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RESEARCH REPORT

Causes of Disability in Employees of the Mining Industry:

Analysis of Social Security Disability Benefit Awards and Allowances to Workers: 1969-1973, 1975-1976

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

Causes of Disability in Employees of the Mining Industry: Analysis of Social Security Disability Benefit Awards And Allowances to Workers 1969-1973, 1975-1976

Rebecca Osborne and Thomas Fischbach

Illness Effects Section, Surveillance Branch
Division of Surveillance, Hazard Evaluations and Field Studies
National Institute for Occupational Safety and Health
Cincinnati, Ohio

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DISCLAIMER

The data used in this report originated in the Disabled Worker's File, Division of Disability Studies, Office of Disability, Social Security Administration. This data was collected by the Social Security Administration. Mention of a company name or a product does not constitute endorsement by the National Institute for Occupational Safety and Health or the Social Security Administration.

NIOSH Project Officer: Thomas J. Fischach
SSA Project Officer: Jerome H. Green

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PREFACE

The Social Security Administration (SSA) routinely collects data on workers eligible for benefits for total disability. Both SSA and the National Institute for Occupational Safety and Health (NIOSH) recognize these data as an inexpensive resource for occupational health and safety research aimed at preventing diseases and accidents that result in injury, illness, disability and death. This surveillance report about the mining industry is one product of the collaboration of SSA and NIOSH using the disabled worker data base.

ABSTRACT

This study examined the causes of disability for Social Security Administration disability benefit awards and allowances to white male miners for 1969-73 and 1975-76. Age-adjusted proportional morbidity ratios (PMR's) were calculated for 67 causes of disability for six mining occupations and four mining industries. Significantly high PMR's were found for diseases of the respiratory system as causes of disability among all groups except the oil and gas extraction industry. Musculoskeletal diseases caused disproportionately high disability among employees of the oil and gas extraction industry. PMR's were recalculated excluding diseases of the respiratory system since the very high association between these diseases and mining could obscure other associations. After removing disabilities from respiratory diseases from the data, the PMR's for accidents, poisonings, and violence and musculoskeletal disease were significantly high. These results agreed with those of previous morbidity and mortality studies and illustrate the utility of routinely collected disability data as a surveillance tool in occupational disease and injury epidemiology.

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We thank Carol Burnett, Illness Effects Section, Surveillance Branch, NIOSH, for major assistance in the literature review, revisions, and numerous readings to help us prepare the final draft. The following staff members made important contributions in the preparation of this report: Audrey B. Coe, SSA, who supervised data compilation from SSA master files, Jerome H. Green, SSA, and Paula Franklin, SSA. Other staff members who made significant contributions during the preparation of this report were John P. Sestito, Chief, Illness Effects Section, Todd M. Frazier, Chief, Surveillance Branch, NIOSH, and Aaron Krute, Director, Division of Disability Studies, SSA.

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INTRODUCTION

Through an interagency agreement the National Institute for Occupational Safety and Health (NIOSH) has acquired data on the characteristics of workers receiving benefit awards for disabilities from the Social Security Administration (SSA). Such awards are granted to workers with social security eligibility who have physical or mental impairments so severe that they are unable to engage in any substantial gainful employment. SSA collects data from applicants as part of its routine administration of the disability program. Data from a sample of the workers actually receiving benefit awards are coded and placed in a computer accessible data file. The NIOSH file is a subset of this file. This data file provides a unique resource for NIOSH to conduct occupational health research including surveillance of adverse health effects. This surveillance encompasses two objectives: (1) To monitor known or suspected patterns of disability to determine if there have been changes; and (2) To detect patterns of disability that either have been undetected in the past or which are emergent.

The purpose of this report is surveillance of the patterns of disability of persons employed in the mining industry and in mining occupations. This is part of a larger effort to prevent morbidity and mortality to workers in mining industries and occupations. Monitoring previously recognized or suspected patterns permits evaluation of intervention efforts. It also tests current hypotheses. The detection of previously unrecognized or of emergent patterns of morbidity is necessary so that additional research can lead to successful intervention.

Previous research was reviewed to determine expected patterns of disability for workers in mining industries and occupations. Little previous work has been done directly on the question of disabilities to miners. However, there is a large body of research on the mortality and, to a lesser extent, the morbidity of miners. For the purpose of generating hypotheses for this analysis, it is assumed that, unless there are known exceptions, conditions which produce mortality or morbidity will also increase the risk of impairment serious enough to produce disability. Causes of the morbidity or mortality are related to specific mining industries or mining occupations when such information is available. The results of this review are summarized in the next section.

The review was not limited by consideration of whether the NIOSH-SSA disability data file would support an investigation of the findings of other researchers. However, the development of specific surveillance hypotheses to guide this analysis required consideration of both the resources and limitations of the NIOSH-SSA disability data file. These are discussed in the Materials and Methods Section. The Surveillance Hypotheses Section then describes the specific surveillance hypotheses guiding the analysis and the specific methods for testing these. The results of the analysis are presented in the Results section. These results are discussed and recommendations for the future are presented in the Discussion Section.

LITERATURE REVIEW

Working conditions in the mining industry can be hazardous to health and safety. These conditions produce illness, injury, and death and may be classified into seven general types of hazard: 1) safety hazards that cause injuries, 2) high levels of dust, 3) extremes of temperature and humidity, 4) noise and vibration, 5) gases, fumes, and smoke, 6) demanding physical labor including repetitive low level trauma, and 7) ionizing radiation.

Demanding physical labor is a characteristic of the modern mining industry, despite intensive mechanization. Many underground mining occupations require working in close quarters with large pieces of equipment, especially in low coal seams - some as low as 22 inches in height (Dadisman, 1970). Occupations such as blasting and drilling involve kneeling and stooping for long periods of time. These physical stresses may place the miner at increased risk of disabling injury.

In addition to risks of occupational origin, persons employed in the mining industry may be at increased risk of certain disabilities due to lifestyle. Particularly significant is the high prevalence of cigarette smoking. Data collected by the Health Interview Survey (1972) estimate that 72 percent of miners are current or ex-smokers and 28 percent are non-smokers. Corresponding estimates for non-miners are 56 percent and 44 percent, respectively. Patterns of tobacco consumption by miners reported elsewhere agree closely with the Health Interview Survey estimate (Higgins, et al., 1981; Enterline and Lainhart, 1967). However the proportion of smokers in comparison groups of nonminers is generally much higher than that reported by the Health Interview Survey. Tobacco smoking has been linked to lung cancer, cardiovascular disease, and respiratory disease, especially emphysema; a high proportion of disabilities among miners might be expected to be due to these diseases.

In a study of morbidity in 40 industries, the mining industry ranked in the lowest quartile for the following measures of morbidity: days of restricted activity, days of bed disability, days of work lost, and number of doctor visits (Kaminski and Spirtas, 1980). The age-adjusted proportion of persons employed in the mining industry having one or more work injuries was the same as that of the total working population (2 percent).

The rate of injuries in the mining industry has been declining steadily (U.S. Bureau of the Census, 1980). From 1965 to 1978, a period of increasing employment in the mining industry, the fatal accident rate for coal mining declined from 1.0 to 0.3 per million work-hours while that for all other mining declined from 1.4 to 0.5. Nonfatal accidents for coal mining declined from 45 to 38 per million work-hours while that for all other mining declined from 92 to 56. The fatal accident rate for mining and quarrying was the highest among all major industry groups in 1978 (63 per 100,000 miners); for all industries combined, the rate was 14 per 100,000. The 1978 nonfatal

accident rate in the mining industry was more than twice that for all other industries (5040 vs. 2369 per 100,000).

Several population-based studies in the United States and England have described morbidity and mortality associated with the mining industry. Guralnick (1963), using a sample of U. S. 1950 death certificates, cited high rates for tuberculosis, respiratory diseases, malignant neoplasms of the stomach, other myocardial degeneration, arteriosclerosis and accidents for coal miners. Crude petroleum and natural gas extraction workers exhibited high risks for coronary artery disease and accidents. Reports of the Registrar General (1957, 1971) for England and Wales, 1951 and 1961, showed high rates for tuberculosis, respiratory diseases, malignant neoplasms of the stomach and accidents for mineworkers. Myocardial degeneration was also high in the 1951 report. In addition to these findings, mine operatives and laborers were reported to have disproportionately high lung cancer in a Washington State mortality study for 1950-1979 (Milham, 1983). Oil well drillers exhibited high risks for only respiratory diseases.

