4	-	6.3
New Mexico	26.3	27.7	27.7	-	18.2
New York	54.6	21.7	12.4	0.2	12.0
North Carolina	43.9	17.9	20.3	12.2	6.1
North Dakota	63.2	10.5	21.1	-	5.3
Ohio	17.8	16.8	49.7	0.2	16.4
Oklahoma	39.8	17.2	28.9	1.6	12.5
Oregon	81.1	9.8	7.2	-	2.6
Pennsylvania	8.4	4.5	81.2	0.0	6.5
Rhode Island	76.7	10.0	5.0	1.7	8.3
South Carolina	68.8	12.2	13.2	4.4	1.5
South Dakota	25.0	41.7	25.0	-	8.3
Tennessee	17.1	7.5	62.5	-	13.1
Texas	80.2	10.7	6.1	0.4	3.9
Utah	12.1	16.5	57.1	-	15.2
Vermont	28.6	44.9	12.2	2.0	12.2
Virginia	19.8	2.0	69.9	0.2	8.3
Washington	83.4	6.9	7.3	-	3.0
West Virginia	5.6	1.8	77.9	0.1	15.1
Wisconsin	35.6	53.2	5.4	1.0	5.9
Wyoming	22.5	2.2	52.8	-	22.5
TOTAL	**28.5**	**8.2**	**54.0**	**0.4**	**9.4**

- indicates no deaths listed.

NOTE: Percentages may total more than 100% due to deaths with multiple pneumoconioses. See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-7. All pneumoconioses: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
616	Mining machine operators	4,581	43.6
889	Laborers, except construction	448	4.3
585	Plumbers, pipefitters, and steamfitters	258	2.5
019	Managers and administrators, n.e.c.	257	2.4
453	Janitors and cleaners	194	1.8
575	Electricians	194	1.8
567	Carpenters	179	1.7
633	Supervisors, production occupations	163	1.6
804	Truck drivers	162	1.5
869	Construction laborers	150	1.4
	All other occupations	3,546	33.8
	Occupation not reported	370	3.5
	TOTAL	**10,502**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-8. All pneumoconioses: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
041	Coal mining	4,875	46.4
060	Construction	1,037	9.9
270	Blast furnaces, steelworks, rolling and finishing mills	216	2.1
360	Ship and boat building and repairing	200	1.9
392	Not specified manufacturing industries	192	1.8
192	Industrial and miscellaneous chemicals	157	1.5
262	Miscellaneous nonmetallic mineral and stone products	151	1.4
040	Metal mining	147	1.4
400	Railroads	144	1.4
961	Non-paid worker or non-worker	111	1.1
	All other industries	2,892	27.5
	Industry not reported	380	3.6
	TOTAL	**10,502**	**100.0**

CIC - Census Industry Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-9 (page 1 of 2). All pneumoconioses: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
616	Mining machine operators	4,581	67.42	65.46	69.58
593	Insulation workers	126	51.84	43.20	62.01
725	Miscellaneous metal and plastic processing machine operators	16	22.55	12.89	36.61
613	Supervisors, extractive occupations	55	17.40	12.89	22.96
615	Explosives workers	11	16.90	8.45	30.23
643	Boilermakers	67	12.26	9.36	15.78
046	Mining engineers	14	11.91	6.51	19.98
768	Crushing and grinding machine operators	40	9.77	6.98	13.31
675	Hand molders and shapers, except jewelers	23	8.53	5.40	12.81
617	Mining occupations, n.e.c.	27	6.18	4.07	9.00
719	Molding and casting machine operators	51	5.57	4.13	7.35
585	Plumbers, pipefitters, and steamfitters	258	5.52	4.88	6.25
787	Hand molding, casting, and forming occupations	14	5.49	3.00	9.21
853	Excavating and loading machine operators	11	4.80	2.40	8.59
646	Lay-out workers	8	4.56	1.97	8.98
843	Supervisors, material moving equipment operators	9	4.09	1.88	7.76
653	Sheet metal workers	61	3.85	2.94	4.95
575	Electricians	194	3.54	3.05	4.10
859	Miscellaneous material moving equipment operators	24	3.28	2.10	4.88
584	Plasterers	10	3.15	1.51	5.79
058	Marine and naval architects	5	3.09	1.00	7.22
516	Heavy equipment mechanics	39	2.94	2.04	4.09
783	Welders and cutters	140	2.93	2.48	3.46
544	Millwrights	43	2.91	2.08	3.96
824	Locomotive operating occupations	34	2.90	1.96	4.14
766	Furnace, kiln, and oven operators, except food	41	2.82	2.01	3.84
849	Crane and tower operators	40	2.76	1.97	3.76
534	Heating, air conditioning, and refrigeration mechanics	17	2.55	1.48	4.08
855	Grader, dozer, and scraper operators	8	2.49	1.07	4.90
547	Specified mechanics and repairers, n.e.c.	33	2.13	1.44	3.04
757	Separating, filtering, and clarifying machine operators	18	2.08	1.23	3.29
844	Operating engineers	79	2.01	1.57	2.54
563	Brickmasons and stonemasons	50	1.90	1.41	2.51
518	Industrial machinery repairers	51	1.88	1.39	2.48
759	Painting and paint spraying machine operators	17	1.79	1.04	2.86
779	Machine operators, not specified	137	1.64	1.37	1.96
549	Not specified mechanics and repairers	35	1.51	1.05	2.10
869	Construction laborers	150	1.46	1.24	1.72
889	Laborers, except construction	448	1.44	1.31	1.59

See footnotes at end of table.

Table 6-9 (page 2 of 2). All pneumoconioses: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
567	Carpenters	179	1.38	1.18	1.61
633	Supervisors, production occupations	163	1.32	1.13	1.54
777	Miscellaneous machine operators, n.e.c.	82	1.29	1.02	1.61
637	Machinists	131	1.27	1.06	1.52

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-10. All pneumoconioses: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
041	Coal mining	4,875	67.69	65.72	69.86
262	Miscellaneous nonmetallic mineral and stone products	151	14.26	12.08	16.84
040	Metal mining	147	11.45	9.70	13.52
360	Ship and boat building and repairing	200	8.67	7.54	9.95
050	Nonmetallic mining and quarrying, except fuel	83	7.79	6.18	9.70
261	Pottery and related products	37	5.24	3.64	7.29
271	Iron and steel foundries	75	5.02	3.92	6.35
252	Structural clay products	34	4.69	3.17	6.70
502	Lumber and construction materials	21	3.33	2.06	5.09
192	Industrial and miscellaneous chemicals	157	3.15	2.67	3.72
190	Paints, varnishes, and related products	11	2.12	1.06	3.79
270	Blast furnaces, steelworks, rolling and finishing mills	216	2.00	1.74	2.30
282	Fabricated structural metal products	51	1.95	1.44	2.57
211	Other rubber products, and plastics footwear and belting	48	1.91	1.39	2.56
250	Glass and glass products	52	1.86	1.38	2.45
300	Miscellaneous fabricated metal products	48	1.83	1.34	2.45
060	Construction	1,037	1.74	1.64	1.85
272	Primary aluminum industries	23	1.68	1.06	2.52
280	Other primary metal industries	31	1.65	1.11	2.36
200	Petroleum refining	35	1.57	1.09	2.18
400	Railroads	144	1.19	1.01	1.40
392	Not specified manufacturing industries	192	1.17	1.01	1.35

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 6-11. Occupational dust diseases of the lungs: Estimated number of cases reported by employers, by industry division, U.S. private sector, 1973-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Total
1973	100	-	100	700	200	200	-	100	**1,500**
1974	100	300	100	900	-	300	-	100	**1,700**
1975	-	-	200	600	-	100	-	-	**1,000**
1976	-	-	200	800	100	-	-	-	**1,200**
1977	100	200	800	700	100	100	100	100	**2,000**
1978	-	300	200	800	100	200	-	100	**1,600**
1979	-	300	200	900	100	100	-	100	**1,700**
1980	-	300	200	1,300	100	100	-	200	**2,300**
1981	-	300	200	1,500	-	-	-	100	**2,100**
1982	-	300	100	1,200	100	100	-	100	**2,000**
1983	-	200	100	900	-	200	-	200	**1,700**
1984	-	200	200	1,000	100	100	-	100	**1,800**
1985	-	200	100	800	100	200	-	200	**1,700**
1986	100	600	100	-	-	-	100	300	**3,200**
1987	-	900	500	1,200	200	-	-	400	**3,400**
1988	-	700	200	1,200	300	-	-	300	**2,900**
1989	-	500	200	1,300	100	100	-	200	**2,600**
1990	100	300	300	1,600	400	100	-	300	**3,000**
1991	100	500	200	1,000	200	-	-	300	**2,500**
1992	-	600	100	1,000	-	200	-	500	**2,600**
1993	100	600	200	900	300	-	-	600	**2,700**
1994	-	400	200	900	300	300	-	500	**2,700**
1995	-	200	100	700	200	200	-	1,100	**2,700**
1996	-	100	100	2,600	200	100	-	400	**3,500**

- indicates no data reported or data that do not meet BLS publication guidelines.

NOTE: Dust diseases of the lungs (pneumoconioses) include silicosis, asbestosis, coal workers' pneumoconiosis, byssinosis, siderosis, and other pneumoconioses. The sum of industry divisions may not equal the total due to rounding. See appendices for source description.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 6-12. Occupational dust diseases of the lungs: Rate (per 10,000 full-time workers), by industry division, U.S. private sector, 1973-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Overall
1973	1.3	0.5	0.4	0.4	0.3	0.2	0.1	0.1	**0.3**
1974	0.8	4.8	0.3	0.4	-	0.2	0.0	0.1	**0.3**
1975	0.4	0.2	0.6	0.4	0.1	-	-	-	**0.2**
1976	0.2	0.1	0.5	0.4	0.2	-	-	-	**0.2**
1977	1.3	2.0	2.5	0.4	0.1	-	0.1	0.1	**0.3**
1978	0.3	4.0	0.6	0.4	0.1	0.1	-	-	**0.3**
1979	0.1	3.4	0.5	0.4	0.1	0.1	-	0.1	**0.3**
1980	0.4	3.3	0.6	0.7	0.1	0.1	-	0.1	**0.4**
1981	0.3	2.5	0.5	0.8	0.1	-	-	0.1	**0.3**
1982	0.4	3.2	0.3	0.7	0.2	0.1	-	0.1	**0.3**
1983	0.4	1.9	0.4	0.5	0.1	0.1	-	0.1	**0.3**
1984	0.4	1.7	0.5	0.5	0.2	0.1	-	0.1	**0.3**
1985	0.5	2.7	0.3	0.4	0.2	0.1	-	0.1	**0.2**
1986	1.0	8.4	0.3	0.9	-	-	-	0.1	**0.5**
1987	0.5	12.9	1.2	0.6	0.3	-	-	0.2	**0.5**
1988	-	10.2	0.5	0.6	0.6	-	-	0.1	**0.4**
1989	0.2	7.5	0.5	0.7	0.2	-	-	0.1	**0.3**
1990	0.6	4.4	0.6	0.9	0.7	-	-	0.1	**0.4**
1991	0.5	7.3	0.4	0.5	0.3	-	-	0.1	**0.3**
1992	0.2	9.0	0.3	0.6	-	0.1	-	0.2	**0.3**
1993	0.5	8.7	0.4	0.5	0.5	-	-	0.3	**0.3**
1994	0.3	6.6	0.5	0.5	0.5	0.1	0.1	0.2	**0.3**
1995	0.1	3.4	0.3	0.4	0.4	0.1	0.1	0.5	**0.3**
1996	0.1	1.6	0.1	1.4	0.3	-	0.1	0.2	**0.4**

- indicates no data reported or data that do not meet BLS publication guidelines.

NOTE: Dust diseases of the lungs (pneumoconioses) include silicosis, asbestosis, coal workers' pneumoconiosis, byssinosis, siderosis, and other pneumoconioses. See appendices for source description.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 6-13 (page 1 of 2). Occupational dust diseases of the lungs: Industries with the highest reported incidence rates, U.S. private sector, 1992-1996

Year/Industry	SIC Code	Rate (per 10,000 full time workers)
1992		
Coal mining	12	43.9
Petroleum and coal products	29	4.7
Nonmetallic minerals, except fuels	14	2.4
Metal mining	10	1.3
Primary metal industries	33	1.2
Stone, clay, and glass products	32	1.1
Rubber and miscellaneous plastic products	30	1.0
Electric, gas, and sanitary services	49	0.9
Chemical and allied products	28	0.9
Transportation equipment	37	0.9
OVERALL		**0.3**
1993		
Coal mining	12	48.6
Nonmetallic minerals, except fuels	14	2.4
Primary metal industries	33	1.8
Electric, gas, and sanitary services	49	1.3
Chemical and allied products	28	1.0
Amusement and recreation services	79	1.0
General building contractors	15	0.9
Transportation equipment	37	0.8
Hotels and other lodging places	70	0.7
Stone, clay, and glass products	32	0.7
Trucking and warehousing	42	0.7
OVERALL		**0.3**
1994		
Coal mining	12	35.4
Nonmetallic minerals, except fuels	14	2.0
Primary metal industries	33	1.7
Local and interurban passenger transit	41	1.5
Transportation equipment	37	1.4
Electric, gas, and sanitary services	49	1.1
Petroleum and coal products	29	1.0
Special trade contractors	17	0.7
Leather and leather products	31	0.7
Stone, clay, and glass products	32	0.6
OVERALL		**0.3**

See footnotes at end of table.

Table 6-13 (page 2 of 2). Occupational dust diseases of the lungs: Industries with the highest reported incidence rates, U.S. private sector, 1992-1996

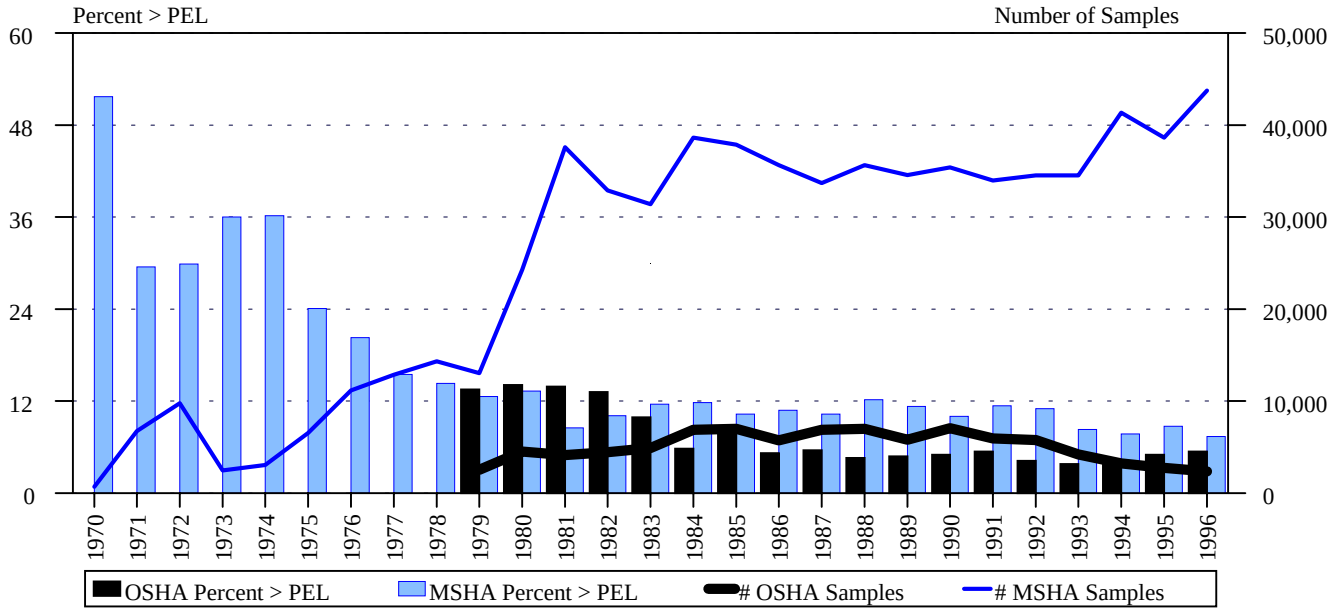
Year/Industry	SIC Code	Rate (per 10,000 full time workers)
1995		
Coal mining	12	17.7
Water transportation	44	1.5
Primary metal industries	33	1.4
Nonmetallic minerals, except fuels	14	1.2
Transportation equipment	37	1.1
Miscellaneous repair services	76	1.0
Motion pictures	78	1.0
Leather and leather products	31	0.7
Electric, gas, and sanitary services	49	0.7
Tobacco products	21	0.6
OVERALL		**0.3**
1996		
Coal mining	12	8.6
Primary metal industries	33	2.2
Local and interurban passenger transit	41	1.7
Chemical and allied products	28	1.1
Transportation equipment	37	1.0
Electric, gas, and sanitary services	49	0.9
Lumber and wood products	24	0.9
Nonmetallic minerals, except fuels	14	0.9
Stone, clay, and glass products	32	0.9
Transportation by air	45	0.6
OVERALL		**0.4**

SIC - 1987 Standard Industrial Classification

NOTE: Dust diseases of the lungs (pneumoconioses) include silicosis, asbestosis, coal workers' pneumoconiosis, byssinosis, siderosis, and other pneumoconioses. See appendices for source description.

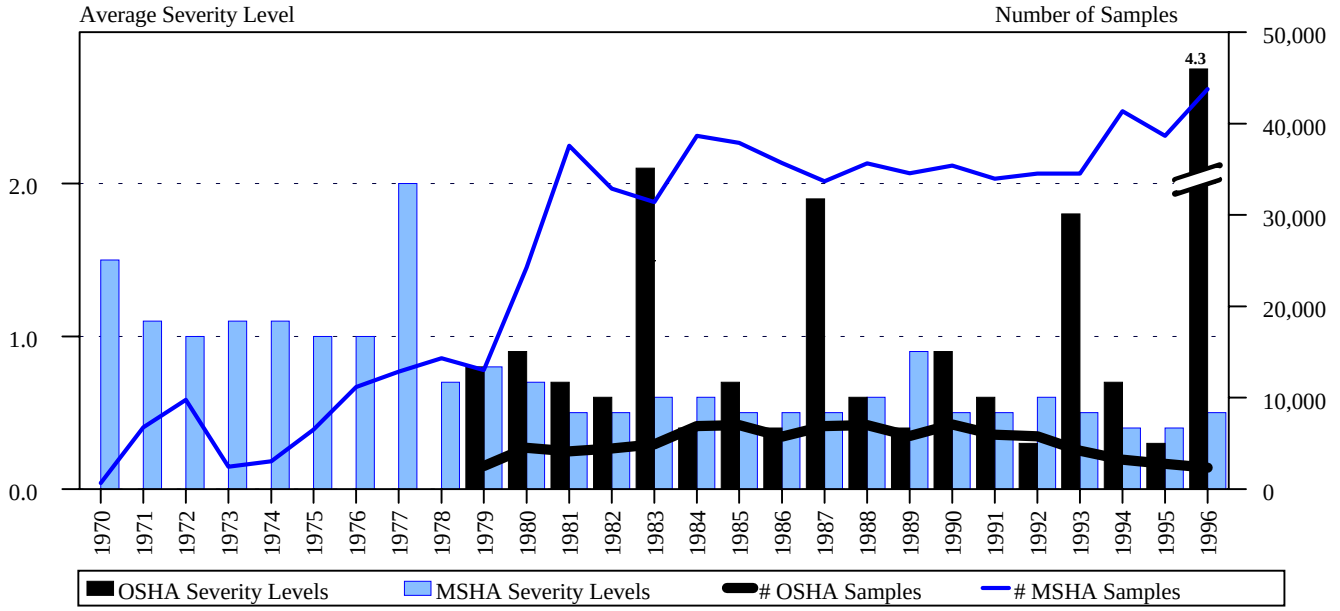
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Figure 6-3. Pneumoconiotic agents: Number of MSHA and OSHA inspector samples and percent exceeding the permissible exposure limit (PEL), 1970-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Figure 6-4. Pneumoconiotic agents: Number of MSHA and OSHA inspector samples and average severity levels, 1970-1996



NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 6-14. Pneumoconiotic agents: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently recorded on death certificates with any pneumoconiosis, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	238,993	57.2	10.8	0.51
060	Construction	4,471	1.1	7.6	1.69
270	Blast furnaces, steelworks, rolling and finishing mills	1,041	0.2	2.3	0.71
360	Ship and boat building and repairing	601	0.1	7.3	0.41
392	Not specified manufacturing industries	0	0.0	-	-
192	Industrial and miscellaneous chemicals	527	0.1	7.4	0.65
262	Miscellaneous nonmetallic mineral and stone products	740	0.2	19.3	0.97
040	Metal mining	15,985	3.8	9.6	0.53
400	Railroads	96	0.0	2.1	0.08
961	Non-paid worker or non-worker	0	0.0	-	-
	All other industries	154,625	37.0	6.6	0.70
	Industry not reported	76	0.0	7.9	0.31
	TOTAL	**417,155**	**100.0**	**9.1**	**0.60**

CIC - Census Industry Code - indicates incalculable field

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 6-15. Pneumoconiotic agents: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1987-1996

CIC	Industries most frequently sampled, 1987-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	238,993	57.3	10.8	0.51
050	Nonmetallic mining and quarrying, except fuel	111,078	26.6	7.4	0.60
040	Metal mining	15,985	3.8	9.6	0.53
280	Other primary metal industries	5,151	1.2	2.2	2.33
060	Construction	4,471	1.1	7.6	1.69
271	Iron and steel foundries	4,277	1.0	10.3	0.70
282	Fabricated structural metal products	3,732	0.9	3.9	1.90
351	Motor vehicles and motor vehicle equipment	3,168	0.8	3.2	0.97
300	Miscellaneous fabricated metal products	3,122	0.7	4.8	2.40
331	Machinery, except electrical, n.e.c.	2,751	0.7	2.1	0.15
	All other industries	24,351	5.8	4.5	0.48
	Industry not reported	76	0.0	7.9	0.31
	TOTAL	**417,155**	**100.0**	**9.1**	**0.60**

CIC - Census Industry Code n.e.c. - not elsewhere classified

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 6-16. Pneumoconiotic agents: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently recorded on death certificates with any pneumoconiosis, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	48,117	55.0	10.2	0.47
060	Construction	480	0.5	12.7	7.74
270	Blast furnaces, steelworks, rolling and finishing mills	90	0.1	2.2	0.09
392	Not specified manufacturing industries	0	0.0	-	-
192	Industrial and miscellaneous chemicals	84	0.1	3.6	0.28
400	Railroads	0	0.0	-	-
040	Metal mining	5,251	6.0	3.8	0.51
360	Ship and boat building and repairing	31	0.0	0.0	0.19
262	Miscellaneous nonmetallic mineral and stone products	63	0.1	17.5	0.42
842	Elementary and secondary schools	36	0.0	0.0	0.02
	All other industries	33,354	38.1	5.1	0.61
	Industry not reported	7	0.0	0.0	0.08
	TOTAL	**87,513**	**100.0**	**7.8**	**0.57**

CIC - Census Industry Code - indicates incalculable field

NOTE: Percentage of total samples may not sum 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, agents, and list of selected states (and years) for which usual industry has been reported.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System. National Center for Health Statistics: multiple cause of death data.

Table 6-17. Pneumoconiotic agents: Number and percent of MSHA and OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity level, by industry, 1995-1996

CIC	Industries most frequently sampled, 1995-1996	Number of samples	% of total samples	% > PEL	Average severity
041	Coal mining	48,117	55.0	10.2	0.47
050	Nonmetallic mining and quarrying, except fuel	29,038	33.2	5.2	0.45
040	Metal mining	5,251	6.0	3.8	0.51
060	Construction	480	0.5	12.7	7.74
300	Miscellaneous fabricated metal products	392	0.4	8.9	7.96
282	Fabricated structural metal products	387	0.4	3.4	0.61
280	Other primary metal industries	379	0.4	3.2	0.23
351	Motor vehicles and motor vehicle equipment	328	0.4	2.7	6.09
271	Iron and steel foundries	302	0.3	20.9	1.46
331	Machinery, except electrical, n.e.c.	292	0.3	1.4	0.06
	All other industries	2,540	2.9	2.6	0.56
	Industry not reported	7	0.0	0.0	0.08
	TOTAL	**87,513**	**100.0**	**7.8**	**0.57**

CIC - Census Industry Code n.e.c. - not elsewhere classified

NOTE: Percentage of total samples may not sum to 100% due to rounding. See appendices for source description, methods, ICD codes, industry codes, and agents.

SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data. Occupational Safety and Health Administration: Integrated Management Information System.