NIOSH conducted a survey of cancer morbidity in relation to occupation for the years 1956 to 1965 using data from Roswell Park Memorial Institute, a major cancer treatment center in Buffalo, N. Y. (Decoufle, et al., 1977). No increased risks were detected for mine operatives and laborers. Disability insurance benefit awards made in 1959-1962 to men under age 65 showed higher proportional morbidity ratios (PMR's) for tuberculosis with occupational disease of lung, pneumoconiosis and other respiratory diseases, and musculoskeletal diseases (Public Health Service, 1967).

An excess of risk of respiratory cancer mortality was reported in European miners exposed to high levels of airborne radon and radon daughters (Hueper, 1942). In a mortality study of uranium miners and millers, significant excess mortality was reported in white male miners with over 5 years underground mining experience (Wagoner et al., 1964;). Causes of excess mortality were: respiratory cancer (10-fold), "all other causes" (2.1-fold), and accidents (3-fold). Excess mortality from "all other causes" was a reflection of pulmonary fibrosis and its complications; 75 percent of the fatal accidents occurred in the uranium mines. Cooper (1968) noted that the increased incidence of lung cancer experienced by underground uranium miners was characterized by the predominance of undifferentiated cell types, a younger than average patient age, and rapid fatality. No excess respiratory cancer deaths were reported at less than 5 years after onset of underground uranium mining (Lundin, et al., 1969). Ten years after onset of mining, all exposure levels had elevated rates.

A dose-response relationship was reported between the incidence of respiratory cancer mortality and duration of underground uranium mining exposure (Wagoner et al., 1965). This curve was linear in nonsmokers; smoking elevated and distorted the curve (Archer et al., 1976). This is consistent with the approximately 10-fold increase in risk of respiratory cancer among smoking uranium miners compared with nonsmoking miners (Lundin et al., 1969). Archer et al. (1976) observed a linear dose-response curve between mine radiation exposure and respiratory disease mortality (noncancer) in nonsmoking miners.

High mortality in Swedish iron ore miners was reported by Jorgensen (1973) and St. Clair Renard (1974). In a nationwide mortality study, the average lung cancer mortality among Swedish miners (the majority mining iron ore) was five times that of the general population. A dose-response relationship between lung cancer mortality and the concentration of radon daughters was noted (Axelson and Sundell, 1978). Excess lung cancer mortality was observed in British (Boyd et al., 1970) and American iron ore miners (Edling, 1982) and in fluorspar miners (Parsons et al., 1964; deVillers and Windish, 1964). Smokers were consistently at excess risk compared to nonsmoking fluorspar miners.

Silicosis, a chronic dust disease of the lung (pneumoconiosis) caused by pulmonary retention of particulate silica, became common among miners at the turn of the century due to increased mechanization and the development of pneumatic tools that generated large amounts of dust. A positive relationship was demonstrated between the concentration of dust and silicosis incidence (Iannssen, 1971). Victims usually have at least 15 years mining experience (Key and Ayer, 1972). In a study of silicosis and occupation, miners had the shortest median exposure time before disease onset and the most rapid radiological progression of all occupations studied (Ahlman, 1968). Silicotic nodules were present in the lungs of 44 percent of the bituminous miners studied by Naeye (1970).

The prevalence of black lung disease, another form of pneumoconiosis, varies greatly between geographic areas, from 7 percent to 46 percent in working underground miners (Higgins et al., 1968; Lapp, 1969; Morgan et al., 1972). The prevalence of pneumoconiosis was also associated with dust exposure in a 20 year cohort study of 10 British coal mines (Hurley et al., 1982). Among men with similar cumulative dust exposures, those with longer exposure times had a higher prevalence of pneumoconiosis. Pneumoconiosis is not restricted to the coal mining industry; it has been reported in gold miners (Solomon, 1977) and in graphite miners (Ranasinha and Uragoda, 1972).

Surface coal miners appear to experience a low prevalence of pneumoconiosis (4 percent) (Fairman et al., 1977). Of surface miners who had never worked underground, only 2.5 percent had pneumoconiosis. The prevalence of pneumoconiosis in surface miners with extensive underground experience was 11.2 percent. However, the total mining experience of the two groups of miners were not compared. The total mining experience of the former underground miners may have been longer which might have caused the difference or the difference might be caused by other factors, e.g. selection, etc. Thus, while the prevalence of pneumoconiosis may be much greater in underground than in surface miners, the evidence is not clear.

In addition to greater prevalence of silicosis and other forms of pneumoconiosis and higher lung cancer mortality, workers in the mining industry experience greater prevalence of chronic respiratory disease. Loss of ventilatory capacity increased in British coal miners with increasing dust exposure in all age-smoking groups (Rogan et al., 1973). Coal miners had more wheezing, dyspnea, and history of pneumonia and pleurisy than other manual nonmining workers (Enterline and Lainhart, 1967). Welsh miners had a higher

prevalence of respiratory symptoms than nonminers (Higgins and Cochrane, 1961). Miners, especially those with 30 years or more underground experience, developed cough, breathlessness, and chest illness more frequently than nonminers (Higgins et al., 1968).

While respiratory diseases are the most frequent occupational diseases among miners, the prevalence of other occupational disease groups is also increased among miners. Naeye (1970) and Wagoner et al (1963) reported excess cardiovascular disease mortality among miners; Liddell (1973) listed cardiovascular disease as a significant cause of work incapacity among miners. Enterline (1972) reported excess mortality from digestive disorders in American coal miners; Wagoner et al., (1963) noted a 1.6-fold excess in digestive cancer mortality among uranium miners with 15 years or more of underground mining experience. The occurrence of cor pulmonale, gastric ulcer, and Caplan's syndrome (rheumatoid arthritis plus nodular pulmonary densities) was increased among persons having pneumoconiosis (Schwartz, 1970). Rosmanith (1971) observed an age-related increase in the occurrence of polyarthritis among coal miners with pneumoconiosis.

Nerve deafness and musculoskeletal disabilities are trauma-induced disorders (Schwartz, 1970). Lumio (1965) studied the effects of occupational noise on the hearing of workers in the mining, textile, paper, and metal industries. In the mining industry, 21 percent of the workers had severe hearing losses. Sataloff et al., (1969) detected hearing losses in 22 percent in a group of iron miners. NIOSH (1976) reported measurably worse hearing in underground coal miners than the national average. Liddell (1973) and Rudo (1970) reported an increased occurrence of musculoskeletal disorders among miners.

Summary

The occurrence of the following diseases appears higher for employees of the mining industry: tuberculosis, lung cancer, cancer of the stomach, cardiovascular disease including cor pulmonale, diseases of the digestive system including gastric ulcer, silicosis and other forms of pneumoconiosis, other chronic respiratory diseases, arthritis and other musculoskeletal disorders, and accidents. Hearing loss is also well documented among persons employed in the mining industry. Such loss, while a functional impairment, may not cause disability if the affected individual is able to continue working.

While lung cancer has been most frequently associated with uranium, iron, and other metal mining, it may also be related to coal mining. The risks of pneumoconiosis and chronic respiratory diseases appear greater for coal mining than for other types of mining, although both types of mining appear to be at greater risk for these diseases than non-mining industries. Within the coal mining industry, underground workers appear to be at greater risk for pneumoconiosis and other chronic respiratory disease than surface miners. In all these cases the risk of disease - whether lung cancer, pneumoconiosis, or other chronic respiratory disease - appears to be related directly to the length of employment. Hence, it might be expected that older workers would be at higher risk than young workers for these diseases.

NIOSH/SSA Disability Data File

The source of data for this report was a statistically selected sample of records for persons determined to be eligible for SSA disability benefit awards for the years 1969 through 1973 and 1975 and 1976. Once SSA determines a worker to be eligible for disability benefits, that worker remains eligible until he/she is no longer disabled, dies, or becomes age 65. Thus, these are incidence data. These records were obtained for routine administration of the disability program. To support its own research, SSA selected a sample of these administrative records each year using a stratified random sampling plan with states as strata. Sampling rates varied by state and from year to year. The sampling rate was made inversely proportional to the total awards for the previous year. However, the overall sampling rate was approximately 20 percent. NIOSH has obtained a subset of this dataset for occupational health research. The NIOSH dataset includes age, race, sex, diagnosis of primary disabling condition, occupation, and industry (1975-1976 only). Detailed information about the NIOSH-SSA disabled worker dataset, statistical inference methods developed for its analysis, and measures of proportional morbidity have been presented elsewhere (DHHS, 1980)

Age refers to age at the date of eligibility for a benefit award. Workers were grouped into 5-year intervals for those aged 40 to 64. The remaining workers fall into two age groups--those under 40 years and those over 64 years (the last group includes workers age 65 and older at the time they were awarded benefits for disabilities that occurred before they became 65). Race was categorized by SSA as black, white, other, or unknown; however, because there were few nonwhite and female miners, the analysis was restricted to white men.