Table 6-18 (page 1 of 2). Pneumoconiotic agents: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	5,908	0.53	12.4	2.03	11,426	0.47	9.6	2.00	2,650	0.41	7.5	1.77
Alaska	118	0.58	10.2	3.26	435	0.80	6.7	10.55	164	0.91	6.1	13.59
Arizona	3,363	1.22	14.7	6.75	4,176	0.43	9.1	3.08	2,207	0.23	4.8	2.92
Arkansas	753	1.14	25.2	3.71	1,887	7.41	13.2	54.93	490	1.16	6.3	16.49
California	2,298	1.46	14.4	8.50	5,706	0.55	9.3	3.90	1,325	0.68	6.9	7.53
Colorado	5,608	0.68	17.6	2.46	6,857	0.61	14.4	2.24	1,148	0.52	10.0	2.27
Connecticut	441	0.76	20.2	2.75	536	0.28	5.8	2.51	198	0.12	2.0	1.36
Delaware	20	0.16	0.0	-	62	0.30	3.2	2.92	24	0.38	8.3	2.92
District of Columbia	0	-	-	-	0	-	-	-	0	-	-	-
Florida	1,329	3.72	5.0	72.12	2,139	0.13	1.9	2.51	592	0.08	1.2	1.97
Georgia	2,435	0.52	11.0	2.58	3,918	0.41	8.3	3.10	782	0.27	5.0	2.32
Hawaii	2	0.50	0.0	-	374	0.11	1.1	4.69	229	0.07	0.4	1.20
Idaho	1,774	1.09	11.6	7.51	2,179	0.52	7.8	4.68	738	0.45	4.5	7.22
Illinois	10,582	0.69	13.4	2.86	15,472	0.49	10.0	1.70	2,984	0.47	11.6	1.57
Indiana	4,898	0.30	4.2	2.73	5,282	0.34	6.2	2.28	1,162	0.26	5.7	1.57
Iowa	1,127	0.42	7.8	2.49	1,628	0.20	4.0	1.76	414	0.12	0.7	1.61
Kansas	1,730	0.50	12.1	1.99	1,760	0.37	7.7	2.49	457	0.24	6.1	1.69
Kentucky	44,381	0.56	12.1	2.43	70,400	0.55	12.2	2.27	15,250	0.50	11.0	1.86
Louisiana	394	0.58	9.4	4.63	2,632	0.16	3.1	2.33	733	0.16	2.7	2.20
Maine	361	0.55	13.9	1.96	403	0.26	4.0	1.66	175	0.25	3.4	1.69
Maryland	1,535	0.49	9.0	2.68	2,424	0.34	5.4	2.33	907	0.34	5.7	2.13
Massachusetts	456	1.60	16.2	8.18	827	0.31	6.3	2.37	258	0.20	2.7	1.65
Michigan	2,272	3.90	8.1	45.81	4,181	0.41	9.0	2.82	1,115	0.22	4.9	1.71
Minnesota	4,574	0.34	5.4	3.18	4,100	0.32	7.0	2.42	1,018	0.18	3.0	2.40
Mississippi	377	0.27	4.2	2.09	1,247	0.30	6.0	2.70	340	0.22	4.4	1.76
Missouri	3,481	1.02	11.1	7.20	6,080	0.78	7.6	7.89	1,299	0.16	2.4	1.58
Montana	2,039	0.40	8.7	2.48	2,864	0.53	10.4	3.35	514	0.35	8.8	2.09

See footnotes at end of table.

Table 6-18 (page 2 of 2). Pneumoconiotic agents: Number of MSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1977-1996

	1977-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	125	0.34	5.6	3.69	642	0.16	2.6	1.99	217	0.13	2.8	1.45
Nevada	1,046	2.09	22.7	8.21	2,620	0.73	16.7	3.11	703	0.58	12.5	3.24
New Hampshire	147	1.01	19.0	3.57	348	0.31	7.2	1.47	132	0.32	8.3	1.45
New Jersey	907	0.74	16.6	2.94	1,467	0.45	10.2	2.58	374	0.22	4.0	1.58
New Mexico	2,092	0.51	10.1	3.28	3,672	0.62	10.2	4.26	1,027	0.68	5.6	9.83
New York	2,004	0.42	9.9	2.24	5,068	0.35	5.5	3.53	1,622	0.22	4.1	1.93
North Carolina	3,286	0.65	8.3	5.52	4,952	0.45	5.1	6.35	917	0.72	3.5	16.91
North Dakota	613	0.34	6.2	2.35	730	0.17	1.2	1.48	166	0.19	1.8	1.93
Ohio	12,813	0.57	12.0	2.45	14,999	0.36	6.3	2.25	2,895	0.31	5.4	2.18
Oklahoma	2,474	0.53	10.7	3.38	4,505	0.64	7.2	6.57	1,026	0.94	4.2	19.39
Oregon	321	0.32	5.0	3.22	2,348	0.98	3.6	23.80	750	0.24	1.6	8.60
Pennsylvania	38,916	0.46	8.5	2.24	30,836	0.41	7.6	2.10	8,759	0.36	6.2	1.83
Rhode Island	52	0.99	25.0	2.71	112	0.56	12.5	3.27	32	0.65	15.6	3.53
South Carolina	1,117	2.62	19.5	12.23	3,472	0.32	5.6	3.58	797	0.42	3.8	8.07
South Dakota	1,673	0.67	12.4	3.35	1,749	0.41	5.6	4.95	621	0.18	3.7	2.21
Tennessee	7,785	0.44	8.0	2.31	9,432	0.44	9.2	2.44	1,702	0.50	9.9	3.00
Texas	2,246	0.75	8.7	6.49	9,718	0.71	5.1	11.60	2,211	1.22	3.3	33.40
Utah	3,738	0.75	17.4	2.60	7,619	0.60	14.3	2.22	1,540	0.47	10.6	2.08
Vermont	860	0.51	12.3	1.84	1,043	0.58	16.8	2.35	309	0.54	17.8	1.89
Virginia	30,589	0.53	11.7	2.20	30,614	0.54	12.5	2.17	5,378	0.47	10.6	1.99
Washington	1,031	0.58	12.5	3.13	2,405	1.04	7.4	12.00	756	2.22	3.7	55.69
West Virginia	57,663	0.55	12.0	2.08	62,388	0.51	10.3	2.07	11,579	0.50	11.2	1.86
Wisconsin	2,023	0.45	8.0	3.15	3,005	0.46	9.2	3.14	808	0.23	4.1	1.76
Wyoming	2,779	1.07	14.3	5.68	3,326	0.49	10.3	2.88	914	0.64	9.0	5.14
TOTAL	**278,556**	**0.63**	**11.3**	**3.21**	**366,065**	**0.54**	**9.7**	**3.07**	**82,408**	**0.47**	**8.0**	**3.06**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Mine Safety and Health Administration: respirable coal mine dust data, respirable coal mine quartz data, and metal/nonmetal mine inspection data.

Table 6-19 (page 1 of 2). Pneumoconiotic agents: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Alabama	468	0.77	20.7	2.95	729	0.53	6.2	7.23	25	0.12	0.0	-
Alaska	169	0.27	1.8	14.83	74	0.19	5.4	2.49	1	0.03	0.0	-
Arizona	134	0.09	2.2	2.14	149	0.38	4.7	6.47	4	1.43	25.0	5.70
Arkansas	218	0.86	7.3	10.80	646	0.20	4.2	3.32	48	0.07	0.0	-
California	19	0.02	0.0	-	1,506	2.05	3.5	56.84	42	0.11	0.0	-
Colorado	1,819	0.67	3.6	16.87	2,201	4.49	2.5	178.00	72	0.23	1.4	12.29
Connecticut	489	0.34	7.4	3.11	1,111	0.26	3.1	7.36	23	0.01	0.0	-
Delaware	50	0.16	4.0	1.77	53	0.06	1.9	1.90	0	-	-	-
District of Columbia	61	0.08	1.6	2.04	47	1.96	8.5	22.75	0	-	-	-
Florida	195	1.09	7.7	13.16	1,127	0.12	2.2	4.16	30	0.02	0.0	-
Georgia	855	0.68	19.3	2.85	2,475	1.77	4.2	41.08	61	49.54	19.7	251.45
Hawaii	21	0.00	0.0	-	14	0.70	7.1	9.79	5	1.97	20.0	9.79
Idaho	44	1.78	9.1	19.10	723	0.11	1.1	5.64	2	0.00	0.0	-
Illinois	1,820	0.65	6.3	9.43	3,906	0.44	2.3	16.76	466	0.12	3.0	2.39
Indiana	458	0.41	10.0	2.36	723	0.34	3.7	6.17	122	0.47	0.8	48.65
Iowa	1,113	0.33	4.9	3.49	867	0.34	6.6	3.34	46	0.30	4.3	2.80
Kansas	292	0.24	5.8	2.59	288	0.11	1.7	3.85	24	0.08	0.0	-
Kentucky	478	1.12	12.8	7.99	876	1.28	4.9	24.99	302	0.10	2.3	3.25
Louisiana	229	0.21	4.4	2.62	441	0.13	2.7	3.17	5	0.19	0.0	-
Maine	128	0.38	10.9	2.47	119	0.52	3.4	13.83	0	-	-	-
Maryland	246	0.73	11.0	5.85	646	2.39	9.4	24.28	48	22.19	12.5	176.94
Massachusetts	1,115	0.43	9.3	3.53	2,388	0.11	2.3	3.18	184	0.23	4.9	3.12
Michigan	14	0.00	0.0	-	2,342	3.42	4.1	81.53	574	4.48	2.4	181.69
Minnesota	59	1.17	35.6	2.59	80	0.01	0.0	-	0	-	-	-
Mississippi	108	0.42	6.5	4.93	487	4.31	3.9	109.44	46	37.50	2.2	1725.00
Missouri	696	0.28	6.2	3.81	829	3.10	3.5	86.26	13	26.23	30.8	85.25
Montana	704	0.24	2.0	8.64	444	0.47	8.1	5.04	25	1.99	16.0	12.39

See footnotes at end of table.

Table 6-19 (page 2 of 2). Pneumoconiotic agents: Number of OSHA inspector samples, percent exceeding the permissible exposure limit (PEL) and average severity levels, by state, 1982-1996

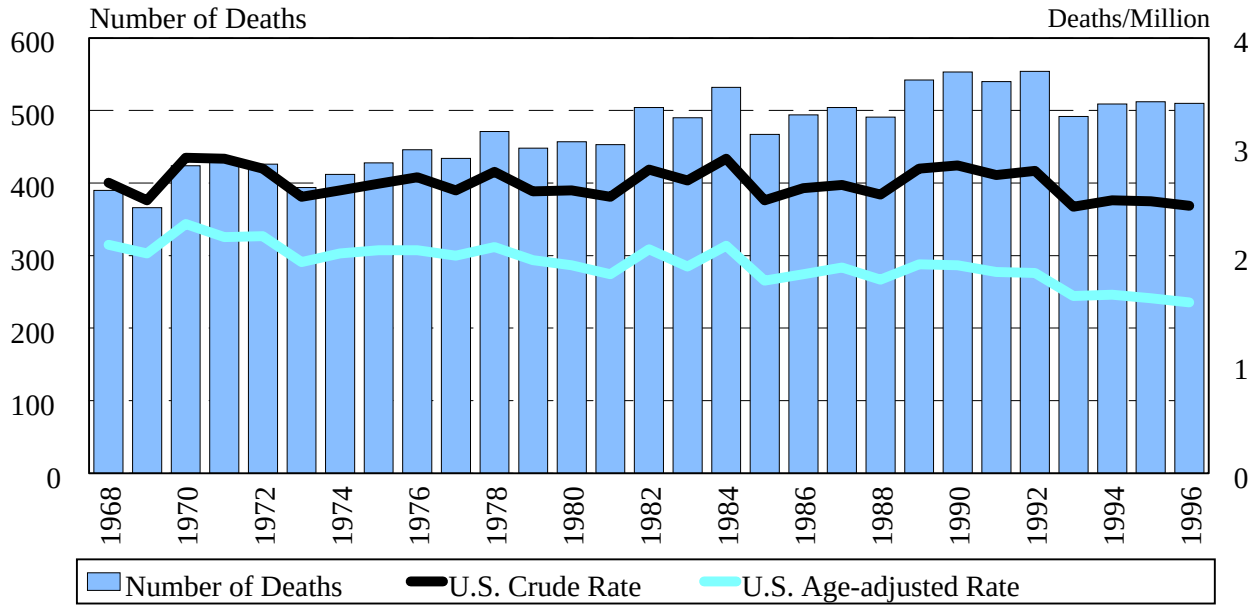
	1982-1986				1987-1996				1995-1996			
	Total samples		Samples > PEL		Total samples		Samples > PEL		Total samples		Samples > PEL	
State	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.	Number	Avg. Sev.	%	Avg. Sev.
Nebraska	175	0.11	1.7	3.07	517	0.17	5.4	2.23	33	0.03	0.0	-
Nevada	101	7.05	19.8	35.04	203	1.64	33.5	4.64	16	0.40	18.8	1.64
New Hampshire	534	0.37	7.1	3.74	449	0.14	2.4	3.51	15	0.70	20.0	3.25
New Jersey	842	0.49	7.8	4.94	1,390	1.11	6.9	15.19	91	1.81	4.4	39.95
New Mexico	2	1.95	100.0	1.95	34	0.21	5.9	2.24	3	1.73	66.7	2.24
New York	1,182	0.34	9.3	2.71	2,619	0.30	3.2	7.64	410	0.38	2.7	12.23
North Carolina	610	13.68	12.8	104.87	1,726	0.40	6.0	5.03	512	0.20	4.5	2.85
North Dakota	400	0.23	3.8	3.66	244	0.15	2.5	1.53	12	0.16	8.3	1.33
Ohio	3,293	0.46	8.0	4.47	4,539	0.48	4.8	9.03	194	3.57	12.9	27.17
Oklahoma	1,238	0.22	2.8	5.42	1,168	1.07	1.9	54.55	65	0.07	0.0	-
Oregon	455	0.67	7.5	6.57	248	2.22	7.7	28.07	58	0.23	1.7	10.50
Pennsylvania	2,211	0.71	13.2	4.13	2,224	0.74	11.3	5.53	199	0.87	15.6	4.50
Rhode Island	512	0.71	8.4	7.38	101	0.65	9.9	5.70	8	0.01	0.0	-
South Carolina	447	0.17	3.6	2.29	799	0.44	5.8	6.07	187	0.17	2.1	3.56
South Dakota	356	0.06	0.6	1.19	323	0.16	4.6	2.17	65	0.19	6.2	2.71
Tennessee	191	0.81	15.2	4.32	557	1.67	7.9	19.66	111	2.91	14.4	19.13
Texas	2,149	0.36	6.0	4.80	3,631	0.85	4.9	16.47	405	0.09	1.7	3.84
Utah	11	0.71	27.3	2.58	81	0.24	3.7	2.83	14	0.17	0.0	-
Vermont	0	-	-	-	3	0.10	0.0	-	0	-	-	-
Virginia	355	0.64	12.7	3.64	251	0.91	17.5	4.17	0	-	-	-
Washington	4	0.21	0.0	-	437	1.19	18.5	5.84	145	1.32	18.6	6.41
West Virginia	529	0.95	12.5	6.66	442	0.20	4.8	3.30	0	-	-	-
Wisconsin	1,379	0.39	8.1	3.56	3,805	0.27	5.4	3.29	393	0.20	6.4	2.18
Wyoming	23	0.27	4.3	2.57	8	0.11	0.0	-	1	0.00	0.0	-
TOTAL	**29,001**	**0.79**	**8.1**	**8.52**	**51,090**	**1.02**	**4.8**	**19.95**	**5,105**	**2.16**	**5.2**	**40.53**

Avg. Sev. - Average Severity - indicates incalculable field.
NOTE: See appendices for source description, methods, and agents.
SOURCE: Occupational Safety and Health Administration: Integrated Management Information System.

Section 7

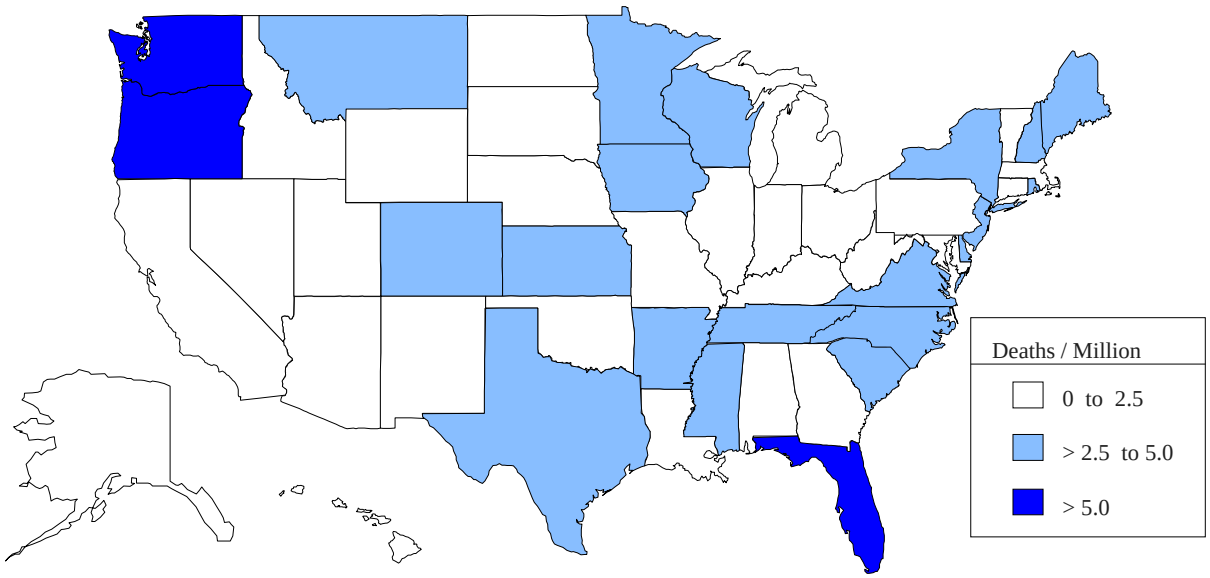
MALIGNANT NEOPLASM OF THE PLEURA

Figure 7-1. Malignant neoplasm of the pleura: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1968-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 7-2. Malignant neoplasm of the pleura: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 7-1. Malignant neoplasm of the pleura: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	Median Age (yrs)
1987	390	114	473	28	3	-	5	9	39	106	180	122	43	504	70.0
1988	368	123	461	26	4	-	2	7	32	102	178	131	39	491	71.0
1989	404	138	500	37	5	-	6	13	30	97	202	155	39	542	70.0
1990	433	120	523	27	3	1	3	9	37	90	205	164	44	553	72.0
1991	426	114	508	25	7	-	1	11	35	87	216	140	50	540	72.0
1992	426	128	521	27	6	-	3	14	36	89	193	164	55	554	71.0
1993	362	130	463	27	2	1	4	13	27	74	192	142	39	492	72.0
1994	371	138	475	30	4	1	-	11	36	81	173	159	48	509	72.0
1995	385	127	484	22	6	-	2	6	21	90	181	160	52	512	73.0
1996	381	129	481	23	6	-	-	5	38	69	183	169	46	510	73.0
Total	**3,946**	**1,261**	**4,889**	**272**	**46**	**3**	**26**	**98**	**331**	**885**	**1,903**	**1,506**	**455**	**5,207**	**72.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 7-2. Malignant neoplasm of the pleura: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	Overall rate	Males	Females	Males	Females
	Crude mortality rate				
1987	2.65	4.71	1.22	1.82	0.86
1988	2.56	4.34	1.39	2.10	0.43
1989	2.80	4.75	1.43	2.17	1.26
1990	2.83	5.13	1.31	1.95	0.58
1991	2.74	4.99	1.22	1.63	0.66
1992	2.78	4.90	1.40	1.98	0.49
1993	2.45	4.15	1.39	1.85	0.56
1994	2.51	4.18	1.46	2.01	0.63
1995	2.50	4.35	1.36	1.70	0.23
1996	2.46	4.29	1.32	1.14	0.76
1987-1996	**2.62**	**4.56**	**1.35**	**1.82**	**0.64**
	Age-adjusted mortality rate				
1987	1.89	3.61	0.70	1.93	0.73
1988	1.78	3.24	0.82	2.25	0.47
1989	1.92	3.47	0.87	2.28	1.01
1990	1.91	3.72	0.73	2.02	0.40
1991	1.85	3.58	0.69	1.77	0.38
1992	1.84	3.44	0.78	1.99	0.46
1993	1.63	2.88	0.82	1.95	0.50
1994	1.64	2.91	0.80	2.16	0.38
1995	1.61	2.97	0.74	1.78	0.15
1996	1.57	2.87	0.74	1.22	0.65
1987-1996	**1.75**	**3.24**	**0.77**	**1.91**	**0.51**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 7-3. Malignant neoplasm of the pleura: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	1,515	1,015	310	95	80
1988	1,235	770	345	90	30
1989	1,470	825	445	100	100
1990	1,380	955	230	135	45
1991	1,270	835	265	105	25
1992	1,440	885	310	190	50
1993	1,285	750	345	80	105
1994	1,265	785	330	145	-
1995	985	600	265	70	15
1996	1,040	655	285	55	40
Total	**12,885**	**8,075**	**3,130**	**1,065**	**490**
	Years of potential life lost to life expectancy				
1987	7,572	4,931	1,559	247	197
1988	7,079	4,320	1,822	293	103
1989	7,997	4,807	2,030	306	264
1990	7,964	5,215	1,664	297	116
1991	7,826	5,163	1,610	260	98
1992	8,087	5,056	1,858	366	128
1993	7,177	4,294	1,949	260	189
1994	7,293	4,422	1,936	341	81
1995	7,031	4,418	1,770	245	43
1996	7,056	4,434	1,773	182	163
Total	**75,082**	**47,059**	**17,971**	**2,797**	**1,380**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 7-4. Malignant neoplasm of the pleura: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	8	6	4	4	2	7	3	8	2	2	**46**
Alaska	-	-	2	-	-	1	1	-	-	-	**4**
Arizona	7	6	7	2	4	6	6	5	5	9	**57**
Arkansas	6	6	6	6	3	4	8	9	2	5	**55**
California	48	43	42	47	52	53	42	43	50	42	**462**
Colorado	7	8	19	9	10	6	-	2	4	6	**71**
Connecticut	5	5	3	6	5	2	5	3	4	4	**42**
Delaware	1	-	2	2	4	2	2	-	1	1	**15**
District of Columbia	1	-	2	1	2	-	2	-	-	-	**8**
Florida	58	55	53	59	62	63	61	76	70	78	**635**
Georgia	4	5	2	9	3	5	5	7	7	1	**48**
Hawaii	2	1	3	-	2	4	3	2	4	-	**21**
Idaho	3	1	-	1	3	3	2	1	1	1	**16**
Illinois	21	30	22	23	20	14	17	14	21	17	**199**
Indiana	11	8	8	11	6	9	9	5	7	3	**77**
Iowa	10	6	10	9	9	14	14	12	9	9	**102**
Kansas	7	10	7	4	7	7	5	7	3	10	**67**
Kentucky	5	10	7	4	7	6	6	6	9	11	**71**
Louisiana	4	2	8	4	4	4	12	8	8	8	**62**
Maine	3	5	4	2	1	7	5	2	1	5	**35**
Maryland	5	4	11	6	8	8	7	5	10	6	**70**
Massachusetts	6	10	11	12	12	8	4	11	12	9	**95**
Michigan	17	20	16	14	17	17	8	13	19	8	**149**
Minnesota	9	15	11	13	6	7	5	9	8	10	**93**
Mississippi	2	6	8	4	4	7	1	13	6	7	**58**
Missouri	8	5	5	10	12	2	3	3	6	5	**59**
Montana	2	3	3	2	-	2	2	2	-	-	**16**
Nebraska	2	2	2	2	1	4	2	3	5	1	**24**
Nevada	-	-	2	4	1	1	-	-	2	1	**11**
New Hampshire	-	1	1	1	1	5	6	7	3	6	**31**
New Jersey	17	22	19	21	15	22	17	15	14	16	**178**
New Mexico	1	2	2	4	1	-	4	-	5	4	**23**
New York	65	45	48	50	43	51	33	42	28	31	**436**
North Carolina	20	19	19	22	13	5	8	12	11	10	**139**
North Dakota	1	-	2	2	1	1	1	1	1	2	**12**
Ohio	19	12	21	15	19	22	22	14	19	20	**183**
Oklahoma	3	6	3	6	3	3	9	4	7	7	**51**
Oregon	9	18	13	19	21	10	9	11	9	9	**128**
Pennsylvania	31	19	26	19	23	21	28	23	22	23	**235**
Rhode Island	3	2	1	-	1	5	3	3	2	3	**23**
South Carolina	7	10	5	15	7	19	5	7	9	6	**90**
South Dakota	1	-	-	1	1	-	-	1	1	1	**6**
Tennessee	9	9	10	7	15	16	13	12	11	19	**121**
Texas	11	10	23	48	40	57	47	47	54	54	**391**
Utah	2	1	3	3	-	3	2	1	-	1	**16**
Vermont	-	2	1	-	1	-	1	2	2	-	**9**
Virginia	10	8	17	8	13	21	24	12	11	6	**130**
Washington	24	15	32	31	38	9	12	15	12	18	**206**
West Virginia	2	6	4	2	2	-	-	3	2	-	**21**
Wisconsin	7	12	12	9	15	11	6	8	12	15	**107**
Wyoming	-	-	-	-	-	-	2	-	1	-	**3**
TOTAL	**504**	**491**	**542**	**553**	**540**	**554**	**492**	**509**	**512**	**510**	**5,207**

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 7-5. Malignant neoplasm of the pleura: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	46	32	1.43	45	0.89	45	623	32	13.5	37
Alaska	4	50	0.94	49	1.14	41	97	49	24.1	1
Arizona	57	28	1.93	37	1.16	39	719	31	12.6	48
Arkansas	55	29	2.96	11	1.75	20	789	27	14.3	28
California	462	2	1.93	38	1.45	31	6,627	2	14.3	29
Colorado	71	21	2.67	19	2.15	11	1,037	23	14.6	24
Connecticut	42	33	1.58	42	0.90	44	551	33	13.1	42
Delaware	15	44	2.76	17	2.01	15	264	41	17.6	2
District of Columbia	8	48	1.60	41	1.15	40	109	48	13.6	36
Florida	635	1	5.77	1	2.94	3	8,677	1	13.7	35
Georgia	48	31	0.92	50	0.73	49	740	30	15.4	13
Hawaii	21	39	2.32	26	1.64	24	290	40	13.8	32
Idaho	16	41	2.05	30	1.20	36	190	44	11.9	49
Illinois	199	7	2.20	27	1.47	30	2,870	7	14.4	27
Indiana	77	20	1.75	40	1.17	37	1,123	20	14.6	25
Iowa	102	16	4.68	4	2.64	4	1,412	16	13.8	31
Kansas	67	24	3.47	7	2.27	7	981	25	14.6	23
Kentucky	71	21	2.43	25	1.69	22	1,075	21	15.1	15
Louisiana	62	25	1.93	36	1.51	27	1,045	22	16.9	6
Maine	35	34	3.58	5	2.21	9	461	35	13.2	41
Maryland	70	23	1.80	39	1.17	38	824	26	11.8	50
Massachusetts	95	17	1.96	34	1.21	35	1,264	19	13.3	40
Michigan	149	10	2.04	31	1.51	28	2,370	10	15.9	9
Minnesota	93	18	2.70	18	1.84	17	1,386	17	14.9	19
Mississippi	58	27	2.95	12	2.15	12	1,007	24	17.4	4
Missouri	59	26	1.46	44	0.81	47	758	29	12.8	46
Montana	16	41	2.59	20	1.75	19	236	42	14.8	21
Nebraska	24	36	1.96	35	1.07	42	314	38	13.1	43
Nevada	11	46	1.05	48	0.76	48	152	46	13.8	33
New Hampshire	31	35	3.54	6	2.58	5	482	34	15.5	11
New Jersey	178	9	2.84	14	1.84	16	2,580	9	14.5	26
New Mexico	23	37	1.97	33	1.62	26	403	36	17.5	3
New York	436	3	3.02	10	2.02	13	6,595	3	15.1	16
North Carolina	139	11	2.56	22	1.82	18	2,095	11	15.1	17
North Dakota	12	45	2.47	23	1.48	29	162	45	13.5	38
Ohio	183	8	2.13	28	1.41	32	2,701	8	14.8	20
Oklahoma	51	30	2.06	29	1.33	34	788	28	15.5	12
Oregon	128	13	5.53	2	3.18	2	1,637	14	12.8	47
Pennsylvania	235	5	2.45	24	1.36	33	3,161	5	13.5	39
Rhode Island	23	37	2.82	15	1.63	25	300	39	13.1	44
South Carolina	90	19	3.21	8	2.31	6	1,345	18	14.9	18
South Dakota	6	49	1.13	47	0.51	51	65	50	10.8	51
Tennessee	121	14	3.07	9	2.21	10	1,898	13	15.7	10
Texas	391	4	2.93	13	2.25	8	5,737	4	14.7	22
Utah	16	41	1.30	46	0.94	43	209	43	13.0	45
Vermont	9	47	2.01	32	1.64	23	148	47	16.5	7
Virginia	130	12	2.57	21	2.02	14	1,996	12	15.4	14
Washington	206	6	5.19	3	3.71	1	2,934	6	14.2	30
West Virginia	21	39	1.46	43	0.89	46	338	37	16.1	8
Wisconsin	107	15	2.77	16	1.72	21	1,466	15	13.7	34
Wyoming	3	51	0.87	51	0.70	50	52	51	17.2	5

NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 7-6. Malignant neoplasm of the pleura: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
914	Homemaker	142	10.6
019	Managers and administrators, n.e.c.	90	6.7
585	Plumbers, pipefitters, and steamfitters	45	3.4
243	Supervisors and proprietors, sales occupations	43	3.2
889	Laborers, except construction	42	3.1
633	Supervisors, production occupations	35	2.6
575	Electricians	30	2.2
473	Farmers, except horticulture	27	2.0
567	Carpenters	27	2.0
637	Machinists	26	1.9
	All other occupations	792	59.2
	Occupation not reported	39	2.9
	TOTAL	**1,338**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 7-7. Malignant neoplasm of the pleura: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
060	Construction	172	12.9
961	Non-paid worker or non-worker	147	11.0
360	Ship and boat building and repairing	38	2.8
842	Elementary and secondary schools	32	2.4
400	Railroads	29	2.2
901	General government, n.e.c.	28	2.1
142	Yarn, thread, and fabric mills	24	1.8
831	Hospitals	22	1.6
010	Agricultural production, crops	21	1.6
270	Blast furnaces, steelworks, rolling and finishing mills	20	1.5
410	Trucking service	20	1.5
641	Eating and drinking places	20	1.5
	All other industries	725	54.2
	Industry not reported	40	3.0
	TOTAL	**1,338**	**100.0**

CIC - Census Industry Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 7-8. Malignant neoplasm of the pleura: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
593	Insulation workers	9	23.08	10.59	43.80
643	Boilermakers	11	15.37	7.68	27.50
584	Plasterers	5	11.61	3.76	27.13
653	Sheet metal workers	23	10.35	6.55	15.54
585	Plumbers, pipefitters, and steamfitters	45	7.02	5.12	9.40
696	Stationary engineers	15	4.41	2.46	7.28
575	Electricians	30	3.91	2.64	5.59
547	Specified mechanics and repairers, n.e.c.	8	3.79	1.63	7.46
766	Furnace, kiln, and oven operators, except food	7	3.70	1.49	7.63
059	Engineers, n.e.c.	5	3.67	1.19	8.57
213	Electrical and electronic technicians	6	3.65	1.34	7.95
783	Welders and cutters	23	3.33	2.11	5.00
503	Supervisors, mechanics and repairers	8	3.31	1.43	6.52
544	Millwrights	6	3.02	1.11	6.58
057	Mechanical engineers	7	2.81	1.13	5.79
055	Electrical and electronic engineers	9	2.54	1.17	4.82
579	Painters, construction and maintenance	14	2.26	1.23	3.79
633	Supervisors, production occupations	35	2.13	1.48	2.96
558	Supervisors, construction, n.e.c.	14	1.92	1.05	3.22
637	Machinists	26	1.92	1.25	2.82
796	Production inspectors, checkers, and examiners	14	1.85	1.01	3.10
019	Managers and administrators, n.e.c.	61	1.73	1.32	2.23
567	Carpenters	27	1.55	1.02	2.26

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 7-9. Malignant neoplasm of the pleura: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

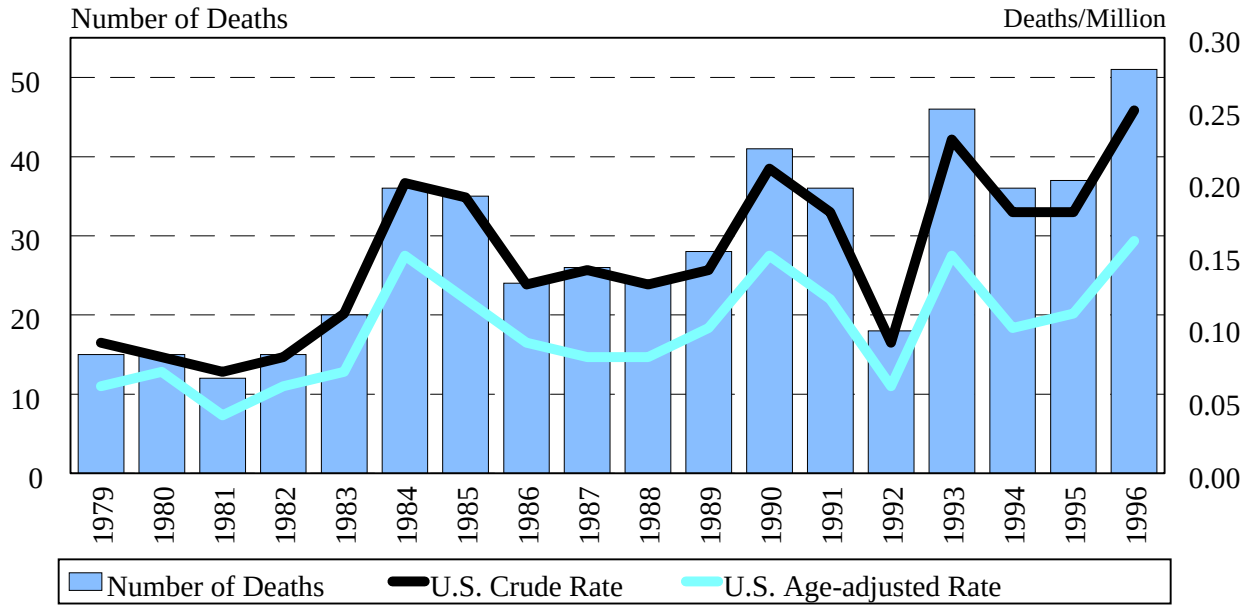
CIC	Industry	Number of deaths	PMR	95% confidence interval LCL	UCL
360	Ship and boat building and repairing	38	12.60	8.75	17.52
200	Petroleum refining	16	5.76	3.29	9.35
262	Miscellaneous nonmetallic mineral and stone products	6	4.12	1.51	8.98
470	Water supply and irrigation	7	3.69	1.48	7.61
921	Public finance, taxation, and monetary policy	7	3.08	1.24	6.35
420	Water transportation	9	3.07	1.41	5.83
460	Electric light and power	18	3.06	1.81	4.83
282	Fabricated structural metal products	11	3.03	1.51	5.42
882	Engineering, architectural, and surveying services	10	2.97	1.43	5.46
211	Other rubber products, and plastics footwear and belting	9	2.83	1.30	5.37
280	Other primary metal industries	7	2.80	1.12	5.77
640	Household appliances, TV, and radio stores	9	2.45	1.12	4.65
160	Pulp, paper, and paperboard mills	15	2.44	1.36	4.03
192	Industrial and miscellaneous chemicals	16	2.38	1.36	3.86
400	Railroads	29	2.03	1.36	2.92
060	Construction	172	2.01	1.72	2.35
352	Aircraft and parts	11	2.01	1.01	3.60

CIC - Census Industry Code LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Section 8

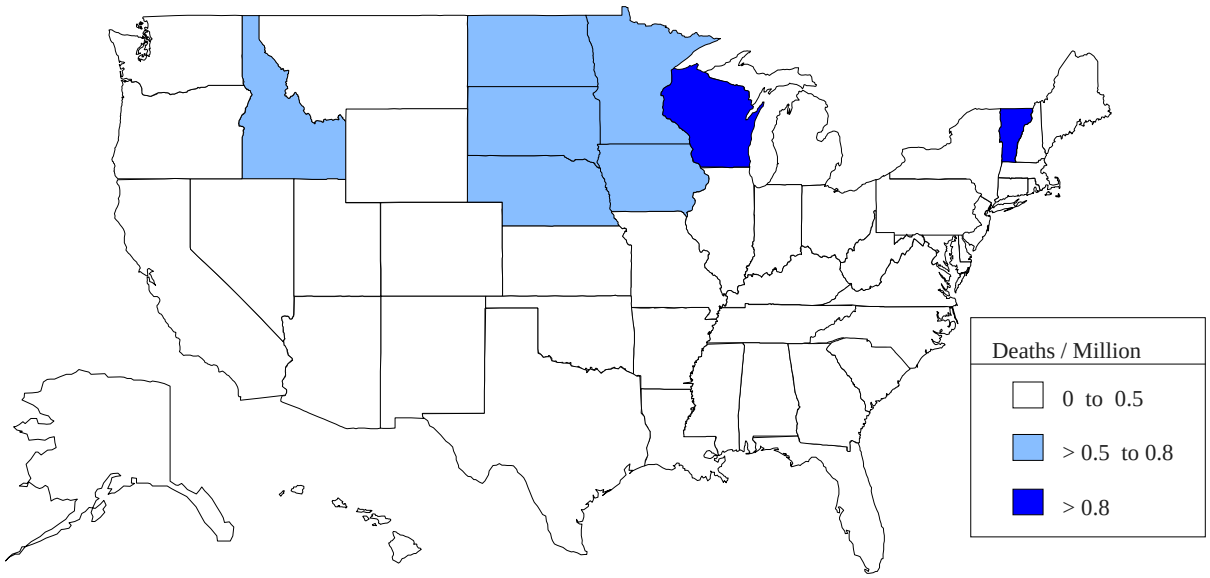
HYPERSENSITIVITY PNEUMONITIS

Figure 8-1. Hypersensitivity pneumonitis: Number of deaths, crude and age-adjusted mortality rates, U.S. residents age 15 and over, 1979-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Figure 8-2. Hypersensitivity pneumonitis: Crude mortality rates by state, U.S. residents age 15 and over, 1987-1996



NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 8-1. Hypersensitivity pneumonitis: Number of deaths by sex, race and age, U.S. residents age 15 and over, 1987-1996

	Sex		Race			Age Group (yrs)									Median Age (yrs)
Year	Male	Female	White	Black	Other	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total	
1987	18	8	25	1	-	-	-	-	1	4	8	9	4	26	74.5
1988	16	8	23	1	-	1	2	-	-	2	8	11	-	24	72.5
1989	17	11	27	1	-	-	1	3	-	2	12	9	1	28	71.0
1990	31	10	38	1	2	-	1	1	3	8	11	15	2	41	73.0
1991	28	8	34	-	2	2	-	1	2	4	11	11	5	36	73.5
1992	14	4	17	1	-	-	1	2	2	2	3	7	1	18	72.5
1993	31	15	44	1	1	-	1	1	4	7	14	14	5	46	71.5
1994	28	8	36	-	-	-	-	-	2	5	8	12	9	36	76.5
1995	24	13	32	5	-	-	1	-	6	4	7	14	5	37	75.0
1996	35	16	49	2	-	-	3	3	5	7	11	16	6	51	73.0
Total	**242**	**101**	**325**	**13**	**5**	**3**	**10**	**11**	**25**	**45**	**93**	**118**	**38**	**343**	**74.0**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data

Table 8-2. Hypersensitivity pneumonitis: Mortality rates (per 1,000,000 population) by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	Overall rate	Males	Females	Males	Females
		Crude mortality rate			
1987	0.14	0.23	0.08	-	0.09
1988	0.12	0.20	0.08	-	0.09
1989	0.14	0.20	0.13	0.10	-
1990	0.21	0.36	0.11	0.10	-
1991	0.18	0.32	0.09	-	-
1992	0.09	0.16	0.05	0.09	-
1993	0.23	0.38	0.15	-	0.08
1994	0.18	0.34	0.09	-	-
1995	0.18	0.26	0.11	0.18	0.23
1996	0.25	0.40	0.17	0.09	0.08
1987-1996	**0.17**	**0.29**	**0.11**	**0.06**	**0.06**
		Age-adjusted mortality rate			
1987	0.08	0.16	0.03	-	0.12
1988	0.08	0.14	0.05	-	0.08
1989	0.10	0.15	0.06	0.12	-
1990	0.15	0.27	0.05	0.08	-
1991	0.12	0.23	0.05	-	-
1992	0.06	0.12	0.03	0.08	-
1993	0.15	0.26	0.09	-	0.10
1994	0.10	0.21	0.04	-	-
1995	0.11	0.16	0.07	0.17	0.27
1996	0.16	0.29	0.09	0.08	0.07
1987-1996	**0.11**	**0.20**	**0.05**	**0.05**	**0.06**

- indicates no deaths listed.
NOTE: See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 8-3. Hypersensitivity pneumonitis: Years of potential life lost to age 65 and to life expectancy, by race and sex, U.S. residents age 15 and over, 1987-1996

		White		Black	
Year	**Overall**	**Males**	**Females**	**Males**	**Females**
	Years of potential life lost to age 65				
1987	35	20	-	-	15
1988	125	45	45	-	35
1989	120	115	-	5	-
1990	145	95	5	35	-
1991	165	75	45	-	-
1992	125	85	40	-	-
1993	155	115	25	-	15
1994	55	40	15	-	-
1995	145	85	35	-	25
1996	290	190	65	35	-
Total	**1,360**	**865**	**275**	**75**	**90**
	Years of potential life lost to life expectancy				
1987	318	202	61	-	28
1988	389	195	131	-	46
1989	450	283	128	16	-
1990	628	396	103	38	-
1991	572	344	134	-	-
1992	333	218	92	7	-
1993	691	425	196	-	28
1994	431	301	100	-	-
1995	553	280	162	18	70
1996	880	542	242	39	14
Total	**5,245**	**3,186**	**1,348**	**119**	**186**

- indicates no deaths listed.
NOTE: The sum of individual years may not equal total due to rounding. See appendices for source description, methods, and ICD codes.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 8-4. Hypersensitivity pneumonitis: Number of deaths by state, U.S. residents age 15 and over, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Alabama	-	-	-	-	2	-	-	-	-	-	**2**
Alaska	-	-	-	-	-	-	-	-	-	-	**-**
Arizona	1	-	2	-	1	1	-	-	-	1	**6**
Arkansas	-	1	-	-	-	-	-	1	-	-	**2**
California	4	1	1	2	1	1	6	3	2	7	**28**
Colorado	1	-	-	-	1	-	1	1	1	-	**5**
Connecticut	-	-	1	1	2	1	-	-	-	1	**6**
Delaware	-	-	-	-	-	-	-	1	-	-	**1**
District of Columbia	-	-	-	-	-	1	-	-	-	-	**1**
Florida	-	-	1	-	1	-	3	5	1	2	**13**
Georgia	-	-	1	-	-	-	-	1	-	-	**2**
Hawaii	-	-	-	-	-	-	-	-	-	-	**-**
Idaho	-	-	1	-	1	1	-	1	-	-	**4**
Illinois	-	1	1	1	1	1	2	1	2	1	**11**
Indiana	1	1	-	1	1	-	-	1	1	1	**7**
Iowa	1	-	4	1	1	1	2	-	3	2	**15**
Kansas	-	-	1	1	-	-	-	2	1	2	**7**
Kentucky	-	-	-	-	1	-	1	-	1	-	**3**
Louisiana	-	-	-	4	-	-	-	1	-	2	**7**
Maine	-	1	-	-	1	-	-	-	-	1	**3**
Maryland	1	-	-	1	-	1	-	1	1	-	**5**
Massachusetts	1	1	-	1	-	-	1	-	-	-	**4**
Michigan	-	3	-	5	1	2	-	2	2	2	**17**
Minnesota	1	2	2	2	3	2	1	3	1	2	**19**
Mississippi	-	-	-	-	-	-	-	-	-	-	**-**
Missouri	-	1	-	-	1	1	1	-	-	2	**6**
Montana	-	-	-	-	-	-	-	1	-	1	**2**
Nebraska	-	1	-	1	1	1	-	2	-	2	**8**
Nevada	-	-	-	-	-	-	-	-	-	-	**-**
New Hampshire	-	-	-	1	1	-	-	-	1	-	**3**
New Jersey	1	1	-	-	1	1	-	-	-	1	**5**
New Mexico	-	-	-	-	-	-	-	-	-	-	**-**
New York	3	-	1	3	1	1	4	2	3	3	**21**
North Carolina	-	1	-	-	-	-	1	1	1	1	**5**
North Dakota	-	-	-	1	1	-	1	-	-	-	**3**
Ohio	-	1	3	-	2	1	-	-	2	2	**11**
Oklahoma	-	-	-	-	1	-	1	-	-	-	**2**
Oregon	1	1	-	1	-	-	1	1	2	-	**7**
Pennsylvania	-	2	1	5	1	-	3	2	4	4	**22**
Rhode Island	1	-	-	-	-	-	1	-	-	-	**2**
South Carolina	1	-	-	1	-	-	2	-	1	1	**6**
South Dakota	1	-	-	1	-	-	2	-	-	-	**4**
Tennessee	-	-	-	-	1	-	-	-	-	1	**2**
Texas	-	-	1	-	2	-	1	1	2	1	**8**
Utah	-	-	2	-	-	-	1	1	-	-	**4**
Vermont	-	1	1	-	1	-	1	-	-	-	**4**
Virginia	1	2	-	-	-	-	2	-	-	1	**6**
Washington	-	-	1	-	-	-	-	-	2	-	**3**
West Virginia	2	-	-	-	-	-	-	-	-	1	**3**
Wisconsin	4	2	3	7	3	1	7	1	3	6	**37**
Wyoming	-	-	-	-	1	-	-	-	-	-	**1**
TOTAL	**26**	**24**	**28**	**41**	**36**	**18**	**46**	**36**	**37**	**51**	**343**

- indicates no deaths listed.

NOTE: See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 8-5. Hypersensitivity pneumonitis: Total number of deaths, crude and age-adjusted mortality rates (per 1,000,000 population), and total years of potential life lost (YPLL) to life expectancy, by state, U.S. residents age 15 and over, 1987-1996

State	Total deaths	Rank	Crude mortality		Age-adjusted mortality		YPLL to life expectancy			
			Rate	Rank	Rate	Rank	Total	Rank	YPLL/death	Rank
Alabama	2	37	0.06	43	0.04	41	47	32	23.3	4
Alaska	-	-	-	-	-	-	-	-	-	-
Arizona	6	17	0.20	23	0.14	21	139	10	23.2	5
Arkansas	2	37	0.11	36	0.11	25	68	26	34.0	2
California	28	2	0.12	35	0.09	28	504	2	18.0	12
Colorado	5	22	0.19	25	0.17	16	86	23	17.3	15
Connecticut	6	17	0.23	19	0.14	20	105	17	17.4	14
Delaware	1	44	0.18	26	0.18	15	21	42	21.1	8
District of Columbia	1	44	0.20	24	0.09	30	9	46	8.5	44
Florida	13	8	0.12	34	0.05	40	157	9	12.1	35
Georgia	2	37	0.04	46	0.03	45	22	41	11.1	39
Hawaii	-	-	-	-	-	-	-	-	-	-
Idaho	4	26	0.51	8	0.35	6	75	25	18.7	11
Illinois	11	9	0.12	32	0.09	31	175	8	15.9	19
Indiana	7	13	0.16	27	0.09	27	103	18	14.7	20
Iowa	15	7	0.69	4	0.37	4	214	7	14.2	25
Kansas	7	13	0.36	9	0.23	11	100	21	14.3	24
Kentucky	3	31	0.10	37	0.07	36	64	28	21.4	6
Louisiana	7	13	0.22	20	0.15	19	124	15	17.7	13
Maine	3	31	0.31	13	0.21	12	43	34	14.4	22
Maryland	5	22	0.13	30	0.08	34	81	24	16.1	18
Massachusetts	4	26	0.08	39	0.06	37	57	30	14.1	26
Michigan	17	6	0.23	17	0.18	14	318	3	18.7	10
Minnesota	19	5	0.55	7	0.34	7	249	6	13.1	30
Mississippi	-	-	-	-	-	-	-	-	-	-
Missouri	6	17	0.15	28	0.10	26	87	22	14.4	21
Montana	2	37	0.32	12	0.17	17	23	40	11.3	38
Nebraska	8	11	0.65	5	0.36	5	102	20	12.8	32
Nevada	-	-	-	-	-	-	-	-	-	-
New Hampshire	3	31	0.34	10	0.21	13	34	38	11.4	37
New Jersey	5	22	0.08	41	0.06	39	121	16	24.2	3
New Mexico	-	-	-	-	-	-	-	-	-	-
New York	21	4	0.15	29	0.08	33	267	5	12.7	33
North Carolina	5	22	0.09	38	0.06	38	60	29	11.9	36
North Dakota	3	31	0.62	6	0.69	1	125	14	41.6	1
Ohio	11	9	0.13	31	0.08	35	138	11	12.5	34
Oklahoma	2	37	0.08	40	0.02	46	14	44	7.2	46
Oregon	7	13	0.30	14	0.13	22	66	27	9.4	43
Pennsylvania	22	3	0.23	18	0.13	24	292	4	13.3	29
Rhode Island	2	37	0.25	16	0.09	29	17	43	8.3	45
South Carolina	6	17	0.21	21	0.17	18	103	18	17.1	16
South Dakota	4	26	0.75	3	0.33	8	42	36	10.6	41
Tennessee	2	37	0.05	45	0.04	44	38	37	19.0	9
Texas	8	11	0.06	44	0.04	42	131	12	16.4	17
Utah	4	26	0.32	11	0.26	9	52	31	12.9	31
Vermont	4	26	0.90	2	0.55	3	44	33	11.1	40
Virginia	6	17	0.12	33	0.08	32	127	13	21.1	7
Washington	3	31	0.08	42	0.04	43	31	39	10.2	42
West Virginia	3	31	0.21	22	0.13	23	43	35	14.3	23
Wisconsin	37	1	0.96	1	0.61	2	518	1	14.0	27
Wyoming	1	44	0.29	15	0.23	10	14	45	14.0	28

- indicates no deaths listed.

NOTE: Ranks are based on unrounded values. See appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause of death data. Population estimates from U.S. Bureau of the Census.

Table 8-6. Hypersensitivity pneumonitis: Most frequently recorded occupations on death certificate, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number	Percent
473	Farmers, except horticulture	45	41.3
914	Homemaker	13	11.9
019	Managers and administrators, n.e.c.	4	3.7
804	Truck drivers	4	3.7
016	Managers, properties and real estate	2	1.8
156	Teachers, elementary school	2	1.8
235	Technicians, n.e.c.	2	1.8
243	Supervisors and proprietors, sales occupations	2	1.8
	All other occupations	27	24.8
	Occupation not reported	8	7.3
	TOTAL	**109**	**100.0**

COC - Census Occupation Code n.e.c. - not elsewhere classified
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 8-7. Hypersensitivity pneumonitis: Most frequently recorded industries on death certificate, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number	Percent
011	Agricultural production, livestock	25	22.9
010	Agricultural production, crops	22	20.2
961	Non-paid worker or non-worker	13	11.9
410	Trucking service	5	4.6
060	Construction	4	3.7
831	Hospitals	3	2.8
842	Elementary and secondary schools	3	2.8
142	Yarn, thread, and fabric mills	2	1.8
601	Grocery stores	2	1.8
630	Apparel and accessory stores, except shoe	2	1.8
712	Real estate, including real estate-insurance offices	2	1.8
850	Colleges and universities	2	1.8
	All other industries	15	13.8
	Industry not reported	9	8.3
	TOTAL	**109**	**100.0**

CIC - Census Industry Code
NOTE: Percentages may not total to 100% due to rounding. See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 8-8. Hypersensitivity pneumonitis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
473	Farmers, except horticulture	45	11.63	8.49	15.57

COC - Census Occupation Code LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 8-9. Hypersensitivity pneumonitis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
011	Agricultural production, livestock	25	29.05	18.74	42.85
010	Agricultural production, crops	22	6.21	3.88	9.41
410	Trucking service	5	3.11	1.01	7.27

CIC - Census Industry Code LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Section 9

ASTHMA

Table 9-1. Work-related asthma: Number of cases by classification category and state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		Total	
Classification Category	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Work-aggravated asthma[+]	**131**	**34.2**	**20**	**12.8**	**44**	**9.9**	**15**	**12.9**	**210**	**19.1**
New-onset asthma[§]	**252**	**65.8**	**136**	**87.2**	**402**	**90.1**	**101**	**87.1**	**891**	**80.9**
Reactive airways dysfunction syndrome (RADS)	24	6.3	16	10.3	47	10.5	36	31.0	123	11.2
Occupational asthma (OA):	228	59.5	120	76.9	355	79.6	65	56.0	768	69.8
Known asthma inducer* with objective evidence	-	0.0	-	0.0	6	1.3	2	1.7	8	0.7
Known asthma inducer* no objective evidence	28	7.3	49	31.4	190	42.6	26	22.4	293	26.6
Unknown asthma inducer with objective evidence	-	0.0	-	0.0	5	1.1	-	0.0	5	0.5
Unknown asthma inducer, no objective evidence	200	52.2	71	45.5	154	34.5	37	31.9	462	42.0
Total	**383**	**100.0**	**156**	**100.0**	**446**	**100.0**	**116**	**100.0**	**1,101**	**100.0**

+ Pre-existing asthma aggravated by exposure or condition at work.
§ Includes cases of RADS and OA.
* Known asthma inducers, defined by medical literature review, are designated in the Association of Occupational and Environmental Clinics (AOEC) exposure coding scheme.
- indicates no cases reported.
NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.
SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Harrison, F Reinisch, J Flattery, and J Chan (California); C Tumpowsky and L Davis (Massachusetts); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); and D Schill and M Stanbury (New Jersey).