The disabling condition was the condition diagnosed as the primary cause of the worker's disability. Disabling conditions were coded by SSA coders according to the Eighth Revision of the International Classification of Diseases Adapted for Use in the United States (ICDA) (U.S. Department of Health, Education, and Welfare, 1968). Coding was done in terms of three digit categories of the ICDA. The categories for disabling conditions used in this report have been chosen for relevance to the surveillance objectives of this study. The categories are shown in Table 1.

Occupation represents the disabled worker's longest full-time occupation in the 10 years preceding the date of the disability. It was coded according to the occupational classification in the Dictionary of Occupational Titles (DOT) (U.S.Department of Labor, 1965). The occupations classified under 930-939, Extraction of Minerals, were compared to all other occupations combined. Specific categories included were:

930 Boring, Drilling, and Cutting
931 Blasting
932 Loading and Conveying
933 Crushing

934 Screening
939 Mining, not elsewhere classified (N.E.C.)

The definitions of these occupations have been published (U.S. Department of Labor, 1965) and are summarized as follows. The boring, drilling, and cutting group includes occupations concerned with drilling wells, undercutting coal seams, sawing and splitting virgin rock, and related activities involved with tapping water-or mineral-bearing formations, obtaining samples of sub-surface strata, and loosening or removing materials. Blasting occupations are concerned with preparation, placement, and detonation of explosives to shatter, dislodge, or move earth, coal, and ore-bearing materials in surface and underground mines and quarries. Loading and conveying occupations involve moving workers, equipment, and extracted materials. Crushing occupations reduce bulky materials to convenient sizes using sledge hammers and crushing machines. The screening occupational group cleans, separates, and sizes coal, ore, stone, and similar materials. Occupations in mining, n.e.c. include miner, pit supervisor, oil well service operator, and roustabout.

Industry refers to the industry of the longest employment of the disabled worker in the 10 years preceding disability. Industry, which was available only for 1975-76, was coded using the Standard Industrial Classification (SIC) (Executive Office of the President, 1972). In this report mining, SIC 100-149, and certain subsets of the mining industry were compared to all other industries combined. Bituminous, lignite, and anthracite coal mining was classified under SIC 110-121. Oil and gas extraction was classified under SIC 130-138. Metal mining (SIC 100-109) includes mining of iron, copper, lead, zinc, gold, silver, uranium and aluminum. Nonmetallic mineral mining (SIC 140-149) includes stone, sand, gravel, clay, and granite. In this study, metal mining and nonmetallic mineral mining were combined because there were not sufficient cases for more detail. By combining industry and occupation codes it was possible to study specifically those workers most exposed to the hazards of mining. The analyses for 1975-76 were thus restricted to those employees of the mining industry, i.e., SIC codes 100-149, who worked in mining occupations, i.e., DOT codes 930-939.

The Social Security Disability Benefit Program

Social security disability benefits are available to qualified totally disabled workers regardless of the cause of their impairments; it is not necessary for the disability to be occupationally caused. To qualify for benefits, workers disabled after age 30 must have worked in covered employment for at least 5 of the 10 years immediately preceding the onset of disability; progressively fewer years of coverage are required for younger workers. To be eligible, a worker must be unable to engage in any substantial gainful activity because of a medically determinable physical or mental impairment that has lasted or can be expected to last for at least 12 months or to result in death (SSA, 1982).

The characteristics of the SSA disability benefit program, as it existed at the time applicable for the study population of this report, have been described in the literature (SSA, 1982; SSA, 1971; Popick, 1971a; Popick, 1971b, Popick, 1971c).

A worker applies for disability benefits at any office of SSA. The worker's eligibility for benefits is determined by SSA while the medical determination of the existence of a physical or mental impairment that has lasted or will last at least 12 months or be terminal is accomplished by a state agency, such as a state vocational rehabilitation agency. SSA reviews the findings of the state agency regarding the medical basis for the worker's claim and the technical eligibility of the worker for SSA benefits in accordance with SSA rules and regulations. If the worker's remaining capacity to perform physical and mental activities ". . . falls short of the demands of jobs he could reasonably be expected to perform, he is considered disabled. . . ." (Popick,1971b). The worker's claim is regarded as "allowed", or his/her case is termed "an allowance", if the SSA review determines that the worker fulfills the requirements for a cash benefit for his/her disability. Workers may appeal a disallowance of their claims. If a worker whose claim is allowed is then judged newly entitled to monthly cash benefits, his/her case is termed an award (SSA, 1982). The NIOSH disability file has data from a sample of the awards for the period from 1969 to 1973 and from a sample of allowances for the period from 1975 to 1976. Allowances and awards are nearly equivalent.

Allowances almost always automatically become awards but workers receiving allowances may not receive cash benefits (awards), or be considered a new entitlement, under some conditions which occur relatively infrequently. Among these conditions are the following: (1) The beneficiary's name is unknown; (2) The address of the beneficiary is unknown; (3) Previous overpayment of benefits; (4) The disability is a continuation of one previously associated with an award (only after the worker had recovered sufficiently to return to work and his/her impairment recurs within five years, see Popick,1971a); and (5) Benefits from workers' compensation, government pensions, and/or other public assistance programs exceed 80 percent of previous earnings while the worker was employed. While allowance data appear more suitable for occupational epidemiological study (because award data do not include some cases which would seem informative), it does not appear that the differences would have noticable effects on analyses.

Both award and allowance data are incidence data as a worker's eligibility for SSA benefits continues until the worker is no longer disabled, dies, or becomes eligible for SSA retirement benefits (Popick, 1971a).

Various characteristics of the SSA disability benefit program and its utilization by workers both enhance and reduce the usefulness of these data on awards or allowances for occupational health research.

Characteristics which argue for the validity of these data for occupational health research are: (1) Cash monthly benefits serve as an incentive for workers with impairments to apply for benefits; (2) Physicians make determinations of disabling conditions using medical evidence (but this may

not require a special examination of the claimant) according to SSA criteria; (3) The accuracy of the determination of the cause and severity of the disabling condition is important to the administration of the program; it is not an issue concerning secondary uses of these data; (4) The determination of occupation and industry of the longest held employment during the ten years prior to disability is based on work histories obtained from the worker in direct interviews by experienced staff; and (5) Occupational information is obtained to satisfy administrative needs.

There are factors which reduce the usefulness or validity of these data for epidemiologic study such as: (1) The precision and reliability of the data for occupation and industry and disabling condition may be more related to the administrative needs of the SSA disability system and less to occupational health research; (2) Data on potential confounding factors, e.g. lifestyle, use of tobacco, alcohol, and other drugs, are not available; (3) Only one occupation and one industry is coded for each worker when, in reality, workers may change from one occupation or industry to another and exposures in the same occupation may vary by industry; (4) Only workers with impairments severe enough to result in total disability are included; and (5) Not all workers with impairments, serious injuries, or illnesses apply for benefits.

Workers may not apply for disability benefits or receive awards for a variety of reasons which may be related to either their occupation and industry or type of impairment. These include the following: (1) Lack of knowledge of the benefits or confusion about requirements, e.g. a worker may erroneously believe that the impairment must be occupationally caused; (2) The impairment may not meet SSA requirements for severity; (3) The opportunity to apply may be cut short by death or severe illness occurring soon after the manifestation of the disease or the injury (although the worker's survivors may be eligible for benefits); (4) Disease conditions with long latencies may not affect the worker until after his retirement; and (5) Workers with conditions known to be caused by their occupations who receive worker's compensation or other compensation may not apply for or receive SSA disability benefit awards.