Table 9-2. Work-related asthma: Number of cases by ascertainment source and state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		Total	
Source	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Physician report+	383	100.0	156	100.0	345	77.4	105	90.5	989	89.8
Hospital discharge	-	0.0	-	0.0	80	17.9	11	9.5	91	8.3
Co-worker screening*	-	0.0	-	0.0	14	3.1	-	0.0	14	1.3
Workers' compensation	-	0.0	-	0.0	5	1.1	-	0.0	5	0.5
MSHA/OSHA	-	0.0	-	0.0	2	0.4	-	0.0	2	0.2
Total	**383**	**100.0**	**156**	**100.0**	**446**	**99.9**	**116**	**100.0**	**1,101**	**100.0**

+ Massachusetts, Michigan, and New Jersey actively solicit reports from physicians; California utilizes an existing administrative data source for passively identifying reports of work-related asthma.

* Michigan identifies additional cases during worksite investigations of work-related asthma cases by selectively screening co-workers.

- indicates no cases reported.

NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.

SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Harrison, F Reinisch, J Flattery, and J Chan (California); C Tumpowsky and L Davis (Massachusetts); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); and D Schill and M Stanbury (New Jersey).

Table 9-3 (page 1 of 2). Work-related asthma: Most frequently reported putative agents associated with work-related asthma cases, both new-onset asthma and work-aggravated asthma, by state and asthma classification category, 1993-1995

		California		Massachusetts		Michigan		New Jersey		All Four States			
		NOA	WAA	NOA	WAA	NOA	WAA	NOA	WAA	NOA	WAA	WRA	
Code[+]	Agent	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	%
320.01	Air pollutants, indoor	17	8	20	3	15	5	15	3	67	19	86	7.8
010.00	Mineral and inorganic dust, n.o.s.	21	21	14	4	8	6	2	3	45	34	79	7.2
320.06	Chemicals, n.o.s.	28	9	5	3	14	1	9	4	56	17	73	6.6
320.14	Lubricants, n.o.s.*	2	-	1	-	51	2	1	-	55	2	57	5.2
322.00	Cleaning materials, n.o.s.	15	5	11	1	13	3	3	-	42	9	51	4.6
330.03	Smoke, n.o.s.[§]	15	4	6	2	16	4	3	-	40	10	50	4.5
171.00	Solvents, n.o.s.[¶]	6	1	8	3	18	2	4	1	36	7	43	3.9
221.01	Toluene diisocyanate	7	-	3	-	30	-	1	-	41	-	41	3.7
023.01	Welding fume, stainless steel	1	-	-	-	30	6	-	-	31	6	37	3.4
221.00	Diisocyanates, n.o.s.	3	-	7	1	23	1	1	-	34	2	36	3.3
120.03	Formaldehyde	2	1	9	2	17	-	4	-	32	3	35	3.2
171.01	Paint	9	9	3	2	10	1	-	1	22	13	35	3.2
320.16	Pesticides, n.o.s.	17	8	3	-	-	-	1	-	21	8	29	2.6
390.01	Mold	12	3	8	3	-	-	1	-	21	6	27	2.5
221.02	Methylene diisocyanate	-	-	-	-	23	1	1	1	24	2	26	2.4
270.02	Latex, natural rubber	1	-	13	2	7	-	3	-	24	2	26	2.4
320.11	Glues, n.o.s.	1	7	5	1	5	-	3	1	14	9	23	2.1
030.02	Chlorine	4	4	-	-	8	1	4	1	16	6	22	2.0
010.09	Man made mineral fibers	5	1	10	2	3	-	-	-	18	3	21	1.9
050.02	Bleach	4	3	4	-	8	2	-	-	16	5	21	1.9
023.00	Welding, n.o.s.	5	1	5	1	2	-	4	1	16	3	19	1.7

See footnotes at end of table.

Table 9-3 (page 2 of 2). Work-related asthma: Most frequently reported putative agents associated with work-related asthma cases, both new-onset asthma and work-aggravated asthma, by state and asthma classification category, 1993-1995

		California		Massachusetts		Michigan		New Jersey		All Four States			
		NOA	WAA	NOA	WAA	NOA	WAA	NOA	WAA	NOA	WAA	WRA	
Code+	Agent	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	%
120.05	Glutaraldehyde	3	-	8	-	3	-	5	-	19	-	19	1.7
331.01	Diesel exhaust	1	4	2	-	4	-	7	1	14	5	19	1.7
050.00	Acids, bases, oxidizers, n.o.s.	-	-	4	-	12	1	1	-	17	1	18	1.6
110.02	Epoxy resins	-	-	2	-	15	-	-	1	17	1	18	1.6
330.02	Plastic smoke	2	3	1	-	5	3	-	-	8	6	14	1.3
142.00	Acrylates, n.o.s.	-	-	-	-	12	-	-	-	12	-	12	1.1
373.00	Wood dust, n.o.s.	2	-	1	-	8	-	1	-	12	-	12	1.1
052.02	Ammonia solution	6	1	1	-	-	1	2	-	9	2	11	1.0
060.11	4-phenylcyclohexene	3	5	2	1	-	-	-	-	5	6	11	1.0
231.00	Ethanolamines, n.o.s.	7	1	-	-	3	-	-	-	10	1	11	1.0
331.00	Exhaust, n.o.s.	3	2	4	-	-	-	2	-	9	2	11	1.0
370.00	Plant material, n.o.s.	4	5	1	-	1	-	-	-	6	5	11	1.0
370.01	Paper dust	4	-	-	-	-	-	7	-	11	-	11	1.0
380.00	Animal material, n.o.s.	1	3	3	-	2	1	1	-	7	4	11	1.0
330.01	Cigarette smoke	3	4	1	-	1	-	-	1	5	5	10	0.9
	All others	142	59	63	7	90	10	84	7	379	83	462	42.0

NOA - new-onset asthma (including RADS and occupational asthma) n.o.s. - not otherwise specified WAA - work-aggravated asthma WRA - work-related asthma
+Association of Occupational and Environmental Clinics (AOEC) exposure codes
* Includes metalworking fluids
§ Includes pyrolysis products other than incinerator fume or cigarette, plastic, marijuana, or lead-containing smoke
¶ Includes graffiti removers
- indicates no cases reported.
NOTE: Number column sums exceed the corresponding number of cases because each case was associated with up to three putative agents. Percentages are based on the actual number of cases. Refer to Table 9-1 for the number of new-onset asthma and work-aggravated asthma cases. See appendices for source description.
SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Harrison, F Reinisch, J Flattery, and J Chan (California); C Tumpowsky and L Davis (Massachusetts); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); and D Schill and M Stanbury (New Jersey).

Table 9-4 (page 1 of 2). Work-related asthma: Primary industries associated with work-related asthma cases, by state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		All Four States	
Industry (SIC Code)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Agriculture, Forestry, Fishing	**22**	**5.7**	**2**	**1.3**	**1**	**0.2**	**1**	**0.9**	**26**	**2.4**
Agricultural production crops (01)	14	3.7	-	0.0	-	0.0	-	0.0	14	1.3
All other (02,07,08)	8	2.1	2	1.3	1	0.2	1	0.9	12	1.1
Mining (10,14)	**1**	**0.3**	**-**	**0.0**	**1**	**0.2**	**-**	**0.0**	**2**	**0.2**
Construction	**5**	**1.3**	**9**	**5.8**	**14**	**3.1**	**9**	**7.8**	**37**	**3.4**
Construction, special trade (17)	2	0.5	7	4.5	10	2.2	8	6.9	27	2.5
All other (15,16)	3	0.8	2	1.3	4	0.9	1	0.9	10	0.9
Manufacturing	**63**	**16.4**	**37**	**23.7**	**311**	**69.7**	**46**	**39.7**	**457**	**41.5**
Transportation equipment (37)	15	3.9	2	1.3	194	43.5	1	0.9	212	19.3
Chemicals and allied products (28)	5	1.3	4	2.6	17	3.8	12	10.3	38	3.5
Industrial and commercial machinery and computer equipment (35)	5	1.3	6	3.8	22	4.9	-	0.0	33	3.0
Fabricated metal products except machinery and transportation equipment (34)	5	1.3	5	3.2	15	3.4	1	0.9	26	2.4
Rubber and miscellaneous plastics products (30)	1	0.3	2	1.3	20	4.5	1	0.9	24	2.2
Primary metal industries (33)	2	0.5	-	0.0	16	3.6	5	4.3	23	2.1
Electronic and other electrical equipment and components except computer equipment (36)	7	1.8	2	1.3	3	0.7	6	5.2	18	1.6
Food and kindred products (20)	9	2.3	1	0.6	3	0.7	2	1.7	15	1.4
Paper and allied products (26)	-	0.0	2	1.3	5	1.1	7	6.0	14	1.3
Measuring, analyzing, and controlling instruments (38)	-	0.0	5	3.2	4	0.9	2	1.7	11	1.0
Printing, publishing, and allied industries (27)	2	0.5	1	0.6	6	1.3	1	0.9	10	0.9
All other (22-25,29,31,32,39)	12	3.1	7	4.5	6	1.3	8	6.9	33	3.0
Transportation	**28**	**7.3**	**2**	**1.3**	**12**	**2.7**	**6**	**5.2**	**48**	**4.4**
Electric, gas, and sanitary services (49)	11	2.9	2	1.3	4	0.9	1	0.9	18	1.6
All other (40-42, 44, 45, 48)	17	4.4	-	0.0	8	1.8	5	4.3	30	2.7

See footnotes at end of table.

Table 9-4 (page 2 of 2). Work-related asthma: Primary industries associated with work-related asthma cases, by state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		All Four States	
Industry (SIC Code)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Wholesale trade (51, 50)	**4**	**1.0**	**2**	**1.3**	**3**	**0.7**	**2**	**1.7**	**11**	**1.0**
Retail trade	**20**	**5.2**	**5**	**3.2**	**11**	**2.5**	**3**	**2.6**	**39**	**3.5**
Food stores (54)	6	1.6	3	1.9	4	0.9	1	0.9	14	1.3
All other (52, 53, 55, 58, 59)	14	3.7	2	1.3	7	1.6	2	1.7	25	2.3
Finance, insurance, and real estate (60, 61, 63, 65)	**10**	**2.6**	**1**	**0.6**	**1**	**0.2**	**1**	**0.9**	**13**	**1.2**
Services	**155**	**40.5**	**80**	**51.3**	**72**	**16.1**	**37**	**31.9**	**344**	**31.2**
Health services (80)	56	14.6	48	30.8	35	7.8	17	14.7	156	14.2
Educational services (82)	55	14.4	16	10.3	15	3.4	10	8.6	96	8.7
Social services (83)	14	3.7	-	0.0	2	0.4	-	0.0	16	1.5
Engineering, accounting, research, management and related services (87)	5	1.3	5	3.2	3	0.7	3	2.6	16	1.5
Business services (73)	9	2.3	-	0.0	3	0.7	1	0.9	13	1.2
Hotels, rooming houses, camps (70)	4	1.0	2	1.3	3	0.7	2	1.7	11	1.0
All other (72, 75, 76, 78, 79, 81, 84, 86, 89)	12	3.1	9	5.8	11	2.5	4	3.4	36	3.3
Public administration	**73**	**19.1**	**18**	**11.5**	**20**	**4.5**	**11**	**9.5**	**122**	**11.1**
Justice, public order, safety (92)	34	8.9	6	3.8	6	1.3	1	0.9	47	4.3
Executive, legislative, general government, except finance (91)	17	4.4	1	0.6	1	0.2	3	2.6	22	2.0
Administration of human resource programs (94)	11	2.9	-	0.0	5	1.1	3	2.6	19	1.7
Administration of economic programs (96)	2	0.5	11	7.1	3	0.7	1	0.9	17	1.5
All other (95, 97, 93)	9	2.3	-	0.0	5	1.1	3	2.6	17	1.5
Nonclassifiable	**2**	**0.5**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**2**	**0.2**
TOTAL	**383**	**100.0**	**156**	**100.0**	**446**	**100.0**	**116**	**100.0**	**1,101**	**100.0**

SIC - 1987 Standard Industrial Classification - indicates no cases reported.
NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.
SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Harrison, F Reinisch, J Flattery, and J Chan (California); C Tumpowsky and L Davis (Massachusetts); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); and D Schill and M Stanbury (New Jersey).

Table 9-5 (page 1 of 2). Work-related asthma: Primary occupations associated with work-related asthma cases, by state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		All Four States	
Occupation (COC)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Managerial and professional specialty	**92**	**24.0**	**47**	**30.1**	**28**	**6.3**	**27**	**23.3**	**194**	**17.6**
Registered nurses (095)	20	5.2	23	14.7	4	0.9	6	5.2	53	4.8
Teachers, n.e.c. (159)	4	1.0	7	4.5	2	0.4	3	2.6	16	1.5
All other	68	17.8	17	10.9	22	4.9	18	15.5	125	11.4
Technical, sales, and administrative	**123**	**32.1**	**40**	**25.6**	**40**	**9.0**	**25**	**21.6**	**228**	**20.7**
Secretaries (313)	10	2.6	8	5.1	3	0.7	3	2.6	24	2.2
General office clerks (379)	11	2.9	8	5.1	1	0.2	1	0.9	21	1.9
Licensed practical nurses (207)	5	1.3	2	1.3	3	0.7	1	0.9	11	1.0
Health technologists and technicians, n.e.c. (208)	3	0.8	2	1.3	4	0.9	2	1.7	11	1.0
Administrative support (389)	8	2.1	1	0.6	1	0.2	-	0.0	10	0.9
All other	86	22.5	19	12.2	28	6.3	18	15.5	151	13.7
Service	**63**	**16.4**	**19**	**12.2**	**37**	**8.3**	**15**	**12.9**	**134**	**12.2**
Janitors and cleaners (453)	13	3.4	4	2.6	8	1.8	3	2.6	28	2.5
Firefighting (417)	10	2.6	3	1.9	1	0.2	-	0.0	14	1.3
Nursing aides, orderlies, and attendants (447)	6	1.6	4	2.6	1	0.2	2	1.7	13	1.2
Health aides, except nursing (446)	1	0.3	1	0.6	7	1.6	2	1.7	11	1.0
All other	33	8.6	7	4.5	20	4.5	8	6.9	68	6.2
Farming, forestry, and fishing	**19**	**5.0**	**1**	**0.6**	**2**	**0.4**	**-**	**0.0**	**22**	**2.0**
Farm workers (479)	12	3.1	-	0.0	-	0.0	-	0.0	12	1.1
All other	7	1.8	1	0.6	2	0.4	-	0.0	10	0.9

See footnotes at end of table.

Table 9-5 (page 2 of 2). Work-related asthma: Primary occupations associated with work-related asthma cases, by state, 1993-1995

	California		Massachusetts		Michigan		New Jersey		All Four States	
Occupation (COC)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Precision production, craft, and repair	**31**	**8.1**	**21**	**13.5**	**86**	**19.3**	**22**	**19.0**	**160**	**14.5**
Supervisors, production (628)	2	0.5	-	0.0	19	4.3	2	1.7	23	2.1
Machinists (637)	2	0.5	3	1.9	9	2.0	2	1.7	16	1.5
Specified mechanics and repairers, n.e.c. (547)	3	0.8	-	0.0	9	2.0	2	1.7	14	1.3
All other	24	6.3	18	11.5	49	11.0	16	13.8	107	9.7
Operators, fabricators, and laborers	**54**	**14.1**	**28**	**17.9**	**247**	**55.4**	**27**	**23.3**	**356**	**32.3**
Assemblers (785)	5	1.3	4	2.6	61	13.7	1	0.9	71	6.4
Welders and cutters (783)	5	1.3	5	3.2	24	5.4	1	0.9	35	3.2
Laborers, except construction (889)	1	0.3	1	0.6	21	4.7	-	0.0	23	2.1
Miscellaneous machine operators, n.e.c. (777)	1	0.3	2	1.3	13	2.9	4	3.4	20	1.8
Painting and paint spraying machine operators (759)	2	0.5	2	1.3	7	1.6	1	0.9	12	1.1
Separating, filtering, and clarifying operators (757)	1	0.3	1	0.6	4	0.9	4	3.4	10	0.9
Production inspectors, checkers, and examiners (796)	2	0.5	-	0.0	8	1.8	-	0.0	10	0.9
All other	37	9.7	13	8.3	109	24.4	16	13.8	175	15.9
Military occupations	**1**	**0.3**	**-**	**0.0**	**-**	**0.0**	**-**	**0.0**	**1**	**0.1**
Unclassified	**-**	**0.0**	**-**	**0.0**	**6**	**1.3**	**-**	**0.0**	**6**	**0.5**
Total	**383**	**100.0**	**156**	**100.0**	**446**	**100.0**	**116**	**100.0**	**1,101**	**100.0**

COC - 1990 Census Occupation Code n.e.c. - not elsewhere classified - indicates no cases reported.

NOTE: Percentages may not sum to 100% due to rounding. See appendices for source description.

SOURCE: Provisional SENSOR surveillance data as of November 1997, aggregated based on reporting source years, reported by R Harrison, F Reinisch, J Flattery, and J Chan (California); C Tumpowsky and L Davis (Massachusetts); K Rosenman, MJ Reilly, and D Kalinowski (Michigan); and D Schill and M Stanbury (New Jersey).

Table 9-6. Asthma: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
099	Occupational therapists	8	3.66	1.58	7.20
098	Respiratory therapists	9	2.66	1.22	5.05
339	Billing clerks	13	2.28	1.21	3.90
197	Public relations specialists	17	2.02	1.17	3.23
317	Hotel clerks	12	2.00	1.03	3.49
446	Health aides, except nursing	49	1.98	1.45	2.65
203	Clinical laboratory technologists and technicians	40	1.71	1.22	2.33
385	Data-entry keyers	30	1.68	1.14	2.40
319	Receptionists	63	1.66	1.27	2.14
447	Nursing aides, orderlies, and attendants	401	1.66	1.51	1.83
387	Teachers aides	28	1.61	1.07	2.33
208	Health technologists and technicians, n.e.c.	31	1.55	1.05	2.21
095	Registered nurses	411	1.50	1.36	1.65
015	Managers, medicine and health	34	1.49	1.01	2.13
468	Child care workers, except private household	59	1.46	1.08	1.93
164	Librarians	50	1.45	1.07	1.91
207	Licensed practical nurses	133	1.45	1.21	1.73
389	Administrative support occupations, n.e.c.	57	1.45	1.07	1.91
405	Housekeepers and butlers	58	1.44	1.07	1.90
683	Electrical and electronic equipment assemblers	40	1.44	1.03	1.96
276	Cashiers	131	1.41	1.17	1.69
915	Student	308	1.41	1.26	1.58
174	Social workers	77	1.39	1.09	1.76
458	Hairdressers and cosmetologists	173	1.39	1.19	1.62
666	Dressmakers	80	1.35	1.07	1.68
407	Private household cleaners and servants	545	1.33	1.22	1.45
914	Homemaker	8,293	1.30	1.27	1.33
313	Secretaries	601	1.29	1.19	1.40
337	Bookkeepers, accounting, and auditing clerks	286	1.29	1.14	1.46
436	Cooks	346	1.29	1.15	1.44
157	Teachers, secondary school	87	1.27	1.01	1.58
274	Sales workers, other commodities	482	1.19	1.09	1.30
156	Teachers, elementary school	632	1.13	1.05	1.22
917	Unemployed, never worked	518	1.13	1.04	1.23

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 9-7. Asthma: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
862	Child day care services	57	2.19	1.62	2.89
840	Health services, n.e.c.	133	1.60	1.33	1.91
592	Variety stores	34	1.54	1.04	2.20
790	Dressmaking shops	36	1.53	1.06	2.13
831	Hospitals	1,064	1.46	1.38	1.55
832	Nursing and personal care facilities	221	1.43	1.24	1.64
812	Offices and clinics of physicians	125	1.39	1.16	1.66
772	Beauty shops	172	1.36	1.16	1.59
922	Administration of human resources programs	88	1.32	1.05	1.64
761	Private households	648	1.31	1.21	1.42
961	Non-paid worker or non-worker	9,107	1.29	1.26	1.32
771	Laundry, cleaning, and garment services	164	1.23	1.05	1.44
850	Colleges and universities	253	1.23	1.09	1.39
691	Not specified retail trade	264	1.20	1.06	1.36
591	Department stores	254	1.16	1.03	1.31
842	Elementary and secondary schools	1,220	1.15	1.10	1.22

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 9-8 (page 1 of 4). Asthma: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Hospitals	389	14.4	8.1 - 20.7	139	12.9	5.5 - 20.3	154	8.9	3.0 - 14.8
Apparel and accessory stores	155	11.5	4.1 - 18.9	32	17.2	0.0 - 44.2	54	5.1	0.0 - 14.1
Justice, public order, and safety	79	11.4	0.2 - 22.6	61	8.0	0.0 - 18.9	40	12.1	0.0 - 25.0
Machinery, except electrical	108	11.2	0.6 - 21.8	87	4.9	0.0 - 10.6	90	3.3	0.0 - 8.0
Insurance and real estate	211	9.7	3.6 - 15.8	113	9.4	2.6 - 16.2	78	1.3	0.0 - 3.2
Paper products, printing	174	9.7	0.0 - 22.4	89	7.3	0.0 - 15.1	92	8.4	1.3 - 15.5
Entertainment and recreation services	103	9.6	4.3 - 14.9	32	4.5	0.0 - 12.1	52	8.2	0.0 - 20.7
Educational services	701	9.5	6.2 - 12.8	278	10.3	6.4 - 14.2	155	4.4	0.1 - 8.7
Business services	268	9.1	3.0 - 15.2	118	5.5	1.8 - 9.2	159	14.0	5.6 - 22.4
Lodging places	186	9.1	0.0 - 19.7	42	13.6	0.0 - 30.0	75	11.7	0.9 - 22.5
Other professional and related services	192	8.4	2.1 - 14.7	106	14.8	1.5 - 28.1	77	1.5	0.0 - 3.2
Chemicals, petroleum, and coal products	92	8.4	0.2 - 16.6	57	5.7	0.1 - 11.3	59	4.9	0.0 - 11.0

See footnotes at end of table.

Table 9-8 (page 2 of 4). Asthma: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Transportation, except trucking	198	7.5	2.4 - 12.6	177	6.9	0.4 - 13.4	128	15.2	5.0 - 25.4
Transportation equipment	189	6.9	2.4 - 11.4	169	7.6	2.3 - 12.9	147	5.8	1.3 - 10.3
Food stores	279	6.8	3.1 - 10.5	86	0.5	0.0 - 1.1	127	10.0	2.4 - 17.6
Other retail trade	374	6.7	3.2 - 10.2	155	6.9	1.4 - 12.4	173	7.7	0.9 - 14.5
Health services, n.e.c.	246	6.3	1.2 - 11.4	72	25.8	12.7 - 28.9	123	14.8	4.4 - 25.2
Social services	163	6.3	1.6 - 11.0	48	13.5	3.3 - 23.7	60	1.0	0.0 - 2.1
Communications	132	6.1	1.4 - 10.8	63	4.9	0.2 - 10.6	65	5.3	0.0 - 11.4
Personal services, except private households and lodging	203	5.8	0.9 - 10.7	91	10.4	1.0 - 19.8	89	15.2	2.7 - 27.7
Eating and drinking places	706	5.7	3.0 - 8.4	190	3.1	1.0 - 5.2	397	13.3	9.4 - 17.2
Construction	366	5.0	1.5 - 8.5	323	11.4	5.3 - 17.5	378	11.2	3.9 - 18.5
Department stores	204	4.9	2.4 - 7.4	64	16.0	4.5 - 27.5	68	1.0	0.0 - 2.2
Offices of health practitioners	133	4.7	0.0 - 9.4	40	7.2	0.0 - 18.1	33	6.2	0.0 - 16.7

See footnotes at end of table.