There is some evidence that tendencies to apply for benefits and appeal initial denials are related to a worker's occupation, among other factors. It is arguable that tendencies to apply may also be related to disease conditions. If so the absolute incidence of disabilities by occupation and by disabling condition, respectively, reflected by disability awards could be deceptive. However, relationships between occupations and illness effects might still be accurately represented by relationships between occupations and disabling conditions of awardees. This would hold if differences among occupational groups in tendencies to apply for benefits operate across all types of impairments and if the characteristics of impairments related to benefit application (if any), e.g. latency period, severity, life expectancy, etc., operate equally across occupations. It seems reasonable that this is the case, and there is no evidence that it is not. This is particularly plausible for surveillance needs when the foremost objective is to detect higher or increased risks for further investigation and knowledge of exact magnitudes is of secondary importance.

Limitations of using "usual" occupation have been studied previously by Gamble and Spirtas (1976); studies by Lansing and Mueller (1967) and by Steinberg (1979) have dealt with occupational mobility. These studies indicated that job changes are most likely to take place between occupations in which work requirements are similar, among individuals who have limited training, and that changes in occupation decrease after age 40. However, the average age of workers in this study was greater than 50 years. Therefore, it is reasonable to believe that the occupation indicated is representative of the worker's major lifetime experience.

Statistical Analyses of the Data

Proportional morbidity ratios (PMR's) were used in this report because the sizes of the various occupational populations at risk (i.e. the denominator) were difficult to estimate with sufficient accuracy for computation of actual disability rates. A PMR for a particular occupational group and a specific disabling condition compares the proportion of all disabled workers in that occupational group who have that disabling condition to the proportion of all disabled workers in all occupations who have the same disabling condition. If the PMR is greater than 100 it implies that workers in that occupation are disabled by that particular condition relatively more often. The actual rate at which workers in that occupational group are disabled by that condition, however, may be more than, equal to, or less than the corresponding rate for all workers of all occupations. Proportional morbidity ratios may not measure the risk of disability from a disease for an occupational group.

The use of PMR's might be compared to comparisons between relative sizes of pieces from two different sized pies. The first piece may be one-third of the first pie whereas the second piece is only one-fourth of the second pie; however, if the second pie has a 20-inch diameter and the first pie has a 10-inch diameter, the second piece is absolutely larger than the first piece, even though the first is proportionately the larger. Thus, comparisons of PMR's for different occupational groups must be done with great caution. However, the frequency of the empirical occurrence of the conditions necessary to produce great distortions in PMR's has not been estimated scientifically. PMR's may provide reliable indications of hazards and other factors adversely affecting the health and safety of workers, whether these factors are completely occupational or not. A more detailed explanation of this measure and its estimation has been published (DHHS, 1980).

Age - adjusted PMR's for white males were estimated for all combinations of occupation and, for 1975-76, of industry by disabling condition. These were used to describe associations between disease and occupation and/or industry. The PMR for a specific occupation, industry, or industry-occupation for a particular disabling condition was defined as the ratio of the observed number of disabled workers to the expected number. For each of seven age groups, the expected number was equal to the proportion of disabled workers for all occupations with the specified disabling condition multiplied by the total number of disabled workers for the selected occupation. This study used disabled white male workers from all industries or all occupations, respectively, combined as the comparison group for mining industries or mining occupations or both.

PMR's were estimated for all occupation, industry, and disease combinations for which the expected number of disabled workers for the U.S., the denominator of the PMR, was 25 or more. This procedure tends to ensure that the standard errors were useful guides to the precision of the PMR's. If the expected number was less than 25, a PMR was presented only if the expected number was at least 5 and the PMR was statistically significantly different from 100 at the .001 level using the two-tailed test described by NIOSH (DHHS, 1980). This modification was motivated by the objective to present a maximum of reliable information. It was based on an asymptotic approximation to Chebyshev's Inequality (Wilks, 1963). Extreme but reliable PMR's were not ignored. The presence of "---" indicates that neither of the criteria just described were fulfilled and the PMR was not estimated.

PMR's presented in this report were estimates of national values and were subject to sampling error. Estimates of the standard errors of these PMR's are presented so that the risk of various magnitudes of sampling error may be determined. Estimation of the standard errors of the PMR's is complicated by the fact that the PMR estimators are ratios and there is no known expression for the standard error. This was overcome by the use of a sample replicate procedure (see DHHS, 1980).

The appearance of one, two, or three asterisks after the values of the PMR's presented in this report represents the outcome of the F-test described by NIOSH (DHHS, 1980). A single asterisk indicates that the difference was statistically significant at the five percent level, two asterisks indicate statistical significance at the one percent level, and three asterisks indicate statistical significance at the 0.001 level. No asterisk appears if the estimated PMR does not differ from 100 by a statistically significant amount.

SURVEILLANCE HYPOTHESES FOR THIS STUDY

The two surveillance objectives of this study are: (1) To monitor relationships found in previous research between causes of disability and employment in mining industries and occupations; and (2) To detect emergent or previously undetected relationships. Hypotheses were formulated to accomplish each of these objectives. To accomplish the first objective, each of the relationships summarized in the Literature Review Section, with a few exceptions to be noted presently, was studied. The appropriate national PMR for white men was estimated and a statistical test of the null hypothesis that it was less than or equal to 100.0 was performed. A one-tail Student's t-test (with 19 degrees of freedom - see DHHS, 1980 - for the statistical justification) at the 0.05 probability level of significance was used. These relationships were tested for each mining industry or occupation as there was no *a priori* basis to exclude any.

To accomplish the second objective, national PMR's for all other combinations of mining industry or occupation and disabling conditions were estimated and statistically analyzed. In each case the hypothesis that the national PMR was less than or equal to 100.0 was tested with a Student's t-test in a manner similiar to that described in the preceding paragraph except for the probability level of the test. Since the alternative hypothesis had not been suggested *a priori*, e.g., in the literature, the level of significance was set at 0.001. This tended to ensure that the overall error probability, of inferring one or more high national PMR's to be greater than 100.0 when none were, would be approximately 0.05 for each mining industry or occupation studied. This allows for the fact that there are 67 different disabling condition PMR's for each mining industry or occupation which could be falsely higher than 100.0 by sampling error.

The literature review indicates that the occurrence of cor pulmonale appears to be higher for miners with pneumoconiosis and other chronic respiratory diseases such as bronchitis and emphysema. However, only three digit ICDA codes were available and fourth digit coding would be necessary to study cor pulmonale. Thus, this study cannot examine PMR's for cor pulmonale. Nor was it known whether workers disabled from cor pulmonale would be included with those coded for circulatory disease or for the associated respiratory disease.

Similarly, there was no grouping for chronic respiratory diseases. The individual PMR's for bronchitis and asthma, emphysema, and bronchiectasis were examined, but only if not precluded by small numbers of cases. The lack of coding in more detail than the three digit level also meant that it was not possible to study the various types of pneumoconiosis, e.g. silicosis, coal workers pneumoconiosis, etc., separately. Similarly, the coding did not separate accidents from poisonings and violence so that the category of accidents, poisonings, and violence was used.

If individuals with mining related hearing loss remain employed, possibly in mining occupations not requiring hearing acuity, disability awards caused by hearing loss will not occur. However, the PMR's were estimated for those mining industries or occupations in which such disabilities occurred .

Different patterns of disability may occur among surface and underground miners. The industry code did not provide information on whether a given mining industry was surface or underground; it was not possible to separate disability patterns by depth of mine.

Significantly elevated PMR's were expected for all mining industry and occupations for the following disease categories:

tuberculosis (ICDA 010-019)
  silicotuberculosis (ICDA 010)
malignant neoplasms of the digestive organs and peritoneum (ICDA 150-159)
malignant neoplasms of the respiratory system (ICDA 160-163)
diseases of the circulatory system (ICDA 390-458)
hearing loss
bronchitis and asthma (ICDA 490-491, 493)
emphysema (ICDA 492)
pneumoconiosis due to silica and silicates (ICDA 515)
bronchiectasis (ICDA 518)
peptic ulcer (ICDA 531-533)
rheumatoid arthritis (ICDA 712)
osteoarthritis (ICDA 713)
displacement of an intervertebral disc (ICDA 725)
accidents, poisonings, and violence (ICDA 800-999)

The data for 1969-73 were analyzed separately from that for 1975-76. The main reason was that industry codes were available for the latter period but not the first. Furthermore, the 1969-73 data are award data while those for 1975-76 are allowance data even though this difference may be of little epidemiological significance. Finally, this division would permit detection of change in relationships over time, at least for all mining occupations as a whole. The dataset for the two years, 1975 and 1976, should provide sufficient statistical power for separate analyses, but adding the 1975-76 dataset to the dataset for 1969-73 would not markedly increase power for the occupational analyses of the 1969-73 dataset.

Mining Occupations: All Industries

A general pattern of morbidity was observed for white males employed in mining occupations (DOT 930-939) in all industries for both 1969-1973 and 1975-1976 (Table 2). Disability from diseases of the respiratory system was more than three times that expected. The PMR's for emphysema and all pneumoconioses for 1969-73 and 1975-76 were significant. The PMR for pneumoconiosis from silica and silicates was also significant for both 1969-1973 and 1975-76. All awards or allowances given for the pneumoconioses were due to pneumoconiosis from silica and silicates which includes silicosis, coal worker's pneumoconiosis, and other pneumoconioses. The number of disabled workers for pneumoconiosis from silica and silicates was 23 times the expected number in 1969-73 and more than 32 times that expected in 1975-76. The difference between the two periods was statistically significant (significance at the 0.001 level was required). Thus, the excess of observed disabilities over the expected number of disabilities for pneumoconiosis from silica and silicates was greater for 1975-76 than for 1969-73.

The PMR for bronchitis and asthma was significantly high for 1969-1973 but not for 1975-76 . A PMR for bronchiectasis was not calculated due to the small number of disabilities from this cause. The observed PMR's for tuberculosis were less than 100.0 for both periods. However, the number of men disabled from silicotuberculosis was more than nine times the expected number in 1969-1973 and the PMR was statistically significant. But, the number of disabilities caused by silicotuberculosis was smaller than the minimum required to estimate a PMR for 1975-76. The estimated number of white male miners disabled from that cause decreased from an average of nearly eight per year for the 1969-73 period to one per year for the 1975-76 period. This difference was not statistically significant.

Contrary to expectations, a statistically significant relative deficit of disabilities due to respiratory system cancer was observed for both 1969-73 and 1975-76. Also, significantly fewer than expected disabilities from cancer of the digestive organs and peritoneum occurred for both 1969-73 and 1975-76.

The PMR's for circulatory disease for both periods were not statistically significant.

Fewer disabilities than expected occurred for diseases of the digestive system. For the period 1969-73, this difference was statistically significant. Although the observed PMR for peptic ulcer was high for the 1975-76 dataset, it was not significant.

The proportion of disabilities due to diseases of the musculoskeletal system and connective tissue was greater than expected, but achieved statistical significance only in the 1975-76 data. A statistically significant deficit of

rheumatoid arthritis was observed for both time periods; osteoarthritis caused more disabilities than expected but this was statistically significant only for 1969-73. More allowances were granted for displacement of intervertebral disc (ICDA 725), slipped disc, than expected, but the difference was statistically significant only for the 1975-76 data.

A statistically significant excess of disabilities due to accidents, poisoning and violence occurred in the 1969-1973 data only. The PMR for 1975-76 was greater than 100.0 but was not significant.

No disabilities were reported due to hearing loss.

None of the PMR's for disabling conditions for which there had not been a previous report of a relationship were significant at the required 0.001 level.

Results by Specific Mining Occupations

Persons engaged in boring, drilling, cutting, and related occupations (DOT 930) exhibited a disability pattern generally consistent with that described for all mining occupations. (Table 3). With the exception of a significantly high PMR for respiratory system cancer for 1975-76, there were too few blasters (DOT 931) to evaluate their disability pattern (N=282 for 1969-73 and N=123 for 1975-76). Loaders and conveyors (DOT 932) exhibited the same basic pattern of disability as for all mining occupations (Table 4). However, accidents, poisoning and violence were significantly high in 1969-1973 but were significantly low in 1975-76. There were too few disabilities awarded to persons employed in crushing (DOT 933) and screening and related occupations (DOT 934) to assess their disability patterns reliably. The basic pattern of disability described for all mining occupations, (DOT 930-939) obtained for other mining occupations (DOT 939) (Table 5). The PMR for silicotuberculosis was significantly high in 1969-73, but the number of miners disabled from this cause in 1975-76 did not fulfill the criterion to estimate a PMR. In the earlier period the observed number of miners disabled from silicotuberculosis was more than 11 times the expected number.

No previously unknown relationships were suggested by any of the analyses for specific occupations.

Mining Industry Analyses for 1975-76

The analysis was further restricted to mining occupations (DOT 930-939) within the mining industry (SIC 100-149) (Table 6). This was possible for the 1975-76 data only. The pattern of disproportionately greater disability from respiratory disease and musculoskeletal diseases was observed again. The observed PMR for pneumoconiosis from silica and silicates was higher than for the mining occupations not restricted to the mining industry (see Table 2), but not significantly so. The number of disabilities caused by silicotuberculosis was smaller than the minimum established to estimate a PMR. The PMR's for musculoskeletal system and connective tissue and

displacement of an intervertebral disc were significantly greater than 100.0 while that for osteoarthritis was greater than 100.0 but was not significant. Significantly low PMR's were noted for the following diseases: cancer of the respiratory system, cancer of the digestive organs and peritoneum, rheumatoid arthritis, all neoplasms, and diseases of the circulatory system. This pattern was also similar to that for all mining occupations not restricted to mining industry. The PMR for accidents, poisoning and violence was greater than 100.0 but was not significant.

Persons employed in boring, drilling, cutting, and related occupations (DOT 930) in mining industries experienced increased disability only from respiratory diseases, specifically all pneumoconioses and silicosis, and displacement of intervertebral disc (slipped disc) (Table 7). All disability allowances for pneumoconiosis were due to silica and silicates. A significantly low PMR was noted for cancer of the digestive organs and peritoneum.

Again, too few blasters (DOT 931) were awarded disability to permit detailed evaluation of their disability pattern (N=109). Significant excess of respiratory system cancer and deficits of heart and hypertensive disease and of musculoskeletal disease relative to expected numbers were noted. Persons employed in loading and conveying occupations (DOT 932) experienced excess disability from diseases of the respiratory system. Deficits of disability were observed for accidents, poisoning, and violence and all neoplasms. Too few men employed in crushing and screening occupations received disability to evaluate the PMR's.

With the exception of musculoskeletal disease, persons employed in other mining occupations (DOT 939) followed the general pattern of disability exhibited by all mining occupations (DOT 930-939) (Table 8). Contrary to the general pattern of disability, the proportion of disabilities due to diseases of the musculoskeletal system was not significantly high.

None of the PMR's for disabilities from diseases not subjected to planned tests were significant for the mining industry as a whole, for any specific mining industry, or for any mining occupation within it that was studied.

Specific Mining Industry Analyses

Disabilities of men engaged in mining occupations (DOT 930-939) in the bituminous, lignite, and anthracite coal mining industry (SIC 110-121) were distributed in a pattern consistent with that described for all mining industries (Table 9). The PMR for pneumoconiosis due to silica and silicates for this occupation/industry was higher than for any considered except for workers in the same industry restricted to "other" mining occupations as described below. The corresponding ratio of observed cases to expected was nearly 49 as the PMR was 4894. There was a significant deficit, relative to the expected number, of disabilities due to circulatory system disease and to rheumatoid arthritis. There were too few cases to estimate the PMR for peptic

ulcer. The PMR's for diseases of the musculoskeletal system and osteoarthritis were low but were not significant while that for displacement of an intervertebral disc was high but not significant. The PMR for accidents, poisoning, and violence was low but was not significant. There were too few disability allowances for specific mining occupations within the coal mining industry to permit analysis with the exception of other mining occupations. Nevertheless, again a significant high PMR for respiratory system cancer was found for blasters (DOT 931). Coal mining industry employees working in other mining occupations (DOT 939) exhibited the same disability pattern as those in all mining industries (Table 10). Observed significance levels were not as great (higher Type I error probability) for any cause of disability other than respiratory disease, pneumoconioses, and pneumoconiosis due to silica and silicates. The PMR for neoplasms was significantly low. The PMR for pneumoconiosis due to silica and silicates for this occupation/industry was the highest for any considered. The corresponding ratio of observed cases to expected was nearly 51.