Table 9-8 (page 3 of 4). Asthma: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Agriculture production	551	4.5	2.8 - 6.2	370	9.3	4.5 - 14.1	265	2.6	0.9 - 4.3
Banking and other finance	209	4.4	0.7 - 8.1	79	16.3	5.0 - 27.6	68	10.9	0.0 - 21.8
Electrical machinery, equipment, and supplies	139	4.3	0.6 - 9.2	66	7.6	0.0 - 15.6	69	14.9	2.4 - 27.4
Wholesale trade, durable goods	74	4.2	0.0 - 9.1	68	6.6	0.0 - 14.2	54	14.8	0.0 - 31.4
Public administration, except justice, public order, and safety	342	4.2	1.9 - 6.5	214	9.8	5.1 - 14.5	162	7.8	4.5 - 11.8
Miscellaneous and not specified manufacturing industries	170	3.9	1.0 - 6.8	101	5.1	1.4 - 8.8	93	3.6	0.0 - 8.1
Trucking service	66	3.8	0.0 - 9.2	84	8.9	0.0 - 20.3	104	13.6	5.0 - 22.2
Utilities	61	3.8	0.0 - 7.7	73	4.2	0.0 - 9.1	62	0.5	0.0 - 1.1
Apparel and other textile products	233	3.7	0.8 - 6.6	71	2.0	0.0 - 4.2	100	4.6	0.3 - 8.9
Textile mill products	143	3.6	1.1 - 6.1	83	15.9	6.7 - 25.1	78	2.8	0.0 - 6.3

See footnotes at end of table.

Table 9-8 (page 4 of 4). Asthma: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Food and kindred products	231	3.0	0.0 - 6.1	140	4.1	0.4 - 6.8	148	7.7	1.1 - 13.8
Wholesale trade, nondurable and not specified goods	143	3.0	0.0 - 6.1	87	11.6	0.0 - 23.5	77	14.7	4.5 - 24.9
Lumber and wood products, including furniture	74	2.8	0.0 - 6.3	59	8.0	0.0 - 18.2	63	12.8	2.8 - 22.8
Repair services	89	2.0	0.0 - 4.9	86	4.0	0.0 - 11.6	90	15.5	3.6 - 27.4
Rubber, plastics, and leather products	101	1.8	0.0 - 4.5	41	3.5	0.0 - 8.8	34	16.1	8.5 - 23.7
Metal industries	134	1.6	0.0 - 4.5	137	5.1	0.1 - 10.1	115	5.9	1.2 - 10.6
Mining	34	1.5	0.0 - 4.2	45	1.3	0.0 - 2.8	27	0	-
Private households	313	1.4	0.6 - 2.2	72	6.4	0.7 - 12.1	80	2.8	0.1 - 5.5
Vehicle dealers, supply and service stores	68	0.6	0.0 - 1.8	61	5.0	1.9 - 8.1	72	9.8	0.6 - 18.0
Agriculture services, forestry, and fishing	69	0.3	0.0 - 0.9	46	11.8	0.0 - 29.2	55	19.8	0.0 - 40.2
TOTAL	**10,235**	**6.6**	**5.8 - 7.4**	**4,805**	**8.4**	**7.2 - 9.6**	**4,990**	**9.1**	**7.9 - 10.3**

CI - confidence interval - indicates incalculable field
NOTE: See appendices for source description and methods. Industries are classified according to 1980 Census Industry Code, and regrouped by NCHS.
SOURCE: NCHS third National Health and Nutrition Examination Survey.

Section 10

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Table 10-1 (page 1 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
168	Sociologists	10	2.46	1.18	4.52
616	Mining machine operators	9,056	2.44	2.39	2.49
615	Explosives workers	76	2.13	1.66	2.69
598	Drillers, earth	161	1.71	1.46	2.00
614	Drillers, oil well	299	1.67	1.48	1.89
755	Extruding and forming machine operators	126	1.62	1.35	1.94
595	Roofers	745	1.61	1.50	1.73
499	Hunters and trappers	26	1.60	1.05	2.35
719	Molding and casting machine operators	805	1.60	1.50	1.71
763	Roasting and baking machine operators, food	31	1.60	1.08	2.29
579	Painters, construction and maintenance	3,796	1.59	1.54	1.64
726	Wood lathe, routing, and planing machine operators	73	1.59	1.24	2.01
597	Structural metal workers	754	1.57	1.47	1.69
787	Hand molding, casting, and forming occupations	218	1.56	1.36	1.79
617	Mining occupations, n.e.c.	372	1.55	1.40	1.72
583	Paperhangers	81	1.54	1.22	1.92
643	Boilermakers	462	1.54	1.41	1.69
783	Welders and cutters	4,032	1.53	1.49	1.58
825	Railroad brake, signal, and switch operators	682	1.52	1.41	1.65
477	Supervisors, farm workers	132	1.51	1.26	1.81
554	Supervisors, carpenters and related workers	82	1.51	1.20	1.88
593	Insulation workers	203	1.51	1.31	1.73
435	Waiters and waitresses	3,700	1.49	1.45	1.54
567	Carpenters	10,586	1.49	1.46	1.52
707	Rolling machine operators	224	1.49	1.30	1.71
509	Small engine repairers	138	1.48	1.23	1.77
844	Operating engineers	3,202	1.48	1.44	1.53
556	Supervisors: painters, paperhangers, and plasterers	446	1.47	1.34	1.62
723	Metal plating machine operators	200	1.47	1.28	1.69
829	Sailors and deckhands	455	1.47	1.35	1.61
853	Excavating and loading machine operators	185	1.47	1.27	1.70
855	Grader, dozer, and scraper operators	260	1.47	1.30	1.66
849	Crane and tower operators	1,159	1.46	1.38	1.55
516	Heavy equipment mechanics	1,054	1.45	1.37	1.54

See footnotes at end of table.

Table 10-1 (page 2 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
519	Machinery maintenance occupations	171	1.45	1.24	1.69
585	Plumbers, pipefitters, and steamfitters	3,711	1.45	1.41	1.50
596	Sheetmetal duct installers	103	1.45	1.18	1.76
706	Punching and stamping press machine operators	838	1.45	1.36	1.55
759	Painting and paint spraying machine operators	757	1.45	1.36	1.56
804	Truck drivers	15,857	1.45	1.42	1.48
885	Garage and service station related occupations	534	1.44	1.32	1.57
058	Marine and naval architects	127	1.43	1.19	1.71
766	Furnace, kiln, and oven operators, except food	1,141	1.43	1.35	1.52
833	Marine engineers	56	1.43	1.06	1.89
848	Hoist and winch operators	61	1.43	1.09	1.84
539	Mechanical controls and valve repairers	94	1.42	1.15	1.74
573	Drywall installers	205	1.42	1.23	1.63
636	Precision assemblers, metal	83	1.42	1.13	1.77
709	Grinding, abrading, buffing, and polishing machine operators	854	1.42	1.33	1.52
727	Sawing machine operators	721	1.42	1.33	1.53
434	Bartenders	825	1.41	1.32	1.51
505	Automobile mechanics	5,386	1.41	1.38	1.45
694	Water and sewage treatment plant operators	180	1.41	1.22	1.63
813	Parking lot attendants	68	1.41	1.08	1.81
496	Timber cutting and logging occupations	1,824	1.40	1.35	1.47
507	Bus, truck, and stationary engine mechanic	1,165	1.40	1.32	1.49
544	Millwrights	1,137	1.40	1.32	1.49
599	Construction trades, n.e.c.	640	1.40	1.30	1.52
826	Rail vehicle operators, n.e.c.	98	1.40	1.13	1.72
514	Automobile body and related repairers	695	1.39	1.29	1.51
653	Sheet metal workers	1,210	1.39	1.32	1.47
768	Crushing and grinding machine operators	312	1.39	1.24	1.56
806	Driver-sales workers	766	1.39	1.30	1.50
526	Household appliance and power tool repairers	268	1.38	1.22	1.56
534	Heating, air conditioning, and refrigeration mechanics	508	1.38	1.27	1.51
566	Carpet installers	223	1.38	1.20	1.58
658	Furniture and wood finishers	363	1.38	1.24	1.53

See footnotes at end of table.

Table 10-1 (page 3 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
704	Lathe and turning machine operators	188	1.38	1.19	1.60
823	Railroad conductors and yardmasters	931	1.38	1.30	1.47
828	Ship captains and mates, except fishing boasts	236	1.38	1.20	1.58
843	Supervisors, material moving equipment operators	166	1.38	1.18	1.61
517	Farm equipment mechanics	103	1.37	1.11	1.67
538	Office machine repairers	75	1.37	1.07	1.73
584	Plasterers	238	1.37	1.19	1.57
713	Forging machine operators	146	1.37	1.16	1.62
824	Locomotive operating occupations	879	1.37	1.28	1.47
498	Fishers	456	1.36	1.25	1.49
549	Not specified mechanics and repairers	1,731	1.36	1.30	1.43
557	Supervisors: plumbers, pipefitters, and steamfitters	166	1.36	1.16	1.59
589	Glaziers	102	1.36	1.11	1.65
613	Supervisors, extractive occupations	235	1.36	1.18	1.56
675	Hand molders and shapers, except jewelers	201	1.36	1.18	1.56
684	Miscellaneous precision workers, n.e.c.	79	1.36	1.06	1.72
725	Miscellaneous metal and plastic processing machine operators	53	1.36	1.01	1.79
708	Drilling and boring machine operators	83	1.35	1.07	1.68
575	Electricians	4,047	1.34	1.30	1.38
553	Supervisors: brickmasons, stonemasons, and tile setters	101	1.33	1.08	1.62
668	Upholsterers	491	1.33	1.22	1.46
518	Industrial machinery repairers	1,961	1.32	1.27	1.38
563	Brickmasons and stonemasons	1,915	1.32	1.27	1.38
577	Electrical power installers and repairers	567	1.32	1.21	1.44
677	Optical goods workers	160	1.32	1.13	1.54
686	Butchers and meat cutters	1,700	1.32	1.26	1.39
809	Taxicab drivers and chauffeurs	1,170	1.32	1.25	1.40
869	Construction laborers	7,492	1.32	1.29	1.35
426	Guards and police, except public service	3,021	1.31	1.27	1.36
438	Food counter, fountain and related occupations	79	1.31	1.02	1.66
565	Tile setters, hard and soft	151	1.31	1.11	1.55
637	Machinists	7,400	1.31	1.28	1.34
645	Patternmakers and model makers, metal	98	1.31	1.06	1.61

See footnotes at end of table.

Table 10-1 (page 4 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
878	Machine feeders and offbearers	1,047	1.31	1.24	1.39
646	Lay-out workers	125	1.30	1.08	1.56
487	Animal caretakers, except farm	102	1.29	1.05	1.57
269	Sales workers, parts	274	1.28	1.13	1.45
416	Fire inspection and fire prevention occupations	80	1.28	1.02	1.59
455	Pest control occuations	118	1.28	1.04	1.56
459	Attendants, amusement and recreation facilities	317	1.28	1.14	1.43
495	Forestry workers, except logging	101	1.28	1.04	1.56
733	Miscellaneous woodworking machine operators	225	1.28	1.11	1.47
834	Bridge, lock, and lighthouse tenders	84	1.28	1.02	1.59
859	Miscellaneous material moving equipment operators	514	1.28	1.17	1.40
474	Horticultural specialty farmers	153	1.27	1.08	1.50
547	Specified mechanics and repairers, n.e.c.	1,078	1.27	1.20	1.35
769	Slicing and cutting machine operators	696	1.27	1.18	1.38
046	Mining engineers	81	1.26	1.00	1.57
359	Dispatchers	495	1.26	1.16	1.38
745	Shoe machine operators	877	1.26	1.18	1.35
756	Mixing and blending machine operators	605	1.26	1.17	1.37
889	Laborers, except construction	21,343	1.25	1.23	1.27
263	Sales workers, motor vehicles and boats	1,451	1.24	1.18	1.31
317	Hotel clerks	116	1.24	1.01	1.51
669	Shoe repairers	375	1.24	1.12	1.38
758	Compressing and compacting machine operators	94	1.24	1.00	1.52
873	Production helpers	122	1.24	1.03	1.48
218	Surveying and mapping technicians	213	1.23	1.07	1.41
424	Correctional institution officers	495	1.23	1.13	1.35
657	Cabinet makers and bench carpenter	335	1.23	1.10	1.38
717	Fabricating machine operators, n.e.c.	150	1.23	1.04	1.45
789	Hand painting, coating, and decorating occupations	201	1.23	1.07	1.41
905	Military occupations	6,260	1.23	1.21	1.26
206	Radiologic technicians	150	1.22	1.03	1.44
558	Supervisors, construction, n.e.c.	3,522	1.22	1.18	1.26
699	Miscellaneous plant and system operators	230	1.22	1.06	1.40

See footnotes at end of table.

Table 10-1 (page 5 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
703	Lathe and turning machine set-up operators	128	1.22	1.02	1.46
777	Miscellaneous machine operators, n.e.c.	4,253	1.22	1.18	1.26
448	Supervisors, cleaning and building service workers	742	1.21	1.13	1.30
508	Aircraft engine mechanics	473	1.21	1.11	1.33
268	Sales workers, hardware and building supplies	514	1.20	1.10	1.31
417	Firefighting occupations	843	1.19	1.11	1.28
486	Groundskeepers and gardeners, except farm	1,526	1.19	1.13	1.25
523	Electronic repairers, communications and industrial equipment	458	1.19	1.09	1.30
527	Telephone line installers and repairers	174	1.19	1.02	1.39
533	Miscellaneous electrical and electronic equipment repairers	200	1.19	1.03	1.37
779	Machine operators, not specified	5,458	1.19	1.17	1.22
633	Supervisors, production occupations	8,016	1.18	1.16	1.21
689	Inspectors, testers, and graders	767	1.18	1.10	1.27
808	Bus drivers	1,538	1.18	1.12	1.24
856	Industrial truck and tractor equipment operators	1,124	1.18	1.11	1.26
634	Tool and die makers	1,577	1.17	1.11	1.23
695	Power plant operators	190	1.17	1.01	1.35
696	Stationary engineers	1,665	1.17	1.11	1.23
734	Printing press operators	1,403	1.17	1.11	1.23
737	Miscellaneous printing machine operators	173	1.17	1.00	1.37
749	Miscellaneous textile machine operators	2,691	1.17	1.13	1.22
267	Sales workers, radio, TV, hi-fi, and appliances	204	1.16	1.01	1.33
473	Farmers, except horticulture	27,018	1.16	1.14	1.18
535	Camera, watch, and musical instrument repairers	225	1.16	1.01	1.33
803	Supervisors, motor vehicle operators	222	1.16	1.01	1.33
453	Janitors and cleaners	10,944	1.15	1.13	1.17
687	Bakers	867	1.15	1.07	1.23
757	Separating, filtering, and clarifying machine operators	546	1.15	1.06	1.26
785	Assemblers	4,497	1.15	1.12	1.19
475	Managers, farms, except horticultural	277	1.13	1.00	1.28
503	Supervisors, mechanics and repairers	1,113	1.13	1.07	1.20
364	Traffic, shipping, and receiving clerks	1,723	1.12	1.07	1.18

See footnotes at end of table.

Table 10-1 (page 6 of 6). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval LCL	UCL
433	Supervisors, food preparation and service occupations	936	1.12	1.06	1.20
365	Stock and inventory clerks	1,445	1.11	1.06	1.17
479	Farm workers	2,346	1.11	1.07	1.16
883	Freight, stock, and material handlers, n.e.c.	1,042	1.11	1.05	1.18
053	Civil engineers	1,331	1.09	1.04	1.15
275	Sales counter clerks	573	1.09	1.00	1.19
588	Concrete and terrazzo finishers	471	1.09	1.00	1.20
913	Retired	3,317	1.08	1.05	1.12
457	Barbers	1,094	1.07	1.01	1.14
259	Sales representatives, mining, manufacturing, and wholesale	3,182	1.06	1.03	1.10
355	Mail carriers, postal service	1,504	1.05	1.00	1.11
796	Production inspectors, checkers, and examiners	3,348	1.05	1.02	1.09
018	Funeral directors	9,410	1.03	1.01	1.05

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 10-2 (page 1 of 4). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
041	Coal mining	9,454	2.40	2.35	2.45
050	Nonmetallic mining and quarrying, except fuel	955	1.64	1.55	1.75
271	Iron and steel foundries	1,273	1.56	1.49	1.65
040	Metal mining	1,076	1.53	1.44	1.63
261	Pottery and related products	582	1.51	1.39	1.65
252	Structural clay products	591	1.49	1.37	1.63
402	Taxicab service	1,041	1.45	1.37	1.54
410	Trucking service	11,642	1.44	1.41	1.47
751	Automotive repair and related services	6,128	1.40	1.37	1.44
060	Construction	45,201	1.38	1.35	1.41
760	Miscellaneous repair services	2,031	1.37	1.32	1.43
201	Miscellaneous petroleum and coal products	96	1.36	1.10	1.67
230	Logging	2,138	1.36	1.31	1.42
250	Glass and glass products	2,087	1.36	1.31	1.42
360	Ship and boat building and repairing	1,703	1.35	1.29	1.42
621	Gasoline service stations	2,182	1.34	1.29	1.40
232	Wood buildings and mobile homes	110	1.33	1.08	1.62
251	Cement, concrete, gypsum, and plaster products	930	1.33	1.25	1.42
262	Miscellaneous nonmetallic mineral and stone products	774	1.33	1.24	1.43
231	Sawmills, planning mills, and millwork	2,672	1.32	1.27	1.37
042	Oil and gas extraction	1,850	1.30	1.25	1.36
141	Carpets and rugs	403	1.30	1.18	1.43
270	Blast furnaces, steelworks, rolling and finishing mills	7,675	1.30	1.27	1.33
752	Electrical repair shops	564	1.28	1.17	1.40
290	Screw machine products	197	1.27	1.09	1.47
400	Railroads	8,358	1.27	1.25	1.30
031	Fishing, hunting, and trapping	394	1.26	1.14	1.40
331	Machinery, except electrical, n.e.c.	4,672	1.26	1.22	1.30
212	Miscellaneous plastics products	715	1.25	1.17	1.35
282	Fabricated structural metal products	1,790	1.25	1.19	1.31
320	Metalworking machinery	1,951	1.25	1.20	1.31
420	Water transportation	1,501	1.25	1.19	1.32

See footnotes at end of table.

Table 10-2 (page 2 of 4). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
470	Water supply and irrigation	947	1.25	1.18	1.33
392	Not specified manufacturing industries	11,116	1.24	1.22	1.26
502	Lumber and construction materials	428	1.24	1.13	1.37
801	Bowling alleys, billiard and pool parlors	1,157	1.24	1.17	1.32
942	Military	6,900	1.24	1.22	1.27
242	Furniture and fixtures	2,962	1.23	1.18	1.28
301	Not specified metal industries	426	1.23	1.12	1.36
351	Motor vehicles and motor vehicle equipment	7,779	1.22	1.20	1.25
030	Forestry	423	1.21	1.10	1.33
221	Footwear, except rubber and plastic	1,701	1.21	1.15	1.27
101	Dairy products	1,466	1.20	1.14	1.26
160	Pulp, paper, and paperboard mills	3,075	1.20	1.17	1.24
531	Scrap and waste materials	470	1.20	1.10	1.32
111	Bakery products	1,422	1.19	1.13	1.25
140	Dyeing and finishing textiles, except wool and knit goods	224	1.19	1.03	1.37
220	Leather tanning and finishing	187	1.19	1.03	1.38
280	Other primary metal industries	1,223	1.19	1.13	1.26
211	Other rubber products, and plastics footwear and belting	1,621	1.18	1.12	1.24
241	Miscellaneous wood products	688	1.18	1.09	1.28
312	Construction and material handling machines	1,421	1.18	1.12	1.24
332	Not specified machinery	420	1.18	1.07	1.30
401	Bus service and urban transit	1,579	1.18	1.12	1.24
562	Miscellaneous wholesale, nondurable goods	235	1.18	1.03	1.35
641	Eating and drinking places	12,679	1.18	1.16	1.20
120	Beverage industries	1,610	1.17	1.11	1.23
272	Primary aluminum industries	882	1.17	1.09	1.25
300	Miscellaneous fabricated metal products	1,689	1.17	1.11	1.23
461	Gas and steam supply systems	867	1.17	1.09	1.25
552	Petroleum products	1,252	1.17	1.11	1.24
560	Alcoholic beverages	194	1.17	1.01	1.35
612	Motor vehicle dealers	3,394	1.17	1.14	1.21

See footnotes at end of table.

Table 10-2 (page 3 of 4). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
011	Agricultural production, livestock	5,970	1.16	1.14	1.19
281	Cutlery, handtools, and general hardware	392	1.16	1.05	1.29
311	Farm machinery and equipment	591	1.16	1.06	1.27
010	Agricultural production, crops	24,290	1.15	1.13	1.17
110	Grain mill products	523	1.15	1.06	1.26
291	Metal forgings and stampings	529	1.15	1.06	1.26
340	Household appliances	1,174	1.15	1.08	1.22
620	Auto and home supply stores	1,178	1.15	1.08	1.22
672	Fuel dealers	681	1.15	1.06	1.25
020	Agricultural services, except horticultural	432	1.14	1.04	1.26
021	Horticultural services	1,268	1.14	1.09	1.21
310	Engines and turbines	640	1.14	1.06	1.24
352	Aircraft and parts	2,519	1.14	1.10	1.19
521	Hardware, plumbing and heating supplies	627	1.14	1.06	1.24
192	Industrial and miscellaneous chemicals	3,104	1.13	1.10	1.17
292	Ordnance	502	1.13	1.04	1.23
580	Lumber and building material retailing	1,580	1.13	1.08	1.19
471	Sanitary services	1,063	1.12	1.06	1.19
551	Farm-product raw materials	469	1.12	1.03	1.23
721	Advertising	626	1.12	1.04	1.21
741	Detective and protective services	682	1.12	1.04	1.21
122	Not specified food industries	694	1.11	1.03	1.20
200	Petroleum refining	1,351	1.11	1.06	1.17
390	Toys, amusement, and sporting goods	375	1.11	1.00	1.23
100	Meat products	1,666	1.10	1.05	1.16
411	Warehousing and storage	539	1.10	1.01	1.20
460	Electric light and power	2,664	1.10	1.06	1.14
550	Groceries and related products	1,776	1.10	1.05	1.16
901	General government, n.e.c.	9,322	1.10	1.08	1.12
171	Newspaper publishing and printing	1,921	1.09	1.05	1.14
210	Tires and inner tubes	995	1.09	1.03	1.16
321	Office and accounting machines	462	1.09	1.00	1.20

See footnotes at end of table.

Table 10-2 (page 4 of 4). Chronic obstructive pulmonary disease: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
802	Miscellaneous entertainment and recreation services	1,128	1.09	1.03	1.16
142	Yarn, thread, and fabric mills	13,353	1.08	1.06	1.10
350	Not specified electrical machinery, equipment, and supplies	1,324	1.08	1.03	1.14
611	Food stores, n.e.c.	872	1.07	1.00	1.15
780	Barber shops	1,077	1.07	1.01	1.14
791	Miscellaneous personal services	773	1.07	1.00	1.15
932	National security and international affairs	3,391	1.07	1.04	1.11
722	Services to dwellings and other buildings	1,339	1.06	1.01	1.12
750	Automotive services, except repair	1,376	1.06	1.01	1.12
601	Grocery stores	5,922	1.05	1.03	1.08
172	Printing, publishing, and allied industries, except newspapers	3,125	1.04	1.01	1.08
342	Electrical machinery, equipment, and supplies, n.e.c.	3,510	1.04	1.01	1.08
910	Justice, public order, and safety	4,960	1.04	1.01	1.07

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit
NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.
SOURCE: National Center for Health Statistics multiple cause of death data.

Table 10-3 (page 1 of 4). Chronic obstructive pulmonary disease: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Textile mill products	143	8.4	1.0 - 15.8	83	12.7	2.9 - 22.5	78	7.7	2.6 - 12.8
Social services	163	8.2	0.2 - 16.2	48	8.8	0.0 - 17.6	60	20.5	4.8 - 36.2
Rubber, plastics, and leather products	101	7.6	2.9 - 12.3	41	29.2	0.0 - 59.7	34	20.9	5.8 - 36.0
Hospitals	389	6.8	3.5 - 10.1	139	8.1	3.0 - 13.2	154	14.7	6.7 - 22.7
Personal services, except private households and lodging	203	6.4	0.7 - 12.1	91	10.3	2.1 - 18.5	89	2.7	0.6 - 4.8
Department stores	204	6.3	1.8 - 10.8	64	21.2	11.4 - 31.0	68	12.9	3.5 - 22.3
Apparel and other textile products	233	5.9	1.2 - 10.6	71	15.9	5.6 - 26.2	100	8.3	3.2 - 13.4
Wholesale trade, nondurable and not specified goods	143	5.7	0.0 - 13.1	87	14.9	2.0 - 27.8	77	4.0	0.0 - 8.5
Food and kindred products	231	4.9	1.8 - 8.0	140	10.3	3.7 - 16.9	148	7.1	1.8 - 12.4
Machinery, except electrical	108	4.9	0.4 - 9.4	87	10.2	1.6 - 18.8	90	8.1	0.5 - 15.7
Food stores	279	4.9	0.0 - 9.8	86	12.6	3.2 - 22.0	127	11.5	4.7 - 18.3

See footnotes at end of table.

Table 10-3 (page 2 of 4). Chronic obstructive pulmonary disease: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Insurance and real estate	210	4.8	1.5 - 8.1	113	6.0	0.3 - 11.7	78	11.1	3.5 - 18.7
Communications	132	4.7	0.2 - 9.2	63	15.9	4.2 - 27.6	65	24.1	3.9 - 44.3
Paper products, printing	174	4.5	2.4 - 6.6	88	6.0	0.3 - 11.7	92	6.5	0.8 - 12.2
Health services, n.e.c.	246	4.3	0.6 - 8.0	72	13.1	0.0 - 26.6	123	19.0	7.3 - 30.7
Metal industries	134	4.1	0.4 - 7.8	137	12.9	2.2 - 23.6	115	15.5	8.3 - 22.7
Eating and drinking places	706	4.1	2.4 - 5.8	190	11.8	4.4 - 19.2	397	16.4	12.3 - 20.5
Private households	313	4.0	1.7 - 6.3	71	6.0	0.0 - 12.6	80	8.0	0.0 - 18.4
Lodging places	186	4.0	0.3 - 7.7	42	5.8	0.0 - 13.2	75	13.4	2.2 - 24.6
Educational services	701	3.9	1.4 - 6.4	278	6.4	2.3 - 10.5	155	2.0	0.1 - 3.9
Utilities	61	3.9	0.0 - 8.0	73	5.3	1.0 - 9.6	62	4.1	0.0 - 9.8
Transportation, except trucking	198	3.7	0.0 - 7.4	177	12.2	0.5 - 23.9	128	16.1	5.9 - 26.3
Agriculture services, forestry, and fishing	69	3.5	0.0 - 8.6	46	11.8	0.0 - 29.4	55	7.3	0.0 - 16.3
Electrical machinery, equipment, and supplies	139	3.5	0.0 - 9.2	66	12.9	3.7 - 22.1	69	22.4	11.0 - 23.8

See footnotes at end of table.