In contrast to the coal mining industry, the distribution of disabilities among those employed in mining occupations (DOT 930-939) in the oil and gas extraction industry (SIC 130-138) generally does not differ from the expected (Table 11). Significant excesses of disabilities from musculoskeletal disease and slipped disc were observed. It is interesting to note that no disabilities from pneumoconiosis or silicosis occurred among men employed in the oil and gas extraction industry. Moreover, there were no disabilities caused by tuberculosis, bronchitis, or asthma. The PMR for accidents, poisoning, and violence was high but was not significant. Men employed in boring, drilling, cutting, and related occupations (DOT 930) had excess disability from musculoskeletal disease (Table 12). The small number of disability allowances in the other occupational groups precludes precise statistical analysis.

The proportion of disabilities from diseases of the respiratory system was significantly high for men employed in all mining occupations (DOT 930-939) in the metal and nonmetallic nonfuel mineral industry (SIC 100-209, 140-149) (Table 13). Individual occupational groups were not examined because of the small sample size.

The results of analysis by industry and occupation for 1975-76 are summarized in the table below. Respiratory system diseases and diseases of the musculoskeletal system and connective tissue were the primary causes of excess disability among miners in all mining industries. Pneumoconiosis, bronchitis and asthma, and emphysema caused the excess respiratory disease disability. Displacement of intervertebral disc and osteoarthritis contributed most to the excess in disability from diseases of the musculoskeletal system and connective tissue. For all mining industries except oil and gas extraction, statistically significant excess disability was caused by diseases of the respiratory system. Statistically significant excess disability among employees in the oil and gas extraction industry was due to diseases of the musculoskeletal system and connective tissue. Industry, not occupation, was associated with variation in cause of major disability.

Disabling Conditions Causing Elevated PMR's, by Occupation and Industry

Classified by occupation	All mining industries (SIC 100-149)	Coal mining (SIC 110-121)	Oil and gas extraction (SIC 130-138)	Metal and nonmetal mining (SIC 100-109)
All mining occupations (930-939)	Respiratory	Respiratory	Musculo-skeletal & connective tissue	Respiratory
Boring, drilling, and cutting (DOT 930)	Respiratory		Musculo-skeletal & connective tissue	
Extraction of minerals, nec (DOT 939)	Respiratory	Respiratory		

Reanalysis Without Respiratory System Disease Caused Cases

PMR's were re-calculated excluding all disabilities caused by diseases of the respiratory system since the very high association between these diseases and mining could obscure associations between mining and other occupation-related diseases. This follows from the negative functional dependence between PMR's for several diseases for any given industry; diseases compete for proportions of the total incidence, here, of disabilities. This procedure tends to offset one limitation of PMR analyses.

Results of these analyses are presented in Tables A-1 to A-12 in the Appendix. For all mining occupations (Table A1) the PMR's for all diseases of the musculoskeletal system, for osteoarthritis, and for displacement of intervertebral disc were significantly high for both periods. The patterns for individual occupations (see Tables A-2 to A-5) were much the same except that the individual PMR's for diseases of the musculoskeletal system, osteoarthritis, and displacement of intervertebral disc , while high, were not always significant for both periods. The pattern for all mining occupations held for mining occupations restricted to the mining industry for 1975-76 (see Table A-5). For the bituminous, lignite, and anthracite coal mining industry (Table A-8), the PMR's for diseases of the musculoskeletal system, osteoarthritis, and displacement of intervertebral disc for 1975-76 were all greater than 100.0 but only that for diseases of the musculoskeletal system was significant. For the oil and gas extraction industries (Table A-10) the PMR for displacement of intervertebral disc was very large, and statistically significant. The PMR for diseases of the musculoskeletal system was also significantly high while that for osteoarthritis was high but not significant.

The other cause of disability which became statistically significant was accidents, poisoning, and violence. For mining occupations in all industries the PMR for accidents, poisoning, and violence was significantly high for both periods. This was also true for the PMR for accidents, poisoning, and violence for the mining industry restricted to mining occupations for 1975-76. For coal mining (bituminous, lignite, and anthracite coal mining) the PMR for accidents, poisoning, and violence for 1975-76 was high but it was not significant.

For mining occupations for all industries, the PMR for tuberculosis was observed higher than 100.0 for 1969-73 but was not significant. However, the PMR for silicotuberculosis, which was significantly high in the previous analysis, was not significant although the number of cases was 13 times the number expected for 1969-73. The PMR's for neoplasms and diseases of the circulatory system were still significantly low for both periods but at lower levels of significance as the occurrence of disabilities caused by these diseases approached that expected under the null hypothesis. The PMR for respiratory system neoplasms was low for both periods but was significant only for 1969-73 The PMR for neoplasms of the digestive organs and peritoneum was significantly low for both periods. The PMR's for diseases of the circulatory system were significantly low for 1969-73 but not for 1975-76.

No PMR's for diseases not expected to be related to mining were found to be significantly high with this analysis.

DISCUSSION

The pattern of disability that emerges for persons employed in mining occupations was weighted heavily toward diseases of the respiratory system. Elevations of the PMR's for silicotuberculosis, emphysema, pneumoconiosis, silicosis, and asthma and bronchitis were significant. Considering that the extremely high PMR's for respiratory diseases must be balanced by reduced PMR's for other diseases, it was not surprising that the PMR's for most of the other diseases were lower than expected. The PMR for cancer of the respiratory system was much lower than expected, as was the PMR for all neoplasms. Diseases of the digestive system, including peptic ulcer and cancer, produced fewer disabilities than expected. Significantly fewer disabilities were observed for endocrine, nutritional, and metabolic diseases, including diabetes mellitus. The proportion of disabilities from musculoskeletal and connective tissue diseases were modestly higher than expected. Rheumatoid arthritis contributed significantly less disability than expected while osteoarthritis and slipped disc contributed more. Accidents were also important causes of disability.

Pneumoconiosis has been identified for many years as the major occupational disease associated with underground coal mining. More recently, pneumoconiosis has been reported in employees of surface coal mines and of other mining industries. The leading cause of excess Social Security disability awards or allowances among mining employees for both periods analyzed in this study was pneumoconiosis due to silica and silicates. For all mining industries combined, coal mining, and metal and nonmetallic mineral mining, there was a significant excess of disabilities awarded for pneumoconiosis due to silica and silicates.

The PMR for pneumoconiosis due to silica and silicates was higher in the 1975-76 period than in the 1969-73 period. Such a difference could signify that an old problem has become worse. However, this difference might result from a greater decrease in the incidence of causes of disability other than pneumoconiosis due to silica and silicates for miners, or a greater decrease in the incidence of pneumoconiosis due to silica and silicates for workers in non-mining occupations than for miners. It might also reflect changes in patterns of diagnosis, in tendencies for disabled workers to apply for disability awards, or in administrative treatment of applications for benefits, among many possibilities. The difference may result from the fact that the 1969-73 data were award data while those for 1975-76 were allowance data, although the differences between awards and allowances do not appear large enough to account for the difference in PMR's. More research is needed to determine the cause for the finding in this study. The direction of the difference occurred for all mining occupations studied. In general, the average number of workers disabled each year from pneumoconiosis due to silica and silicates was lower for 1975-76 than for 1969-73. However, for boring, drilling, cutting, and related occupations and for loaders and conveyors the average number was greater for the more recent period. Such changes in average numbers of disabled workers may be deceptive because changes in the sizes and compositions of the populations at risk have not been considered.

In addition to higher relative incidence of disabilities caused by pneumoconiosis, workers in the mining industry also experience higher relative incidence of other chronic respiratory diseases. In fact, in contrast to most non-mining occupations (DHHS, 1980), respiratory diseases were the leading cause of disabilities rather than diseases of the circulatory system. The disability pattern discovered was consistent with the studies of mortality and morbidity previously summarized. The number of disability awards or allowances for emphysema and bronchitis and asthma was significantly higher than expected in those occupation and industry groups where the PMR was based on enough cases to provide reasonable power for statistical tests against reasonable alternatives.

The leading cause of disability for miners for 1969-73 among all disease rubrics analyzed was emphysema. One factor associated with emphysema is smoking. This may be the source of the emphysema caused disabilities found in this study. However, this relationship may result from the combined effects of smoking and dust, or other factors not yet understood. Only one disease is selected by SSA as the primary cause of disability for a disability award. This is the cause of disability analyzed in this report. In fact, more than one disease condition may contribute to a worker's impairment. Many of the workers disabled by emphysema may also have had pneumoconiosis, and vice versa so that these results may underestimate the incidence of both conditions.

Tuberculosis was not found to be a cause of higher relative incidence of disability in either period but silicotuberculosis was for the 1969-73 period but not for the 1975-76 period. This may reflect better control of this disease or changes in diagnosis.

Nerve deafness and musculoskeletal disease are often trauma-induced diseases of the mining industry. Although much of the equipment used in mining is noisy, especially when sound is confined underground, there were no disabilities awarded for hearing loss. There are several possible explanations for this: 1) Nerve deafness is not perceived as a disabling condition and compensation is not sought; 2) When hearing loss is first detected, the miner is transferred to a quieter environment, thus limiting hearing loss; or 3) The impairment is not severe enough to result in inability to have employment.

Except for the possible changes previously discussed, the general pattern of disability observed in mining occupations was consistent across the two time periods, 1969-1973 and 1975-1976. The larger sample size of the dataset for the earlier period permitted a more detailed analysis of disabling conditions than was possible for the later period. Respiratory diseases caused significant excess disability among miners in all occupations and individual occupations. Pneumoconiosis due to silica and silicates, bronchitis and asthma, and emphysema were causes of significant excess disability; bronchiectasis was not.

The pattern of disability observed in the oil and gas extraction industry was different from that observed in most other mining industries. Nonmalignant respiratory disease, primarily pneumoconiosis, caused most of the disability

in other mining industries, while in the oil and gas extraction industry, musculoskeletal and connective tissue disease was the leading cause of disability. No employee of the oil and gas extraction industry was awarded disability for pneumoconiosis. This difference in the disability patterns most likely illustrates the importance of exposure to dusts resulting from mining activities in the development of pneumoconiosis. These data do not contain information by type of mine (surface or underground); it was not possible to determine if the lower prevalence of pneumoconiosis in surface miners reported in the literature was reflected in fewer disability awards for pneumoconiosis.

The lack of relationship of musculoskeletal disease to coal mining and metal and nonmetallic mining, in contrast to the significant relationships of these causes of disability to the oil and gas extraction industry, may be a compensation for the huge PMR's for respiratory diseases. This is suggested by the results of the re-analysis of the data after all awards or allowances for respiratory system diseases were deleted. High PMR's for musculoskeletal diseases were found for most mining industries even coal mining.

Variations among occupations within the same industry do not appear as important as variations among industries for the same occupation for differences in distributions of conditions causing disabilities.

This study examines only the primary cause of disability. Thus, increases in disability from diseases associated with pneumoconiosis, such as cor pulmonale and rheumatoid arthritis, might not be detected. Competing causes of disability could not be examined to determine if certain patterns of disability occurred together.

Accidents appear to be a disproportionate source of disabilities for workers in mining occupations and in mining industries in both periods, especially when the depressing effects of the huge PMR's for respiratory diseases are removed. These results may underestimate the true impact of accidents as sources of major chronic impairment for mine workers. Many mine accidents may be clearly occupational so that the worker's claim for worker's compensation is readily established. While worker's compensation awards do not preclude SSA disability awards in all cases, in some cases the benefit "offset" may be enough to do so. However, worker's compensation awards certainly do not preclude allowances. In addition, some workers receiving worker's compensation awards may mistakingly believe that they have exhausted their sources of benefits and may not apply for SSA benefits.

Malignant neoplasms of the respiratory system and the digestive system were hypothesized as causes of disproportionately high disability but were found, instead, to cause disproportionately low numbers of disabilities (with the single exception of the high respiratory cancer PMR for coal mine blasters for 1975-76). This result is puzzling not only because of the previously cited evidence that miners may engage in heavier smoking than other workers, but also because underground workers have often been considered at higher risk for lung cancer. In part, this finding may reflect the oft-mentioned

depressing effects of the huge PMR's for respiratory diseases, the high PMR' for musculoskeletal system diseases, and perhaps that for accidents, poisoning and violence as well. However, even when disabilities from respiratory diseases were completely eliminated from the data significantly low PMR's for these malignant neoplastic diseases (and others in some cases) were observed.

One tempting potential explanation does not seem reasonable when considered more fully. This is the explanation that such diseases produce death too rapidly for workers to apply for SSA disability benefits. While it is certainly plausible, and it probably happens, such a phenomenon seems as likely to occur for miners as for non-miners; hence, it probably (in terms of present evidence) produces a constant effect across all industries and occupations while the low PMR's reflect a variation from the norm. A constant cannot account for a variable.

Another explanation, which is conjecture, is that there is "competition" for causes of disabilities among disease conditions in terms of latency. Once a worker receives a disability award for one disease, that worker does not get a second award if he/she develops another disease. If the same exposures tend to produce several different diseases then the diseases with the shortest latencies will be the ones which cause disabilities. If this is true for those most susceptible to diseases with long latencies, then such persons will be removed from the workforce by disabilities from the diseases with the shorter latencies before they have a chance to develop the competing diseases with a longer latencies. If such hazards are not present for workers in other occupations or industries, then among those workers the ones who are most susceptible to the diseases with the longer latencies will develop such diseases and become disabled. This could produce the negative PMR's for the longer latency diseases in the first industries. Such a phenomenon may occur for lung cancer and digestive system cancer relative to the mining industry. Those workers who are at greatest genetic risk for such cancers may also be a high risk for pneumoconiosis or emphysema, etc., and develop those diseases to such an extent as to cause disability before they develop the cancers, unlike workers with similar genetic characteristics in other occupations or industries. To the extent that this speculation is accurate, then miners disabled from respiratory disease, especially pneumoconiosis, maybe at higher risk for subsequent lung cancer and digestive system cancer. Thus, follow-up studies of such workers are recommended to determine their risks for malignant neoplastic disease.

No conditions not previously considered related to mining work were found associated with any of the mining occupations or mining industries analyzed in this study.

Based on the results of this analysis, the following recommendations are made: 1) Conduct follow-up studies of mine workers disabled from respiratory diseases to determine subsequent morbidity and mortality from malignant neoplasms as these persons may be at high risk; 2) Continue to monitor the incidence of respiratory disease, especially pneumoconiosis, of miners with surveillance data systems including both mortality data and morbidity data, to

determine if this incidence is increasing; 3) Continue studies of the mining industry to determine methods to control respiratory disease; 4) Conduct studies to determine the causes of the high relative incidence of emphysema and its prevention; 5) Also, conduct studies to determine the causes of the high relative incidence of diseases of the musculoskeletal system and connective tissue and their prevention especially in the oil and gas extraction industries; and 6) Study the causes of injuries in the mining industry which remain a source of disability for relatively large numbers of miners and also measure the relative incidencies of disabilities from accidents, from poisoning, and from violence separately.

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TABLE 1: Diseases and ICDA-8 codes analyzed in this report.

Infective and parasitic diseases	000-136
Tuberculosis	010-019
Silicotuberculosis	010
Pulmonary tuberculosis	011
Neoplasms	140-239
Malignant neoplasms	140-199
Buccal cavity & pharynx	140-149
Digestive organs & peritoneum	150-159
Respiratory system	160-163
Bone, connective tissue, and skin	170-173
Breast	174
Genital organs	180-187
Urinary organs	188-189
Other & unspecified sites	190-199
Neoplasms of lymphatic & hematopoietic tissue	200-209
Sarcoma (lympho-,reticulo-), other lymphomas	200,202
Leukemia	204-207
Benign neoplasms	210-228
Neoplasms of unspecified nature	230-239
Endocrine, nutritional, & metabolic diseases	240-279
Diabetes mellitus	250
Diseases of blood & blood-forming organs	280-289
Mental disorders	290-315
Schizophrenia	295
Neuroses	300
Alcoholism	303
Diseases of nervous system & sense organs	320-389
Meningitis	320
Multiple sclerosis	340
Cataract	374
Glaucoma	375
Blindness	379
Diseases of circulatory system	390-458
Heart & hypertensive disease	393-429
Hypertensive disease	400-404
Ischemic heart disease	410-414
Cerebrovascular disease	430-438
Cerebral hemorrhage	431
Cerebral thrombosis & embolism	433-434
Arteriosclerosis	440
Diseases of respiratory system	460-519
Bronchitis & asthma	490-491, 493
Emphysema	492
Pneumoconiosis & related diseases	515-516
Pneumoconiosis due to silica & silicates	515
Other pneumoconioses & related diseases	518
Bronchiectasis	518

TABLE 1 (Cont'd.)