Table 10-3 (page 3 of 4). Chronic obstructive pulmonary disease: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Transportation equipment	189	3.5	0.0 - 7.2	169	5.3	0.6 - 10.0	147	6.7	3.2 - 10.2
Offices of health practitioners	133	3.5	0.0 - 7.4	40	3.3	0.0 - 8.4	33	1.1	0.0 - 2.8
Other retail trade	374	3.4	0.7 - 6.1	155	8.6	4.3 - 12.9	173	4.9	1.0 - 8.8
Agriculture production	551	3.3	1.9 - 4.7	369	14.1	9.4 -18.8	264	9.4	3.9 - 14.9
Construction	365	3.3	0.6 - 6.0	323	9.0	5.5 - 12.5	378	9.8	4.5 - 15.1
Apparel and accessory stores	155	3.1	0.0 - 6.4	32	6.9	0.0 - 15.5	54	5.6	0.0 - 12.0
Public administration, except justice, public order, and safety	342	3.0	0.9 - 5.1	214	8.6	4.7 - 12.5	161	6.5	2.0 - 11.0
Business services	268	2.9	0.2 - 5.6	118	12.7	4.9 - 20.5	158	17.8	7.6 - 28.0
Lumber and wood products, including furniture	74	2.8	0.0 - 8.3	59	3.9	0.0 - 8.4	63	10.7	1.3 - 20.1
Banking and other finance	209	2.8	0.0 - 5.7	79	18.6	6.5 - 30.7	68	17.5	4.6 - 30.4
Repair services	89	2.7	0.0 - 6.6	86	15.7	6.7 - 24.7	90	6.8	0.8 - 12.8
Vehicle dealers, supply and service stores	68	2.4	0.0 - 5.9	61	9.5	0.0 - 19.1	72	4.8	0.0 - 11.6

See footnotes at end of table.

Table 10-3 (page 4 of 4). Chronic obstructive pulmonary disease: Estimated prevalence by usual industry and smoking status, U.S. residents age 17 and over, 1988-1994

Industry	Smoking status								
	Non-smokers			Former smokers			Current smokers		
	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI	Respondents No.	Prevalence %	95% CI
Miscellaneous and not specified manufacturing industries	170	2.3	0.0 - 4.6	101	8.3	3.8 - 12.8	93	7.0	1.5 - 12.5
Chemicals, petroleum, and coal products	92	2.2	0.0 - 5.7	57	6.4	0.0 - 15.0	59	8.1	0.7 - 15.5
Other professional and related services	192	1.9	0.0 - 4.2	106	6.9	1.6 - 12.2	77	12.2	3.8 - 20.6
Justice, public order, and safety	79	1.9	0.0 - 4.4	61	3.7	0.2 - 7.2	40	8.7	0.0 - 20.6
Mining	34	1.5	0.0 - 4.2	45	11.3	0.0 - 23.4	27	10.5	0.0 - 29.3
Wholesale trade, durable goods	74	1.3	0.0 - 3.6	68	10.9	1.1 - 20.7	54	19.6	6.9 - 30.3
Entertainment and recreation services	103	0.7	0.1 - 1.3	32	3.8	0.0 - 11.6	52	7.8	0.0 - 18.2
Trucking service	66	0	-	84	4.8	0.0 - 12.2	104	12.0	2.4 - 21.6
TOTAL	**10,233**	**4.0**	**3.4 - 4.6**	**4,802**	**9.8**	**8.8 - 10.8**	**4,987**	**11.0**	**9.8 - 12.2**

CI - confidence interval - indicates incalculable field

NOTE: See appendices for source description and methods. Industries are classified according to 1980 Census Industry Code, and regrouped by NCHS.

SOURCE: NCHS third National Health and Nutrition Examination Survey.

Section 11

RESPIRATORY CONDITIONS DUE TO TOXIC AGENTS

Table 11-1. Occupational respiratory conditions due to toxic agents: Estimated number of cases reported by employers, by industry division, U.S. private sector, 1973-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Total
1973	100	-	1,000	7,300	700	1,100	100	1,100	**11,500**
1974	200	100	900	8,500	700	1,200	100	1,000	**12,700**
1975	200	100	900	7,100	900	1,400	300	1,100	**11,900**
1976	200	100	1,100	7,700	1,100	1,000	200	1,600	**13,100**
1977	100	-	1,100	7,500	1,100	1,400	100	1,700	**13,100**
1978	100	100	1,100	7,900	1,100	1,600	200	1,600	**13,600**
1979	100	100	1,100	7,800	900	1,300	200	1,700	**13,100**
1980	100	100	700	6,700	1,000	1,300	100	1,300	**11,400**
1981	100	100	1,000	5,900	800	1,100	100	1,600	**10,800**
1982	100	100	600	4,700	700	700	100	1,600	**8,800**
1983	100	100	700	4,000	600	700	100	1,700	**7,900**
1984	100	100	700	5,500	700	1,200	200	2,100	**10,600**
1985	200	100	800	6,000	900	1,400	400	1,800	**11,600**
1986	100	-	600	6,400	700	1,600	400	2,400	**12,300**
1987	700	-	700	7,500	900	1,700	400	2,400	**14,300**
1988	200	100	900	9,200	1,000	1,300	500	3,000	**16,100**
1989	100	-	700	9,900	800	3,500	300	3,500	**18,900**
1990	200	100	1,200	10,300	1,200	2,200	800	4,700	**20,500**
1991	300	-	800	8,800	1,100	1,600	700	4,800	**18,300**
1992	400	100	1,000	10,000	1,100	3,300	900	6,800	**23,500**
1993	300	100	800	10,100	2,000	3,000	1,500	6,400	**24,200**
1994	200	100	900	11,000	1,700	3,000	800	7,700	**25,300**
1995	200	100	800	9,400	1,800	2,900	1,400	7,900	**24,400**
1996	200	-	600	7,800	1,800	2,000	700	8,500	**21,700**

- indicates no data reported or data that do not meet BLS publication guidelines.

NOTE: Respiratory conditions due to toxic agents include pneumonitis, pharyngitis, rhinitis or acute congestions due to chemicals, dusts, gases or fumes. The sum of industry divisions may not equal the total due to rounding. See appendices for source description.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 11-2. Occupational respiratory conditions due to toxic agents: Rate (per 10,000 full-time workers), by industry division, U.S. private sector, 1973-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Overall
1973	1.8	1.7	3.2	3.8	1.7	0.8	0.2	1.2	**2.1**
1974	2.4	0.9	3.0	4.4	1.6	0.8	0.2	0.9	**2.2**
1975	1.7	0.8	3.1	4.1	2.1	1.0	0.7	1.1	**2.2**
1976	3.1	1.6	3.7	4.3	2.6	0.7	0.5	1.5	**2.3**
1977	2.0	0.5	3.3	4.0	2.5	0.9	0.2	1.4	**2.2**
1978	2.2	0.8	2.9	4.0	2.4	1.0	0.6	1.3	**2.2**
1979	1.1	0.8	2.8	3.9	1.9	0.8	0.5	1.3	**2.0**
1980	2.0	0.8	2.0	3.5	2.0	0.8	0.2	1.0	**1.8**
1981	1.1	1.0	2.9	3.1	1.7	0.7	0.2	1.1	**1.7**
1982	1.7	0.5	1.9	2.7	1.5	0.5	0.3	1.1	**1.4**
1983	1.4	0.8	2.0	2.3	1.4	0.4	0.2	1.1	**1.2**
1984	1.5	0.9	1.8	2.9	1.4	0.7	0.5	1.3	**1.6**
1985	2.4	1.0	1.9	3.2	1.8	0.8	0.8	1.1	**1.7**
1986	1.3	-	1.5	3.5	1.5	0.9	0.6	1.4	**1.7**
1987	7.9	0.6	1.6	4.0	1.7	0.9	0.7	1.3	**2.0**
1988	2.1	0.7	2.0	4.9	1.9	0.6	0.9	1.6	**2.2**
1989	1.5	0.5	1.5	5.2	1.6	1.7	0.5	1.7	**2.5**
1990	1.6	0.7	2.6	5.6	2.2	1.1	-	2.2	**2.7**
1991	2.7	0.6	2.1	5.0	2.1	0.8	-	2.3	**2.4**
1992	3.8	1.3	2.4	5.6	2.1	1.6	1.4	3.1	**3.1**
1993	2.5	0.9	2.0	5.6	3.7	1.5	2.5	2.8	**3.1**
1994	1.8	1.2	1.9	6.0	3.0	1.4	1.2	3.3	**3.1**
1995	1.4	1.5	1.7	5.1	3.2	1.3	2.3	3.4	**3.0**
1996	1.7	0.3	1.2	4.2	3.1	0.9	1.2	3.5	**2.6**

- indicates no data reported or data that do not meet BLS publication guidelines.

NOTE: Respiratory conditions due to toxic agents include pneumonitis, pharyngitis, rhinitis or acute congestions due to chemicals, dusts, gases or fumes. See appendices for source description.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 11-3 (page 1 of 2). Occupational respiratory conditions due to toxic agents: Industries with the highest reported incidence rates, U.S. private sector, 1992-1996

Year/Industry	SIC	Rate (per 10,000 full time workers)
1992		
Transportation equipment	37	15.2
Forestry	08	7.0
Primary metal industries	33	6.9
Instruments and related products	38	6.8
Museums, botanical, zoological gardens	84	6.6
Petroleum and coal products	29	6.6
Electronic and other electric equipment	36	6.5
Rubber and miscellaneous plastic products	30	6.3
Food and kindred products	20	6.1
Chemical sand allied products	28	5.7
OVERALL		**3.1**
1993		
Miscellaneous manufacturing industries	39	12.6
Transportation equipment	37	12.3
Primary metal industries	33	8.1
Food and kindred products	20	7.3
Fabricated metal products	34	6.6
Tobacco products	21	6.6
Agricultural production-livestock	02	6.5
Leather and leather products	31	6.5
Rubber and miscellaneous plastics products	30	6.3
Chemicals and allied products	28	6.0
OVERALL		**3.1**
1994		
Transportation equipment	37	20.4
Rubber and miscellaneous plastics products	30	8.2
Primary metal industries	33	7.8
Electric and other electric equipment	36	7.1
Museums, botanical, zoological gardens	84	7.0
Health services	80	6.0
Food and kindred products	20	5.7
Fabricated metal products	34	5.5
Instruments and related products	38	5.1
Chemicals and allied products	28	4.7
OVERALL		**3.1**

See footnotes at end of table.

Table 11-3 (page 2 of 2). Occupational respiratory conditions due to toxic agents: Industries with the highest reported incidence rates, U.S. private sector, 1992-1996

Year/Industry	SIC	Rate (per 10,000 full time workers)
1995		
Transportation equipment	37	13.5
Primary metal industries	33	7.6
Electronic and other electric equipment	36	7.6
Health service	80	6.9
Rubber and miscellaneous plastic products	30	6.6
Food and kindred products	20	5.8
Apparel and other textile products	23	5.4
Transportation by air	45	4.8
Amusement and recreation services	79	3.9
Paper and allied products	26	3.9
OVERALL		**3.0**
1996		
Transportation equipment	37	11.2
Fishing, hunting, and trapping	09	7.4
Health services	80	6.9
Hotels and other lodging places	70	6.3
Food and kindred products	20	5.7
Primary metal industries	33	4.8
Communications	48	4.7
Fabricated metal products	34	4.7
Chemicals and allied products	28	4.5
Leather and leather products	31	4.5
Rubber and miscellaneous plastic products.	30	4.5
OVERALL		**2.6**

SIC - 1987 Standard Industrial Classification

NOTE: Respiratory conditions due to toxic agents include pneumonitis, pharyngitis, rhinitis or acute congestions due to chemicals, dusts, gases or fumes. See appendices for source description.

SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 11-4. Respiratory conditions due to chemical fumes and vapors: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval LCL	95% confidence interval UCL
060	Construction	13	2.32	1.23	3.97

CIC - Census Industry Code LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Section 12

PULMONARY TUBERCULOSIS

Table 12-1. Pulmonary tuberculosis: Proportionate mortality ratio (PMR) by usual occupation, residents age 15 and over, selected states and years, 1987-1996

COC	Occupation	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
768	Crushing and grinding machine operators	13	4.76	2.53	8.14
887	Vehicle washers and equipment cleaners	14	4.12	2.25	6.91
509	Small engine repairers	6	4.00	1.47	8.71
875	Garbage collectors	19	3.52	2.12	5.50
479	Farm workers	97	3.22	2.60	3.96
079	Forestry and conservation scientists	6	3.05	1.12	6.64
183	Authors	7	2.91	1.17	6.00
829	Sailors and deckhands	9	2.47	1.13	4.69
869	Construction laborers	220	2.37	2.06	2.72
616	Mining machine operators	94	2.20	1.77	2.70
457	Barbers	26	2.17	1.42	3.18
496	Timber cutting and logging occupations	37	2.12	1.47	2.95
756	Mixing and blending machine operators	13	2.07	1.10	3.54
747	Pressing machine operators	21	2.05	1.27	3.13
599	Construction trades, n.e.c.	13	2.04	1.09	3.49
595	Roofers	19	1.99	1.20	3.11
563	Brickmasons and stonemasons	39	1.97	1.37	2.74
719	Molding and casting machine operators	12	1.96	1.01	3.42
809	Taxicab drivers and chauffeurs	24	1.96	1.26	2.92
486	Groundskeepers and gardeners, except farm	37	1.80	1.25	2.50
889	Laborers, except construction	409	1.78	1.62	1.96
405	Housekeepers and butlers	17	1.72	1.00	2.75
473	Farmers, except horticulture	417	1.67	1.52	1.84
917	Unemployed, never worked	195	1.66	1.43	1.92
453	Janitors and cleaners	199	1.62	1.40	1.87
883	Freight, stock, and material handlers, n.e.c.	23	1.62	1.03	2.43
913	Retired	52	1.59	1.18	2.10
579	Painters, construction and maintenance	53	1.57	1.16	2.07
449	Maids and housemen	42	1.55	1.11	2.11
783	Welders and cutters	52	1.42	1.05	1.87
804	Truck drivers	217	1.42	1.23	1.63
567	Carpenters	132	1.39	1.16	1.66
505	Automobile mechanics	74	1.34	1.05	1.69
407	Private household cleaners and servants	128	1.28	1.07	1.53

COC - Census Occupation Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Table 12-2. Pulmonary tuberculosis: Proportionate mortality ratio (PMR) by usual industry, residents age 15 and over, selected states and years, 1987-1996

CIC	Industry	Number of deaths	PMR	95% confidence interval	
				LCL	UCL
040	Metal mining	21	2.51	1.55	3.84
130	Tobacco manufactures	33	2.41	1.63	3.44
791	Miscellaneous personal services	26	2.35	1.54	3.45
262	Miscellaneous nonmetallic mineral and stone products	17	2.33	1.35	3.73
471	Sanitary services	32	2.32	1.57	3.31
050	Nonmetallic mining and quarrying, except fuel	16	2.29	1.31	3.72
030	Forestry	10	2.17	1.04	3.99
271	Iron and steel foundries	21	2.13	1.31	3.26
780	Barber shops	25	2.13	1.37	3.14
010	Agricultural production, crops	489	2.11	1.94	2.31
230	Logging	43	2.05	1.46	2.79
280	Other primary metal industries	24	1.95	1.25	2.90
951	Retired	18	1.86	1.10	2.94
041	Coal mining	80	1.76	1.40	2.19
420	Water transportation	24	1.69	1.08	2.51
620	Auto and home supply stores	23	1.68	1.06	2.52
762	Hotels and motels	67	1.66	1.27	2.14
360	Ship and boat building and repairing	24	1.59	1.02	2.37
231	Sawmills, planning mills, and millwork	37	1.48	1.03	2.06
060	Construction	676	1.47	1.36	1.59
761	Private households	164	1.37	1.17	1.60
410	Trucking service	145	1.29	1.09	1.52

CIC - Census Industry Code n.e.c. - not elsewhere classified LCL - lower confidence limit UCL - upper confidence limit

NOTE: See appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states (and years) for which usual industry and occupation have been reported.

SOURCE: National Center for Health Statistics multiple cause of death data.

Section 13

MULTIPLE WORK-RELATED RESPIRATORY CONDITIONS

Table 13-1. Work-related respiratory illnesses (with days away from work): Estimated number, 1992-1996

	1992	1993	1994	1995	1996
Acute respiratory infections (including common cold)	**500**	**615**	**568**	**350**	**212**
Other diseases of upper respiratory tract	**400**	**393**	**382**	**638**	**169**
Allergic rhinitis	100	125	78	129	51
Chronic conditions of upper respiratory tract (including chronic sinusitis, pharyngitis)	-	-	114	310	41
Other diseases of upper respiratory tract, unspecified or n.e.c.	300	189	190	199	42
Pneumonia, influenza	**300**	**253**	**519**	**188**	**79**
Influenza	100	-	82	-	-
Pneumonia	100	140	252	127	46
Legionnaire's disease	-	-	104	-	17
Chronic obstructive pulmonary disease (COPD) and allied conditions	**1,100**	**1,330**	**892**	**1,088**	**2,160**
Bronchitis	300	485	184	246	738
Extrinsic asthma	300	318	367	414	403
COPD and allied conditions, unspecified or n.e.c.	300	450	197	297	926
Extrinsic alveolitis and pneumonitis (including farmer's lung, bagassosis)	100	74	132	120	87
Pneumoconioses	**200**	**187**	**110**	**60**	**45**
Coal workers' pneumoconiosis (including anthracosis, black lung, miners' asthma)	100	135	64	-	-
Pneumoconioses, unspecified	-	-	-	-	18
Pneumonopathy	**200**	**163**	**134**	**57**	**39**
Byssinosis, mill fever	-	58	-	-	-
Metal fume fever	-	-	72	-	-
Pneumonopathy, unspecified	100	76	-	-	-
Other respiratory system diseases	**500**	**558**	**334**	**411**	**80**
Pneumonitis, n.e.c.	100	-	88	51	-
Atelectasis, collapsed lung	100	135	75	-	18
Other respiratory system diseases, unspecified or n.e.c.	300	367	132	301	47
Respiratory system diseases, unspecified	**800**	**848**	**727**	**813**	**882**
All respiratory system diseases	**3,900**	**4,347**	**3,668**	**3,606**	**3,665**

n.e.c. - not elsewhere classified. - indicate no data reported or data do not meet BLS publication guidelines.
NOTE: See appendices for source description and methods. Numbers do not sum to totals in 1992 due to rounding.
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 13-2. Work-related respiratory illnesses (with days away from work): Median days away from work, 1992-1996

	1992	1993	1994	1995	1996
Acute respiratory infections (including common cold)	**5**	**2**	**4**	**2**	**5**
Other diseases of upper respiratory tract	**3**	**3**	**3**	**5**	**3**
Allergic rhinitis	5	3	4	6	3
Chronic conditions of upper respiratory tract (including chronic sinusitis, pharyngitis)	-	-	-	-	-
Other diseases of upper respiratory tract, unspecified or n.e.c.	4	6	6	10	4
Pneumonia, influenza	**5**	**9**	**10**	**13**	**10**
Influenza	5	-	3	-	-
Pneumonia	14	20	10	14	10
Legionnaire's disease	-	-	30	-	12
Chronic obstructive pulmonary disease (COPD) and allied conditions	**7**	**5**	**6**	**5**	**6**
Bronchitis	5	4	5	4	2
Extrinsic asthma	3	7	8	7	6
COPD and allied conditions, unspecified or n.e.c.	31	11	39	10	9
Extrinsic alveolitis and pneumonitis (including farmer's lung, bagassosis)	4	7	5	4	5
Pneumoconioses	**153**	**133**	**120**	**111**	**14**
Coal workers' pneumoconiosis (including anthracosis, black lung, miners' asthma)	187	150	150	-	-
Pneumoconioses, unspecified	-	-	-	-	14
Pneumonopathy	**21**	**2**	**3**	**6**	**15**
Byssinosis	-	10	-	-	-
Metal fume fever	-	-	2	-	-
Pneumonopathy, unspecified	21	1	-	-	-
Other respiratory system diseases	**12**	**7**	**9**	**14**	**5**
Pneumonitis, n.e.c.	4	-	9	3	-
Atelectasis, collapsed lung	21	10	25	-	11
Other respiratory system diseases, unspecified or n.e.c.	21	8	11	14	2
Respiratory system diseases, unspecified	**2**	**3**	**5**	**3**	**2**
All respiratory system diseases	**5**	**4**	**6**	**5**	**5**

- indicate no data reported or data do not meet BLS publication guidelines..
NOTE: See appendices for source description and methods.
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 13-3a. Annual average employment (in thousands) by major industry division, 1992-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Total
1992	1,224	631	4,471	18,040	5,709	25,391	6,571	28,422	**90,460**
1993	1,224	599	4,574	17,802	5,708	25,856	6,604	29,544	**91,932**
1994	1,228	600	5,010	18,303	6,006	28,577	6,933	30,792	**95,449**
1995	1,641	582	5,088	18,473	5,858	27,564	6,617	30,920	**96,886**
1996	1,717	578	5,360	18,461	5,989	28,027	6,746	31,895	**98,773**

NOTE: The sum of individual industries may not equal yearly total due to rounding. See appendices for source description and methods.
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 13-3b. Work-related respiratory illnesses (with days away from work): Estimated number, by industry division, 1992-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Total
1992	100	100	300	1,300	300	700	200	1,100	**3,900**
1993	71	148	141	1,461	226	378	279	1,544	**4,347**
1994	27	87	237	1,303	248	504	122	1,140	**3,668**
1995	41	24	84	1,068	367	431	131	1,461	**3,606**
1996	-	15	178	840	503	589	161	1,365	**3,665**

- indicates no data reported or data that do not meet BLS publication guidelines.
NOTE: The sum of individual industries may not equal yearly total due to rounding. See appendices for source description and methods.
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 13-3c. Work-related respiratory illnesses (with days away from work): Rate (per 100,000 workers), by industry division, 1992-1996

Year	Agri-culture	Mining	Con-struction	Manu-facturing	Trans-portation & Public Utilities	Wholesale & Retail Trade	Finance	Services	Total
1992	8.2	15.8	6.7	7.2	5.3	2.8	3.0	3.9	**4.3**
1993	5.8	24.7	3.2	8.2	4.0	1.5	4.2	5.2	**4.7**
1994	2.2	14.5	4.7	7.1	4.1	1.8	1.8	3.7	**3.8**
1995	2.5	4.1	1.7	5.8	6.3	1.6	2.0	4.7	**3.7**
1996	-	2.6	3.3	4.6	8.4	2.1	2.4	4.3	**3.7**

- indicates no data reported or data that do not meet BLS publication guidelines.
NOTE: See appendices for source description and methods.
SOURCE: Bureau of Labor Statistics annual reports of occupational injuries and illnesses.

Table 13-4. Work-related respiratory conditions: Number of diagnoses related to asbestos or to other occupational exposures, based on physician's judgement, selected occupational and environmental medical clinics, 1991-1996

	Asbestos-related (2,426 patients)		Other (3,324 patients)		
	No.	%	No.	%	Most frequent hazard (No. of cases)
MALIGNANT DISEASES					
Lung cancer	30	1.2	6	0.4	crystalline silica (2)
Nasal/pharyngeal cancer	-	-	2	0.1	wood dust (1), smoke n.o.s. (1)
Laryngeal cancer	6	0.2	1	0.1	acids (1)
Mesothelioma	7	0.3	-	-	
OTHER CONDITIONS					
Upper airway diseases	**2**	**0.1**	**326**	**23.8**	
Upper respiratory irritation	-	-	314	22.9	indoor air pollutants (101)
Laryngeal disorders (other than irritation or cancer)	2	0.1	9	0.7	indoor air pollutants (2), HCl (2)
Nasal septum perforation	-	-	3	0.2	NaOH (1), NH3 gas (1), Cr (1)
Lower airway diseases	**41**	**1.7**	**690**	**50.4**	
Asthma & reactive airways dysfunction syndrome	3	0.1	537	39.2	indoor air pollutants (77)
COPD & emphysema	24	1.0	52	3.8	welding n.o.s. (10)
Bronchitis, chronic	14	0.6	33	2.4	welding n.o.s. (7), dust n.o.s. (7)
Bronchitis, acute	-	-	8	0.6	welding fume n.o.s. (2)
Bronchitis, n.o.s.	-	-	60	4.4	indoor air pollutants (7)
Interstitial inflammatory/fibrotic diseases	**1,972**	**79.7**	**153**	**11.2**	
Asbestosis	1,966	79.5	-	-	
Silicosis	-	-	72	5.3	crystalline silica (68)
Coal workers' pneumoconiosis	-	-	33	2.4	coal (33)
Pneumoconiosis due to other or mixed dust	6	0.2	13	0.9	crystalline silica (4)
Interstitial pulmonary fibrosis	-	-	13	0.9	methyl chloroform (3), paint (3)
Chemical pneumonitis	-	-	12	0.9	chlorine (3), solvents n.o.s. (3)
Hypersensitivity pneumonitis	-	-	10	0.7	avian material n.o.s. (3)
Pleural disease (without apparent lung disease)	**386**	**15.6**	**1**	**0.1**	crystalline silica (1)
Lung function abnormalities (n.o.s.)	**9**	**0.4**	**11**	**0.8**	crystalline silica (2), solvents n.o.s. (2)
Abnormal CXR (n.o.s.)	**10**	**0.4**	**0**	**0.0**	
Symptoms	**7**	**0.3**	**44**	**3.2**	
Cough	1	0.0	14	1.0	indoor air pollutants (3)
Shortness of breath	4	0.2	14	1.0	various (1 each)
Chest pain	-	-	7	0.5	various (1 each)
Hoarseness	-	-	6	0.4	various (1 each)
Nosebleeds	-	-	2	0.1	glutaraldehyde (1), chromium n.o.s. (1)
Hemoptysis	1	0.0	1	0.1	cutting oils (1)
Respiratory irritation	1	0.0	-	-	
Non-specific respiratory disorders	**4**	**0.2**	**18**	**1.3**	indoor air pollutants (2)
Chemical poisonings	**0**	**0.0**	**49**	**3.6**	
Metal fume fever	-	-	14	1.0	zinc (5)
Toxic effects of carbon monoxide or cyanides	-	-	15	1.1	carbon monoxide (7)
Toxic effects of gas/fumes/vapors/misc. chemicals (excl. lead, other heavy metals, pesticides, solvents)	-	-	19	1.4	ethylene oxide (6)
Hypoxia	-	-	1	0.1	Freon (1)
Selected miscellaneous conditions	**0**	**0.0**	**69**	**5.0**	
Positive PPD skin test	-	-	66	4.8	tuberculosis (66)
Sarcoidosis	-	-	3	0.2	cleaning materials n.o.s. (2)
TOTAL RESPIRATORY DIAGNOSES	**2,474**	**100.0**	**1,370**	**100.0**	

n.o.s. - not otherwise specified - indicates no cases

NOTE: In the Symptoms and the Chemical Poisonings categories, all diagnoses in the subcategories shown have been included as "respiratory" in this table, though some may not have been respiratory. In addition to the diagnoses shown in this table, there were 15 non-respiratory diagnoses related to asbestos and 2,712 non-respiratory diagnoses related to other occupational hazards. See appendices for source description.

SOURCE: AOEC Occupational and Environmental Disease Database reports.

APPENDICES

Annual Survey of Occupational Injuries and Illnesses, BLS

After passage of the Occupational Safety and Health Act of 1970, the responsibility for collecting statistics on occupational injuries and illnesses was delegated to the Bureau of Labor Statistics (BLS). The BLS Annual Survey of Occupational Injuries and Illnesses, done in cooperation with participating State agencies, involves data collection by mail from a sample of approximately 250,000 establishments each calendar year. Nearly all industries in the private sector (employers covered by the Occupational Safety and Health Act of 1970) are included. Annual BLS reports of these data incorporate corresponding data from mining operators, provided to BLS by the Mine Safety and Health Administration (MSHA), and from railroad transportation employers, provided to BLS by the Federal Railroad Administration. National estimates of incidence rates by industry are developed from the survey data. Beginning in 1992, the survey was expanded to provide more information on illnesses resulting in days away from work, allowing for more detailed classification of respiratory system diseases.

For this report, annual summary data on respiratory illnesses with days away from work for 1992-1996 were abstracted from BLS annual reports on occupational injuries and illnesses, published during the period 1995-1999.

In contrast with injury data, illness data presented in the BLS annual reports are quite limited because employers typically do not recognize and report illnesses, particularly illnesses with a long latency. Also, the annual survey excludes: the self-employed; farm operators with fewer than 11 employees; private households; employees in Federal, state, and local government agencies, and independent mining contractors.

For more information refer to: *Occupational Injuries and Illnesses: Counts, Rates, and Characteristics, 1996*. Bulletin 2512, U.S. Department of Labor, Bureau of Labor Statistics, U.S. Government Printing Office, Washington, DC 20402.

Black Lung Benefit Awards, SSA and DOL

Title IV of the Coal Mine Health and Safety Act of 1969 provided for a benefits program, consisting of a medical payment and cash stipend program for miners totally disabled because of pneumoconiosis arising out of employment in underground coal mining, as well as for widows of coal miners whose death resulted from the disease or who were entitled to Black Lung benefits at the time of death. The Social Security Administration (SSA) was assigned initial responsibility for operating the benefits program. The Black Lung Benefits Act of 1972 continued SSA responsibility for payments to miners granted claims before July 1973, assigned the Department of Labor responsibility for claims filed after July 1973, and extended eligibility for benefits to surface coal miners and to surviving children of miners. This latter provision allowed children to receive benefits if both parents were deceased, or if a widow ceased to qualify for benefits through remarriage.

For more information refer to: 1) *Social Security Bulletin, Annual Statistical Supplement, 1998.* SSA Pub. No. 13-11700. U.S. Government Printing Office, Washington, DC 20402; and 2) *Office of Workers' Compensation Programs, Annual Report to Congress: FY1996.* Submitted to Congress, 1997. U.S. Department of Labor, Employment Standards Administration.

Coal Mine Employment Data, MSHA

Initiated in 1970, annual informational reports from the Mine Safety and Health Administration (MSHA) summarize occupational injury and illness experience of United States miners, based on data reported by mine operators. Each operator subject to the Federal Mine Safety and Health Act of 1977 is required to submit annual reports of all injuries and occupational illnesses (see section on Annual Survey of Occupational Injuries and Illnesses, above), as well as related data, including average number of employees during the year. The MSHA informational reports on coal mining provide annual estimates for size of the mining workforce, including separate figures for underground mines. Similar estimates are provided

based on data reported by contractors performing certain work at mining operations.

For more information refer to: *Injury Experience in Coal Mining, 1996,* U.S. Department of Labor, Mine Safety and Health Administration, Information Report, IR1253 1997, U.S. Government Printing Office, Washington, DC 20402.

Coal Workers' X-ray Surveillance Program, NIOSH

The Coal Workers' X-ray Surveillance Program (CWXSP) is a NIOSH-administered occupational health program mandated by the Coal Mine Health and Safety Act of 1969. The primary objective of the CWXSP is to screen miners for coal workers' pneumoconiosis (CWP). Since 1970, all active underground coal miners have been required to have a chest radiograph at the time of hire and again three years later. Subsequently, they can volunteer for radiographs at approximately five-year intervals. The chest x-rays are taken at no cost to the miners. In addition to the posterior-anterior chest x-ray, other information is collected, including miner identification, age, tenure, and specific job in the mine.

The chest films are read by physicians certified by NIOSH as proficient in use of the International Labour Office (ILO) classification system for radiographs of the pneumoconioses. Each film is read by at least two readers, and a consensus rule is used to reach a final determination for each film. The CWXSP defines CWP as small opacity profusion category of at least 1/0 or large (i.e., larger than one centimeter in diameter) opacities consistent with pneumoconiosis. Miners with radiographic evidence of CWP on their chest radiographs are offered the option to work in an area of the mine with a respirable coal mine dust level of 1 mg/m^3 or less and have personal dust exposures monitored at frequent intervals.

The large number of chest x-rays readings collected since 1970 provide a means of monitoring the prevalence of CWP among active underground coal miners. However, coal miner participation rates have generally decreased since 1970 to less than 30% of working underground coal miners. Thus, tenure-specific prevalence estimates may be biased due to selective participation. Also, overall crude prevalence estimates may reflect over-representation of newly employed miners. Thus, inferences regarding the entire coal mine work force that are based on CWXSP data should be used with caution. NIOSH has recently undertaken efforts to increase miner participation in the program. Tabulations of CWXSP data presented in this report vary from those presented in earlier editions of the *Work-Related Lung Disease Surveillance Report* due to revised criteria for categorizing tenure and round.

For more information contact: Coal Workers' Health Surveillance Program Activity, Surveillance Branch, Division of Respiratory Disease Studies, NIOSH, 1095 Willowdale Road, Morgantown, WV 26505. Phone (304) 285-5724.

Integrated Management Information System, OSHA

The Integrated Management Information System (IMIS) includes most of the industrial hygiene sampling data from Occupational Safety and Health Administration (OSHA) compliance inspections conducted since May 1979. These data are reported by OSHA field compliance officers. Each IMIS record includes sampling date, substance code, airborne concentration, sample and exposure type (see Methods, Appendix B), occupation, permissible exposure limit (PEL), and standard industrial classification. OSHA provides IMIS data to NIOSH on an annual basis. Because OSHA occasionally revises and updates IMIS files provided to NIOSH, some numbers of records shown in this report for a given year (or period of years) are not identical to the corresponding numbers presented in previous reports.

For more information contact: Occupational Safety and Health Administration, Office of Management Data Systems, 200 Constitution Avenue, NW, Washington, DC 20210. Phone (202) 693-1700.

Metal/Nonmetal Mine Inspection Data, MSHA
The metal/nonmetal mine inspection data (MNMID) are records of industrial hygiene samples collected by Mine Safety and Health Administration (MSHA) inspectors in non-coal surface and underground mines since 1974. These data represent both personal and area samples. Each MNMID record includes sampling date, contaminant code, airborne concentration, occupation, permissible exposure limit (PEL), percent silica and silica concentration (where applicable), standard industrial classification, and the mine at which the sample was obtained. The quartz reference standard used for MNMID samples changed in 1988. MSHA annually provides NIOSH with the MNMID, including updated data for previous years. Because MSHA occasionally revises and updates MNMID files provided to NIOSH, some of the numbers of records shown in this report for a given year (or period of years) are not identical to the corresponding numbers presented in previous reports.

For more information contact: Mine Safety and Health Administration, Metal and Nonmetal Health Division, Room 705A, 4015 Wilson Blvd., Arlington, VA 22203. Phone (703) 235-8307.

For more information on the quartz reference standard used for the MNMID samples, contact: Mine Safety and Health Administration, Pittsburgh Safety and Health Technology Center, Dust Division, P.O. Box 18233, Pittsburgh, PA 15236. Phone (412) 386-6902.

Multiple Cause of Death Data, NCHS
The National Center for Health Statistics (NCHS) makes available annual public-use multiple cause of death data files since 1968. These public-use files contain records of all deaths in the United States (approximately two million annually) that are reported to state vital statistics offices. Each death record includes codes for up to 20 conditions listed on the death certificate, including both underlying and contributory causes of death. Other data include age, race, sex, and state and county of residence at time of death. In addition, usual occupation and industry codes are available for decedents from some states since 1985, and NCHS annually determines that certain quality criteria have been met by usual industry and occupation data from selected states (see list in Appendix E).

Potential limitations of multiple cause of death data include: under- or over-reporting of conditions on the death certificate by certifying physicians; incomplete or unclassified reporting of usual occupation and industry; and non-specificity of codes.

For more information refer to: *Vital Statistics of the United States, 1993*, Vol. l, DHHS Pub. No. (PHS) 99-1100 and Vol. ll, Part A, DHHS Pub. No. (PHS) 99-1101, Public Health Service, National Center for Health Statistics. U.S. Government Printing Office, Washington, DC 20402.

National Health and Nutrition Examination Survey, NCHS
The National Center for Health Statistics (NCHS) makes available public-use data from the National Health and Nutrition Examination Survey (NHANES), a series of national surveys initiated in 1960. The fundamental purpose of these surveys is to characterize the health and nutritional status of the civilian noninstitutionalized population of the United States. The third National Health and Nutrition Examination Survey (NHANES III), conducted from 1988 to 1994, was a cross-sectional household interview and physical examination survey of the United States civilian noninstitutionalized population, aged two months and older. NHANES III data were collected in 81 counties across the nation on approximately 30,000 respondents among 39,696 persons selected for participation. There were 20,050 adult respondents (age 17 and older).

For more information contact: Division of Health Examination Statistics, National Center for Health Statistics, 6525 Belcrest Road, Hyattsville, MD 20782. Phone (301) 436-7068.

National Hospital Discharge Survey, NCHS
Estimated numbers of hospital discharges presented in this report have been abstracted from National

Hospital Discharge Survey (NHDS) reports published by the National Center for Health Statistics (NCHS). The NHDS, conducted yearly by NCHS, collects data on the use of short-stay non-Federal hospitals in the United States. In recent years, data have been abstracted from approximately 250,000 records from about 500 hospitals. Each discharge record includes information on patient age, race, sex, ethnicity (since 1985), marital status, length of stay, source of payment (since 1977), diagnoses and surgical procedures, hospital size, ownership, and region of the United States.

Only hospitals with six or more beds for patient use and those in which the average length of stay for all patients is less than 30 days are included in the survey. One limitation of NHDS data is that it represents number of discharges, not number of patients. In addition, information is available only nationally and by region, but not by state. The NHDS relies on the completeness of hospital medical records, and findings can be influenced by diagnostic practices.

For more information refer to: Graves EJ, Kozak LJ. *Detailed Diagnoses and Procedures, National Hospital Discharge Survey, 1996*. National Center for Health Statistics, Series 13 (138), 1998.

Occupational and Environmental Disease Surveillance Database, AOEC

A database for occupational and environmental diseases and chronic injuries has been developed by the Association of Occupational and Environmental Clinics (AOEC). For inclusion in the database, a case must have at least one diagnosed condition that, in the physician's judgement, is more likely than not to be related to occupational or environmental exposure. Thirteen AOEC member clinics contributed cases for the period 1991-1993, for which data have been reported by the AOEC in *Summary of AOEC Database Case Reports, The first Three Years: 1991-1993* (September 1995). Ten clinics contributed cases for the period 1993-1996, for which data have been reported by the AOEC in *Summary of AOEC Database Case Reports, 1994-1996* (January 1998). The AOEC database is increasingly dominated by cases contributed by only three clinics (located in Massachusetts, Michigan, and the District of Columbia). In 1996, 348 of the 351 cases related to occupational exposures other than asbestos were contributed by these three clinics. Thus, cases in the database may not be representative of occupational disease cases seen in all AOEC clinics.

For more information contact: Association of Occupational and Environmental Clinics, 1010 Vermont Ave., NW, #513, Washington, DC 20005. Phone (202) 347-4976.

Population Data Estimates, BoC and CDC

National population estimates used in this report are based on national and state level data from the United States Bureau of the Census (BoC). All population estimates used to compute rates in this report have been those obtainable through the CDC computer system. BoC decennial census population data were used for 1970, 1980, and 1990. For all other years preceding 1996, estimates from intercensal or (for 1991 through 1995) postcensal Demo-Detail files, have been used. For 1996, comparable postcensal population estimates prepared by the BoC were used. [Note: Comparing population statistics from Demo-Detail and BoC postcensal estimates for each year from 1990 through 1995, we observed a maximum annual difference of less than 0.05 percent, and a difference of 0.01 percent or less in a majority of years. State-specific differences for the same years were less than one percent for all states, with very rare exceptions.]

For information on the 1990 census, refer to: U.S. Bureau of the Census, *1990 Census of the Population, General Population Characteristics*, Series 1900, CP-1. For information on Demo-Detail population estimates contact: Richard Irwin, Director, Demo-Detail, 2303 Apple Hill Road, Alexandria, VA 22308. Phone (703) 780-9563.

Respirable Coal Mine Dust Data, MSHA

These data, provided by the Mine Safety and Health Administration (MSHA) staff to NIOSH, represent

respirable coal mine dust levels measured by MSHA inspectors at surface and underground coal mines since 1970. Each record includes sampling date, dust concentration, occupation associated with the sample, an MSHA designator as to the validity of the sample, and the mine at which the sample was obtained.

The MSHA respirable coal mine dust samples are obtained by drawing mine air through a filter at the rate of two liters per minute, with a cyclone used to extract non-respirable particles prior to the filter. The dust weight collected on the filter is multiplied by 1.38 to complete the conversion to Mines Research Establishment (MRE) units. The "MRE" designation indicates that measurements obtained by MSHA were converted so that they would be equivalent to those obtained with an instrument on which the British standards have been based (Isleworth Type 113A Gravimetric Dust Sampler).

For more information, contact: Mine Safety and Health Administration, Information Resource Center, P.O. Box 25367, Denver, CO 80225. Phone (303) 231-5475.

Respirable Coal Mine Quartz Dust Data, MSHA

These data, provided by MSHA to NIOSH, represent respirable quartz levels derived from respirable coal mine dust samples collected by MSHA inspectors at surface and underground coal mines since 1982. Each record includes sampling date, sampling time, initial and final weights, percent quartz, the occupation associated with the sample, and the mine at which the sample was obtained.

For more information, contact: Mine Safety and Health Administration, Pittsburgh Safety and Health Technology Center, Dust Division, P.O. Box 18233, Pittsburgh, PA 15236. Phone (412) 386-6902.

The Sentinel Event Notification Systems for Occupational Risks (SENSOR), NIOSH

Since 1987, the National Institute for Occupational Safety and Health (NIOSH) has awarded cooperative agreements to various state health departments to develop models for state-based and condition-specific surveillance and preventive intervention. Two of the conditions for which states have been funded through the SENSOR program are silicosis and work-related asthma. States and years funded for these two conditions are shown in the following table.

States with SENSOR Silicosis (S) and/or Work-related Asthma (A) Surveillance and Intervention Programs, 1988-present

State	Oct. 1988-Sept. 1992	Oct. 1992-Sept. 1997	Oct. 1997-present
CA		A	A
CO	A		
IL		S	
MA	A	A	A
MI	A, S	A, S	A
NJ	A, S	A, S	A*, S
NY	A		
NC		S	
OH	S	S	S
TX		S	
WI	A, S	S	

*Not funded by NIOSH for work-related asthma during this period, but continued its program.

SENSOR Silicosis

During the period of time covered by the SENSOR tables included in this report (1993-1995), all seven states with SENSOR silicosis programs reviewed state death certificate data and actively solicited case reports from physicians to identify potential silicosis cases. Illinois, Michigan, New Jersey, Ohio, and Wisconsin also identified potential cases through review of hospital discharge data or direct hospital reporting to the state health department. In addition, Michigan, North Carolina, and Ohio reviewed workers' compensation records and North Carolina

reviewed data from the North Carolina Dusty Trades Program, a longstanding screening program for employees exposed to silica dust.

In all seven states, demographic, work history, and medical information used for case confirmation and description was obtained through a combination of the initial case ascertainment source, a review of medical records, and follow-up telephone interview of the reported cases or their surviving next of kin. For SENSOR surveillance purposes, silicosis case confirmation requires a history of occupational exposure to airborne silica dust and at least one of the following: a) a chest radiograph interpreted as characteristic of silicosis; b) lung histopathology characteristic of silicosis (see Appendix G).

For more information refer to: Maxfield R, Alo C, Reilly MJ, et al. Surveillance for silicosis, 1993S Illinois, Michigan, New Jersey, North Carolina, Ohio, Texas, and Wisconsin. *Morb Mort Weekly Rep* 1997;46;No SS-1:13-21.

SENSOR Work-Related Asthma (WRA)

During the period of time covered by the SENSOR tables included in this report (1993-1995), physician case reports represented the primary ascertainment source for WRA cases in all four states. Massachusetts, Michigan, and New Jersey actively solicited physicians for case reports, whereas California identified potential cases by reviewing data from Doctor's First Reports (DFR) of Occupational

Injury or Illness, a longstanding statewide physician reporting system linked to physician reimbursement for medical services. In addition, Michigan and New Jersey actively solicited hospital reports and reviewed hospital discharge records for potential WRA cases. In 1997, California and Massachusetts also began supplementing case ascertainment with review of state-wide hospital discharge data and workers' compensation data.

In all four states, surveillance staff collected demographic, work history, and medical information used for case confirmation, classification, and description through a combination of the initial case ascertainment source, a review of medical records, and follow-up telephone interview with reported cases. For SENSOR surveillance purposes, WRA surveillance case confirmation requires a healthcare professional's diagnosis of asthma (or a related diagnosis consistent with asthma**)** and an association between symptoms of asthma and work. Confirmed WRA cases are classified according to established criteria (see Appendix H).

To facilitate consistency in agent coding across states, putative causes of WRA are coded using the Association of Occupational and Environmental Clinics (AOEC) exposure coding scheme (at http://occ-env-med.mc.duke.edu/oem/aoeccode.htm), which flags “known asthma inducers.”

For more information refer to: Jajosky RA, Harrison R, Reinisch F, et al. Surveillance of work-related asthma in selected U.S. states using surveillance guidelines for state health departmentsSCalifornia, Massachusetts, Michigan, and New Jersey, 1993-1995. *Morb Mort Weekly Rep* 1999;48;No. SS-3:1-20.

MORTALITY

Number of Deaths

In this report, the number of deaths for each occupational respiratory condition is the number of decedents for which the condition was coded as either underlying or contributory cause of death. These numbers were tabulated from the record axis of the NCHS multiple cause of death data files. Cause of death codes were defined as shown in Appendix C [International Classification of Disease (ICD) Codes]. In the current report, the number of deaths by condition are reported both annually and for selected time periods. Where numbers of deaths are presented in this report, the total for the specific period is reported. Reported deaths are restricted to United States residents, 15 years or older, based on state of residence at death. Race was classified as white, black, and all others.

Crude Mortality Rates

To compute annual cause-specific crude mortality rates, the total number of decedents, 15 years and older, with a specified condition coded as either underlying or contributory cause in a given year was divided by the population, 15 years and older, of the same geopolitical unit in the same year. To compute race- and sex-specific rates, appropriate restrictions were placed on data used for the numerator and for the denominator. To compute mortality rates for the 1987-1996 period, the 1987-1996 average annual number of decedents, 15 years and older, with a specified condition coded as either underlying or contributory in the area of interest was divided by the 1992 population, 15 years and older, of the same geopolitical unit in the same year.

Age-adjusted Mortality Rates

Age-adjusted mortality rates presented in this report were based on deaths with the condition of interest mentioned as either underlying or contributory cause of death. Age-adjusted rates were computed by the direct method. Rates were calculated annually for each specified condition from 1968 through 1996, as well as for selected periods. For a given year, the age-adjusted rates represent the rates that would have been observed if the age-specific rates for specified age groups had occurred in a population with the same age distribution as that of the standard population. For this report, the 1940 United States population was used as the standard. The specific age intervals used were 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85 years and older. Rates for the entire United States population and for each sex-race group were age-adjusted separately, using the same standard population.

The method of calculation first computed the annual age-specific rates for the population of interest. The product of the age-specific rates and the number in the comparable age-specific group in the standard population equals the expected number of deaths per million population for each age group. The total expected numbers of deaths were then obtained by summing over all age groups. The total expected number of deaths was divided by the sum of the standard population and the resulting quotient was multiplied by 1,000,000 to produce the age-adjusted rate (per million).

Age-adjusted mortality rates were computed at the national and state level for the multi-year periods 1987-1996. The method of calculation first computed age-specific rates by dividing the average annual number of deaths for each age group by the corresponding age-grouped 1992 population for the comparable geopolitical unit. Age-adjusted rates were then computed as described above.

Years of Potential Life Lost

Years of potential life lost (YPLL) were based on deaths with the condition of interest mentioned as either underlying or contributory cause of death. They were calculated using the method described by the Centers for Disease Control (CDC) *(MMWR, Vol 34/2S:* December 19,1986). YPLL were calculated both to age 65 and to life expectancy. YPLL to age 65 may be considered as a loss of years from a normal working life, while YPLL until life expectancy may be considered as a loss of years from the overall life span. For YPLL to age 65, the number of deaths with a

mention of a specific condition of interest were classified into the ten-year age groups mentioned in the section on age-adjusted mortality rates. The number of deaths in age group was then multiplied by the difference between 65 years and the mid-point of the age group. Thus for the 15-24 year age group, the number of deaths would be multiplied by 45 (i.e., 65 minus 20 years). The age-specific YPLL were summed over all age groups to obtain the total YPLL for each year.

For YPLL to life expectancy, the single difference was that the calculation was based on the number of deaths in the age-specific group and the life expectancy at that age in the year of death. Life tables published annually by NCHS were used to determine life expectancy. State-specific YPLL (to life expectancy) per death were calculated for the period, 1987-1996. To calculate this index, YPLL (to life expectancy) were divided by the total number of deaths in the time period.

Rank Order

For each state, a rank order is presented for each of several mortality measures. Depending on the specific mortality measures, a rank order of "1" indicates the greatest number of deaths, highest mortality rate, or highest YPLL among all states in the U.S.

Most Frequently Recorded Occupations/Industries

In this report, the ten most frequently recorded industries (and occupations) of decedents have generally been listed for specified causes of death. Where more than one industry/occupation was tied for tenth place, all those that were tied were listed if the number of deaths was at least two for each tied industry/occupation.

Proportionate Mortality Ratio (PMR)

The data used for PMR analyses were a subset of the NCHS multiple cause of death files for which usual occupation and industry are available and meet quality criteria set by NCHS (see Appendix E for a list of states and years for which data qualified).

The PMR is defined as the observed number of deaths with the condition of interest (mentioned as either underlying or contributory cause) in a specified occupation or industry divided by the expected number of deaths with that condition. The expected number of deaths is the total number of deaths in the occupation or industry of interest multiplied by a proportion defined as the number of cause-specific deaths for the condition of interest in the total population divided by the total number of deaths in the population. The PMRs in this report have been internally age-adjusted (i.e., 15-34, 35-54, 55-74, and 75 years and over). Confidence intervals were calculated assuming Poisson distribution of the data.

A PMR over 1.00 indicates that there were more deaths with the condition in a specified occupation or industry than expected. In this report, PMRs with a lower 95% confidence limit exceeding 1.0 have been listed for occupations or industries with at least five deaths from the condition of interest.

Census Industry and Occupation Codes

Industry and occupation codes and titles presented in the mortality and exposure sections of this report follow the Bureau of Census Classified Index of Industry and Occupations used in the 1980 census of the United States population. Since 1993, the 1990 classification system has been used for coding death certificate information on the NCHS multiple cause of death data files. Most codes and titles in the 1990 system do not differ from the 1980 system. However, some tables in this report contain codes (i.e., CIC or COC) where inconsistencies occur between the 1980 and 1990 systems (see Appendix D).

MORBIDITY

Prevalence (COPD and Asthma)

On the basis of the NHANES III adult (17 years and older) household interview, chronic obstructive pulmonary disease (COPD) was defined as a "yes" response to either of the following questions: 1) "Has a doctor ever told you that you had chronic bronchitis?"; or 2) "Has a doctor ever told you that you

had emphysema?". Asthma was defined as a "yes" response to the question, "Has a doctor ever told you that you had asthma?". Prevalence rates for COPD and for asthma were estimated (using sample weights and adjustment for non-responses) by smoking status and usual industry (using the 44 industry categories as regrouped by NCHS in the NHANES III data files). Survey Data Analysis (SUDAAN) software was used to estimate variances, enabling calculation of 95% confidence intervals for COPD and asthma prevalence rates.

Prevalence (CWP)

Prevalence of coal workers' pneumoconiosis (CWP), presented by tenure and time period, was based solely on "final determinations" (consensus values) of ILO category 1/0 or higher of chest radiographs taken for the Coal Workers' X-ray Surveillance Program (CWXSP). Administrative and regulatory guidelines have varied over the life of the program. From 1970 through 1981, the program had been administered in structured rounds. After a change in procedure in 1981, examinations have been arranged on a more continuous basis. For this report, CWXSP data collected after 1981 are grouped into 5-year periods (referred to as "rounds"), which roughly correspond to cycles during which all working underground coal miners could elect to receive a chest x-ray. In cases where more than one chest x-ray was available for a single participant in the same roundSusually due to a change in employer, the final determination for the most recent chest x-ray of acceptable quality was used. Tenure in underground coal mining was based on summation of years in various mining occupations, as reported by the miner at the time of x-ray. Tenure totals, especially those of less than one year in underground coal mining, were reviewed for data completeness and accuracy.

Incidence Rates (Occupational Respiratory Illnesses)

Where not abstracted directly from BLS reports, incidence rates for occupational respiratory illnesses (with days away from work) were computed by dividing the BLS-estimated annual number of incident cases in the industry by the BLS-estimated industry-specific employment for the corresponding year. The resulting quotients were multiplied by 100,000 to yield rates per 100,000 workers.

Association of Occupational and Environmental Clinics (AOEC) Diagnoses

The table summarizing frequency distributions of work-related respiratory conditions diagnosed in AOEC clinics from 1991 to 1996 represents aggregation of data abstracted from the two AOEC reports that covered the 1991-1993 period and the 1994-1996 period, respectively (see Appendix A).

EXPOSURE

Data Selection

MSHA respirable coal mine dust samples selected for analysis were restricted to those samples which met all three of the following criteria:

1) samples obtained in the 50 U.S. states or Washington, DC (i.e., the Virgin Islands and Puerto Rico were excluded);
2) samples designated by MSHA as valid;
3) samples coded as "designated occupation," "non-designated occupation," "designated work position," "non-designated work position" with valid occupation codes, or "designated area" other than "intake air."

MSHA coal mine quartz samples selected for analysis were those samples which met all five of the following criteria:

1) samples obtained in the 50 U.S. states or Washington, DC (i.e., the Virgin Islands and Puerto Rico were excluded);
2) samples designated by MSHA as valid;
3) samples with sampling time greater than zero;
4) samples with quartz concentration greater than zero;
5) samples coded as "designated occupation," "non-designated occupation," "designated work position," "non-designated work position" with valid occupation codes, or "designated area" other than "intake air."

MNMID data selected for analysis were all MSHA non-coal sample records that met all three of the following criteria:

1) samples for agents listed in Appendix F;
2) samples obtained in the 50 U.S. states or Washington, DC (i.e., the Virgin Islands and Puerto Rico were excluded);
3) samples not duplicated by another record, as determined by a comparison of all data fields.

NIOSH staff edited the MNMID provided by MSHA to remove duplicate records and records with internal inconsistencies, in a manner similar to that previously employed by the U.S. Bureau of Mines for data presented in earlier *Work-Related Lung Disease Surveillance Reports*.

IMIS data selected for analysis were a subset of all sample records for agents listed in Appendix F. The subset for analysis resulted from selecting records which met all four of the following criteria:

1) records with the state code of one of the 50 U.S. states or Washington, DC (i.e., the Virgin Islands and Puerto Rico were excluded);
2) records with sample type "area" or "personal" (i.e., "bulk," "wipe," "screen," "blood," and "urine samples were excluded);
3) records with exposure type "time-weighted average," "ceiling," "peak," or "not detected" (i.e., "dose," "sound reading," "not analyzed," and "not valid" were excluded);
4) records for which the indicated PEL and units were applicable to the contaminant indicated by the substance code for the recorded date of sampling.

Data Analysis

The number of samples within an agent category of interest was the total number of samples selected by the above criteria for the agents in that category (see Appendix F for agents and categories).

The severity level for any sample was calculated as the measured exposure level divided by either the enforced PEL or a surrogate for the enforced PEL (see below).

The percent of samples exceeding the PEL (or its surrogate) for an agent category was calculated as the number of samples in that category with measured exposure exceeding the corresponding PEL (or its surrogate), divided by the total number of samples, and finally multiplying by 100.

The average severity level for an agent category was calculated by determining the severity level for each sample in that category, then summing the severity levels, and finally dividing the sum by the number of samples. The average severity level for samples exceeding the PEL (or its surrogate) was calculated in the same manner, after restricting the data to samples for which measured exposure exceeded the PEL (or its surrogate).

Due to complexities of determining the enforced PELs for respirable coal mine dust samples and for respirable coal mine quartz samples, the number and percent of samples exceeding the PEL and the average severity levels presented in this report were calculated using surrogate PELsSalways 2 mg/m^3 MRE for respirable coal mine dust and 0.1 mg/m^3 MRE for respirable coal mine quartz. The following paragraph explains the MSHA method for determining respirable coal mine dust PELs and provides a rationale for selecting these surrogate PELs.

Since December 1972, the maximum PEL for respirable coal mine dust has been 2 mg/m^3 MRE unless the quartz concentration at the particular mine has been found in excess of 5%. MSHA has no specific PEL for quartz in coal mines. MSHA's respirable coal mine quartz data are based on their analysis of respirable coal mine dust samples. However, until April, 1995, inspector samples with less than 0.45 mg net weight gain were not analyzed for quartz. Since April, 1995, samples with less than 0.45 mg net weight gain have also been analyzed for quartz. When the quartz content has been found to be in excess of 5% in dust from a particular mine, the 2 mg/m^3 MRE PEL is reduced based on the following formula:

$$PEL = \frac{10 \text{ mg/m}^3 \text{ MRE}}{\text{SSSSSSSSSSSS}}$$
$$\% \text{ quartz}$$

Using this formula, one can see that at 100% quartz, the PEL would be 0.1 mg/m^3 MRE.

Permissible Exposure Limits

OSHA and MSHA each enforce regulations which establish the legal limits on workplace exposures to pneumoconiotic agents. These legal limits are described in this report as permissible exposure limits (PELs), although the regulations sometimes use the term "standard" or "exposure limit." The current legal limits may be found in the U.S. Code of Federal Regulations (CFR), as follows:

OSHA	
general industry:	29 CFR 1910.1000
	29 CFR 1910.1001
	29 CFR 1910.1043
construction industry:	29 CFR 1926.55
	29 CFR 1926.1001
maritime industry:	29 CFR 1915.1000
	29 CFR 1915.1101
MSHA	
coal mine industry:	30 CFR 70.100-.101
	30 CFR 71.100-.101
	30 CFR 71.700
	30 CFR 75.321
non-coal industry:	30 CFR 56.5001
	30 CFR 57.5001

This report uses the PELs which were enforced at the time of the sample, unless a surrogate PEL was being used (see preceding Data Analysis section).

International Classification of Disease (ICD) Codes

Condition (as defined for this report)	ICD-8 (1968-1978)		ICD-9 (1979-1996)	
	Rubrics	Codes	Rubrics	Codes
Asbestosis	**Asbestosis**	**515.2**	**Asbestosis**	**501**
Coal Workers' Pneumoconiosis	**Anthracosilicosis** Anthracosis Coal miners' lung	**515.1**	**Coal workers' pneumoconiosis** Anthracosilicosis Anthracosis Black lung disease Coal workers' lung Miners' asthma	**500**
Silicosis	**Silicosis** Calcicosis Chalicosis	**515.0**	**Pneumoconiosis due to other silica or silicates** Pneumoconiosis due to talc Silicotic fibrosis (massive) of lung Silicosis (simple)/(complicated)	**502**
	Silicotuberculosis Colliers' phthisis Grinders' phthisis Miners' phthisis Stonemasons' phthisis	**010**	*No equivalent ICD-9 code*	
Byssinosis	*No specific ICD-8 code for byssinosis*		**Pneumonopathy due to inhalation of other dust** Byssinosis Cannabinosis Flax-dressers' disease	**504**
Unspecified/Other Pneumoconioses	**Pneumoconiosis due to inhalation of other inorganic dust** Aluminosis (of lung) Bauxite fibrosis (of lung) Berylliosis Graphite fibrosis (of lung)	**516.0**	**Pneumoconiosis due to other inorganic dust** Aluminosis (of lung) Bauxite fibrosis (of lung) Berylliosis Graphite fibrosis (of lung) Siderosis Stannosis	**503**
	Other pneumoconiosis, including unspecified Pneumoconiosis: NOS; due to: silicates NEC, talc	**515.9**	**Pneumoconiosis, unspecified**	**505**
Malignant Neoplasm of Pleura	**Malignant neoplasm of pleura**	**163.0**	**Malignant neoplasm of pleura** Parietal pleura Visceral pleura Other specified site of pleura Pleura, unspecified	**163**

NOS - not otherwise specified NEC - not elsewhere classified

International Classification of Disease (ICD) Codes (continued)

Condition (as defined for this report)	ICD-9 (1979-1996)	
	Rubrics	Codes
Hypersensitivity Pneumonitis	**Extrinsic allergic alveolitis**	**495**
	Farmers' lung	
	Bagassosis	
	Bird-Fanciers' lung	
	Suberosis	
	Malt workers' lung	
	Mushroom workers' lung	
	Maple bark-strippers' lung	
	Ventilation pneumonitis	
	Other specified allergic alveolitis and pneumonitis	
	Unspecified allergic alveolitis and pneumonitis	
Asthma	**Asthma**	**493**
	Extrinsic asthma	
	Intrinsic asthma	
	Asthma, unspecified	
Chronic Obstructive Pulmonary Disease	**Bronchitis, not specified as acute or chronic**	**490**
	Chronic bronchitis	**491**
	Simple chronic bronchitis	
	Mucopurulent chronic bronchitis	
	Obstructive chronic bronchitis	
	Other chronic bronchitis	
	Unspecified chronic bronchitis	
	Emphysema	**492**
	Emphysematous bleb	
	Other emphysema	
	Bronchiectasis	**494**
	Bronchiectasis (fusiform) (postinfectious) (recurrent)	
	Bronchiolectasis	
	Chronic airway obstruction, NEC	**496**
Respiratory Conditions due to Chemical Fumes and Vapors	**Respiratory conditions due to chemical fumes and vapors**	**506**
	Bronchitis and pneumonitis due to fumes and vapors	
	Acute pulmonary edema due to fumes and vapors	
	Upper respiratory inflammation due to fumes and vapors	
	Other acute and subacute respiratory conditions due to fumes and vapors	
	Chronic respiratory conditions due to fumes and vapors	
	Unspecified respiratory conditions due to fumes and vapors	
Pulmonary Tuberculosis	**Pulmonary tuberculosis**	**011**
	Other respiratory tuberculosis	
	Tuberculous pleurisy	**012.0**
	Isolated tracheal or bronchial tuberculosis	**012.2**
	Other specified respiratory tuberculosis	**012.8**

NEC - not elsewhere classified

SOURCES: U.S. Department of Health, Education, and Welfare: Eighth Revision International Classification of Diseases, Volume 1.
U.S. Department of Health and Human Services: International Classification of Diseases 9th Revision, Volume 1.

Changes in Bureau of Census Industry and Occupation Codes and Titles			
1980 Code	**1980 Title**	**1990 Code**	**1990 Title**
Industry: 1980 codes merged into 1990 codes			
382	Not specified professional equipment (manufacturing)	**392**	Not specified manufacturing industries
392	Not specified manufacturing industries		
510	Sporting goods, toys and hobby goods	**532**	Miscellaneous wholesale, durable goods
522	Not specified electrical and hardware (wholesale trade)		
532	Miscellaneous wholesale, durable goods		
730	Commercial research, development, and testing labs	**891**	Research, development and testing services
891	Noncommercial educational and scientific research		
Industry: 1980 title changed to 1990 title			
042	Crude petroleum and natural gas extraction	**042**	Oil and gas extraction
102	Canned and preserved fruits and vegetables	**102**	Canned, frozen and preserved fruits and vegetables
141	Floor coverings, except hard surface	**141**	Carpets and rugs
281	Cutlery, handtools, and other hardware	**281**	Cutlery, handtools, and general hardware
322	Electronic computing equipment	**322**	Computers and related equipment
372	Optical and health services supplies	**372**	Medical, dental, optical instruments and supplies
440	Radio and television broadcasting	**440**	Radio and television broadcasting and cable
441	Telephone (wire and radio)	**441**	Telephone communications
672	Fuel and ice dealers	**672**	Fuel dealers
701	Savings and loan associations	**701**	Savings institutions, including credit unions
712	Real estate, including real estate-insurance-law offices	**712**	Real estate, including real estate-insurance offices
751	Automotive repair shops	**751**	Automotive repair and related services
812	Offices of physicians	**812**	Offices and clinics of physicians
820	Offices of dentists	**820**	Offices and clinics of dentists
821	Offices of chiropractors	**821**	Offices and clinics of chiropractors
822	Offices of optometrists	**822**	Offices and clinics of optometrists
830	Offices of health practitioners, n.e.c.	**830**	Offices and clinics of health practitioners, n.e.c.
851	Business, trade, and vocational schools	**851**	Vocational schools
961	Homemaker, student, unemployed, volunteer	**961**	Non-paid worker or non-worker
Occupation: 1980 codes merged into 1990 codes			
349	Telegraphers	**353**	Communications equipment operators, n.e.c.
353	Communications equipment operators, n.e.c.		
368	Weighers, measurers, and checkers	**368**	Weighers, measurers, checkers, and samplers
369	Samplers		
436	Cooks, except short-order	**436**	Cooks
437	Short-order cooks		
673	Apparel and fabric patternmakers	**674**	Miscellaneous precision apparel and fabric workers
674	Miscellaneous precision apparel fabric workers		
794	Hand grinding and polishing occupations	**795**	Miscellaneous hand working occupations
795	Miscellaneous hand working occupations		
804	Truck drivers, heavy	**804**	Truck drivers
805	Truck drivers, light		
Occupation: 1980 title changed to 1990 title			
098	Inhalation therapists	**098**	Respiratory therapists
558	Supervisors, n.e.c.	**558**	Supervisors, construction, n.e.c.
734	Printing machine operators	**734**	Printing press operators

States reporting industry and occupation codes from death certificates to NCHS, 1987-1996

State	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Alaska	X	X								
Colorado	X	X	X	X	X	X	X	X	X	X
Georgia	X	X	X	X	X	X	X	X	X	X
Hawaii							X	X		X
Idaho		X	X	X	X	X	X	X	X	X
Indiana	X	X	X	X	X	X	X		X	
Kansas	X	X	X	X	X	X	X	X	X	X
Kentucky	X	X	X	X	X	X	X	X	X	X
Maine	X	X	X	X	X	X	X	X	X	X
Nevada	X	X	X	X	X	X	X	X	X	X
New Hampshire	X	X	X	X	X	X	X	X	X	X
New Jersey		X	X	X	X	X	X	X	X	X
New Mexico	X	X	X	X	X	X	X	X	X	X
North Carolina	X	X	X	X	X	X	X	X	X	X
Ohio	X	X	X	X	X	X	X		X	X
Oklahoma	X	X	X	X	X	X	X			
Rhode Island	X	X	X	X	X	X	X	X	X	X
South Carolina	X	X	X	X	X	X	X	X	X	X
Tennessee	X	X								
Utah	X	X	X	X	X	X	X	X	X	X
Vermont	X	X	X	X	X	X	X	X	X	X
Washington			X	X	X	X				
West Virginia		X	X	X	X	X	X	X	X	X
Wisconsin	X	X	X	X	X	X	X	X	X	X

NOTE: Shown in this table are states (and years) for which coded industry and occupation data have met NCHS quality criteria.

Pneumoconiotic Agent Categories for MSHA and OSHA Inspector Data

Pneumoconiotic Agent Category (as defined for this report)	OSHA Agents in Category	MSHA Agents in Category
Asbestos	Asbestos (all forms) Asbestos (state of Oregon) Talc, fibrous tremolite (see asbestos) Tremolite*	Asbestos, fibers >5 µm in length ($3MgO{\cdot}2SiO_2{\cdot}2H_2O$)
Cotton Dust	Cotton dust (raw) Flax dust*	
Coal and Coal Mine Dust	Coal dust Coal dust ($\leq$5% SiO_2)(respirable quartz fraction)	Coal dust, respirable fraction, <5% quartz Coal mine respirable dust
Silica	Silica (quartz, non-respirable) Silica crystalline quartz (as quartz), respirable dust Silica, amorphous, diatomaceous earth (>1% crystalline silica) Silica, crystalline cristobalite respirable dust Silica, crystalline tridymite respirable dust Silica, crystalline tripoli (as quartz)(respirable dust)	Coal mine quartz Cristobalite, respirable fraction Nuisance dust, respirable fraction, < 1 % quartz** Quartz, respirable fraction, >1% quartz Respirable dust (not analyzed or below detection limit)** Tridymite, respirable fraction Unlisted particulate, respirable fraction, < 1 % quartz**
Other	Alpha-alumina (total dust) Aluminum (as Al), metal (respirable fraction) Aluminum (as Al), metal (total dust) Aluminum (as Al), welding fumes Aluminum oxide Aluminum silicate Antimony and compounds (as Sb) Barium (insoluble compounds) Barium sulfate (total dust) Beryllium and compounds Cadmium dust (as Cd) Cadmium fume (as Cd) Carbon black Cobalt, metal, fume and dust (as Co) Emery Emery (respirable fraction)* Graphite (natural) Iron oxide fume Kaolin* Kaolin (respirable fraction) Magnesite Magnesite (respirable fraction)* Mica (less than 1% crystalline silica) Portland cement (less than 1% quartz) Portland cement (respirable fraction)* Rouge Rouge (respirable fraction)* Talc (containing no asbestos) Talc, fibrous non-tremolite Tin oxide Titanium dioxide Tungsten and compounds (insoluble)(as W) Welding fumes (total particulate) Wollastonite*	Aluminum oxide dust, as Al_2O_3 Aluminum oxide fume, as Al_2O_3 Antimony dusts, as Sb Beryllium dusts, as Be Beryllium fumes, as Be Cadmium oxide fume, as Cd Cadmium, metal dusts and soluble salts, as Cd Carbon black Cobalt dusts, as Co Cobalt fumes, as Co Graphite (natural) Iron oxide fume, as Fe_2O_3 Mica Talc, fibers >5 µm in length ($Mg_3Si_4O_{10}(OH)_2$) Talc, nonfibrous, <1% quartz Tin oxide dust, as SnO_2 Tin oxide fume, as SnO_2 Titanium dioxide dust, as TiO_2 Titanium dioxide fume, as TiO_2 Tungsten fumes, as W Tungsten, insoluble dusts, as W Welding fumes, total particulate

* No data reported for these agents in currently updated provisional data.
** See Selected Limitations, page 9.

Surveillance Guidelines For State Health Departments

Silicosis

Reporting Guidelines

State health departments should encourage physicians, including radiologists and pathologists, as well as other health-care professionals, to report all diagnosed or suspected cases of silicosis. These reports should include persons with:

A. A physician's provisional or working diagnosis of silicosis.
OR
B. A chest radiograph interpreted as consistent with silicosis.
OR
C. Pathologic findings consistent with silicosis.

State health departments should collect appropriate clinical, epidemiologic, and workplace information on reported persons with silicosis as needed to set priorities for workplace investigations.

Surveillance Case Definition

A. History of occupational exposure to airborne silica dust.*****
AND EITHER OR BOTH OF THE FOLLOWING:
B1. Chest radiograph or other imaging technique interpreted as consistent with silicosis.**+**
B2. Pathologic findings characteristic of silicosis.**§**

***** Exposure settings associated with silicosis are well characterized and have been summarized in several reviews. The induction period between initial silica exposure and development of radiographically detectable nodular silicosis is usually >10 years. Shorter induction periods are associated with heavy exposures, and acute silicosis may develop within months following massive silica exposure.

+ Cases can be classified as simple or complicated. Simple silicosis is present if the largest opacity is $\leq$1cm in diameter. Complicated silicosis (also known as progressive massive fibrosis [PMF]) is present if the largest opacity is >1 cm in diameter. Common radiographic findings of nodular silicosis include multiple, bilateral, and rounded opacities in the upper lung zones; other patterns have been described. Since patients may have mixed dust exposure, irregular opacities may be present or even predominant. Radiographs interpreted by NIOSH-certified "B" readers should have profusion categories of 1/0 or greater by the International Labour Organization classification system. A bilateral alveolar filling pattern is characteristic of acute silicosis and may be followed by rapid development of bilateral small or large opacities.

§ Characteristic lung tissue pathology in nodular silicosis consists of fibrotic nodules with concentric "onion-skinned" arrangement of collagen fibers, central hyalinization, and a cellular peripheral zone, with lightly birefringent particles seen under polarized light. In acute silicosis, microscopic pathology shows a periodic acid-Schiff positive alveolar exudate (alveolar lipoproteinosis) and a cellular infiltrate in the alveolar walls.

Surveillance Guidelines for State Health Departments

Work-Related Asthma

Reporting Guidelines

State health departments should encourage health-care professionals to report all diagnosed or suspected cases of asthma that are caused by or exacerbated by workplace exposures or conditions. Reported cases should include asthma caused by sensitizers or irritants and should include cases of reactive airways dysfunction syndrome (RADS).

Surveillance Case Definition

A. Healthcare professional's diagnosis consistent with asthma.*****
AND
B. An association between symptoms of asthma and work.**+**

Surveillance Case Classification Criteria (see next page)

***** Asthma is a chronic condition characterized by inflammation of the tracheobronchial tree associated with increased airways responsiveness to a variety of stimuli. Symptoms of asthma include episodic wheezing, chest tightness, cough, and dyspnea, or recurrent attacks of bronchitis with cough and sputum production. The primary physiologic manifestation of airways hyperresponsiveness is variable or reversible airflow obstruction. It is commonly demonstrated by significant changes in the forced expiratory volume in 1 second (FEV_1) or peak expiratory flow rate (PEFR). Airflow changes can occur spontaneously, with treatment, with a precipitating exposure, or with diagnostic maneuvers such as nonspecific inhalation challenge.

+ Patterns of association can vary and include: 1) symptoms of asthma that develop or worsen after a worker starts a new job or after new materials are introduced on a job (a substantial period can elapse between initial exposure and development of symptoms); 2) symptoms that develop within minutes of specific activities or exposures at work; 3) delayed symptoms that occur several hours after exposure (e.g., during the evenings of workdays); 4) symptoms that occur less frequently or not at all on days away from work and on vacations; 5) symptoms that occur more frequently when the affected worker returns to work; and 6) symptoms that are temporally associated with workplace exposure to an agent with irritant properties. Work-related changes in medication requirements can accompany these symptom patterns.

Surveillance Guidelines for State Health Departments

Work-Related Asthma

Surveillance Case Classification Criteria (see decision logic on next page)

C1) Increased asthma symptoms or increased use of asthma medication (upon entering an occupational exposure setting) experienced by a person with preexisting asthma who was symptomatic or treated with asthma medication within the two years prior to entering that occupational setting.

C2) New asthma symptoms that develop within 24 hours after a one-time high-level inhalation exposure (at work) to an irritant gas, fume, smoke, or vapor and that persist for at least three months.

C3) Workplace exposure to an agent previously associated with occupational asthma.*****

C4) Work-related changes in serially measured forced expiratory volume in one second (FEV_1) or peak expiratory flow rate (PEFR).**+**

C5) Work-related changes in bronchial responsiveness as measured by serial nonspecific inhalation challenge testing.**§**

C6) Positive response to specific inhalation challenge testing**¶** with an agent to which the patient has been exposed at work.

***** Many agents can induce occupational asthma via a specific hypersensitivity mechanism. A comprehensive list of these asthma inducers is used for this criterion. Known asthma inducers have been designated with the letter "A" in the Association of Occupational and Environmental Clinics (AOEC) coding scheme (available at: http://occ-env-med.mc.duke.edu/oem/aoeccode.htm).

+ Spirometric measurements (e.g., FEV_1) can be obtained before and after a person's work shift (i.e., cross-shift spirometry). However, many cases of occupational asthma can fail to demonstrate a significant cross-shift reduction in FEV_1, either because of a delayed bronchoconstrictor response or because of intermittent exposure patterns. Cross-shift spirometry testing on multiple days might help confirm the association with work. Alternatively, PEFR can be measured serially throughout the day on multiple days at and away from work using a portable peak flow meter.

§ Changes in bronchial responsiveness can be measured by serial inhalation challenge testing with nonspecific agents (e.g., using methacholine or histamine). Evidence of work-relatedness is manifested by increased bronchial responsiveness (i.e., bronchoconstriction at lower inhaled doses of methacholine or histamine) following work exposures and decreased or normal bronchial responsiveness after a period away from work.

¶ Specific inhalation challenge testing has distinct objectives, including the following: 1) identifying previously unrecognized causes of occupational asthma; 2) confirming a diagnosis of occupational asthma; and 3) identifying the causative agent when more than one allergen is present in the occupational environment and identification of the causative agent is essential for management. Specific inhalation challenge testing is potentially dangerous and should be performed by experienced personnel in a hospital setting where resuscitation facilities are available and frequent observations can be made over sufficient time to monitor for delayed reactions. Specific inhalation challenge testing is usually not necessary for clinical diagnosis of occupational asthma.

Surveillance Guidelines for State Health Departments
Decision Logic for Work-Related Asthma