Diseases of digestive system	510-577
Peptic ulcer	531-533
Chronic enteritis & ulcerative colitis	563
Cirrhosis of liver	571
Diseases of genitourinary system	580-629
Nephritis & nephrosis	580-584
Chronic nephritis	582
Other diseases of urinary system	590-599
Diseases of male genital organs	600-607
Diseases of skin & subcutaneous tissue	680-709
Diseases of musculoskeletal system & connective tissue	710-738
Rheumatoid arthritis	712
Osteoarthritis	713
Other & unspecified arthritis	710-711, 714-715
Displacement of intervertebral disc	725
Congenital anomalies	740-759
Symptoms & ill-defined conditions	780-796
Accidents, poisonings, & violence	800-999
Unknown or not classifiable	

TABLE 2: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E.(PMR), for white males employed in the extraction of minerals (DOT 930-939) by disabling condition: Social Security Disability Awards, 1969-1973, and Allowances, 1975-1976.

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
All disabling conditions				23854			7330
Infective and parasitic diseases	000-136	77 *	8	332	56 *	19	40
Tuberculosis	010-019	98	13	287	93	34	33
Silicotuberculosis	010	958 *	303	39	---		2
Pulmonary tuberculosis	011	87	12	220	110	38	31
Neoplasms	140-239	47 ***	2	1104	49 ***	7	341
Malignant neoplasms	140-199	46 ***	4	909	47 ***	9	274
Buccal cavity & pharynx	140-149	45 **	13	55	32 *	23	10
Digestive organs & peritoneum	150-159	37 ***	8	170	30 ***	8	40
Respiratory system	160-163	52 ***	6	392	53 ***	10	116
Bone, connective tissue, & skin	170-173	48	23	44	38	50	12
Genital organs	180-187	51 *	19	67	92	44	40
Urinary organs	188-189	37 **	16	46	40 *	22	14
Other & unspecified sites	190-199	47 ***	10	135	47 *	23	42
Neoplasms of lymphatic & hematopoietic tissue	200-209	53 **	13	158	72	20	61
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	56 *	17	51	57 ***	4	15
Leukemia	204-207	57	26	42	100	40	25
Benign neoplasms	210-228	21 ***	11	9	15 ***	19	2
Neoplasms of unspecified nature	230-239	91	53	28	---		4
Endocrine, nutritional, & metabolic diseases	240-279	54 ***	7	402	41 ***	7	92
Diabetes mellitus	250	51 ***	9	282	32 ***	8	56
Diseases of blood & blood-forming organs	280-289	123	31	49	---		10
Mental disorders	290-315	65 ***	2	1391	67 **	8	451
Schizophrenia	295	44 ***	5	342	57 *	17	136
Neuroses	300	110	7	432	116	16	160
Alcoholism	303	39 ***	12	56	14 ***	13	6

TABLE 2 (Cont'd.)

	ICDA	1969-1973 PMR		SE(PMR)	TOTAL	1975-1976 PMR		SE(PMR)	TOTAL
Diseases of nervous system & sense organs	320-389	52	***	6	711	67	***	6	281
Multiple sclerosis	340	13	***	12	15	---			19
Cataract	374	112		32	59	---			12
Glaucoma	375	60		25	25	---			6
Blindness	379	65		29	44	---			31
Diseases of circulatory system	390-458	65	***	1	5431	73	***	3	1714
Heart & hypertensive disease	393-429	70	***	1	4502	75	***	4	1408
Hypertensive disease	400-404	107		16	235	97		17	90
Ischemic heart disease	410-414	68	***	2	3870	76	***	4	1241
Cerebrovascular disease	430-438	35	***	4	405	68		14	174
Cerebral thrombosis & embolism	433-434	46	***	11	118	77		28	33
Arteriosclerosis	440	66	*	13	216	100		23	71
Diseases of respiratory system	460-519	354	***	4	7716	397	***	16	2183
Bronchitis & asthma	490-491,493	189	***	15	310	227		59	143
Emphysema	492	307	***	3	4194	289	***	27	592
Pneumoconiosis & related diseases	515-516	2280	***	83	2180	3147	***	236	739
Pneumoconiosis due to silica & silicates	515	2327	***	85	2180	3240	***	238	739
Bronchiectasis	518	---			17	---			17
Diseases of digestive system	520-577	59	***	5	412	86		13	176
Peptic ulcer	531-533	101		14	112	209		55	58
Chronic enteritis & ulcerative colitis	563					---			8
Cirrhosis of liver	571					70		21	71
Diseases of genitourinary system	580-629	58	*	15	98	101		29	53
Nephritis & nephrosis	580-584	41	**	18	35	148		45	38
Chronic nephritis	582	49	*	20	35	---			38
Other diseases of urinary system	590-599	63		25	44	---			15
Diseases of male genital organs	600-607	---			19				
Diseases of skin & subcutaneous tissue	680-709	106		41	79	---			30

TABLE 2 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Disease of musculoskeletal system & connective tissue	710-738	106	3	3652	123 *	7	1453
Rheumatoid arthritis	712	69 ***	5	313	46 **	14	48
Osteoarthritis	713	123 **	7	1377	128	16	498
Other & unspecified arthritis	710-711, 714-715	115	18	167	79	34	39
Displacement of intervertebral disc	725	117	9	1062	162 **	17	464
Congenital anomalies	740-759	67 *	14	145	49 *	17	34
Symptoms & ill-defined conditions	780-796	---		14	---		10
Accidents, poisonings, & violence	800-999	139 ***	6	2318	118	13	459

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 3: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) by disabling condition: Social Security Disability Awards, 1969-73, and Allowances, 1975-1976.

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
All disabling conditions				5434			1823
Infective & parasitic disease	000-136	106	23	109	---		10
Tuberculosis	010-019	129	29	91	---		10
Silicotuberculosis	010	---		8			
Pulmonary tuberculosis	011	134	32	82	---		10
Neoplasms	140-239	60 ***	8	312	61 *	16	101
Malignant neoplasms	140-199	61	9	263	56 *	19	78
Buccal cavity & pharynx	140-149	65	58	17			
Digestive organs & peritoneum	150-159	63	20	61	6 ***	6	2
Respiratory system	160-163	61 *	13	97	78	33	40
Bone, connective tissue, & skin	170-173	---		10	---		10
Genital organs	180-187	38	37	11	---		26
Urinary organs	188-189	84	59	22			
Other & unspecified sites	190-199	67	20	45			
Neoplasms of lymphatic & hematopoietic tissue	200-209	68	28	49	---		19
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	---		10			
Leukemia	204-207	---		21	---		5
Benign neoplasms	210-228				---		2
Neoplasms of unspecified nature	230-239				---		2
Endocrine, nutritional, & metabolic diseases	240-279	50 **	14	83	20 ***	12	11
Diabetes mellitus	250	49 *	20	61	21 ***	14	9
Diseases of blood & blood-forming organs	280-289	---		9			
Mental disorders	290-315	49 ***	6	281	67	19	127
Schizophrenia	295	33 ***	10	78	69	37	51
Neuroses	300	80	15	75	119	39	42
Alcoholism	303	28 **	17	9			

TABLE 3 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Diseases of nervous sytem & sense organs	320-389	48 **	15	159	82	23	90
Multiple sclerosis	340				---		15
Cataract	374	226	128	25	---		2
Glaucoma	375	---		5			
Blindness	379	---		11	---		12
Diseases of circulatory system	390-458	66 ***	5	1158	79 *	7	437
Heart & hypertensive diseases	393-429	72 **	7	971	81 *	8	357
Hypertensive disease	400-404	90	20	42	---		36
Ischemic heart disease	410-414	70 **	8	839	77 *	9	296
Cerebrovascular disease	430-438	41 ***	9	98	53	22	32
Cerebral thrombosis & embolism	433-434	45 *	22	24	---		7
Arteriosclerosis	440	45 **	13	30	---		20
Diseases of respiratory system	460-519	264 ***	16	1192	275 ***	28	356
Bronchitis & asthma	490-491,493	143	58	50	---		36
Emphysema	492	245 ***	14	686	170	55	82
Pneumoconiosis & related diseases	515-516	1498 **	326	295	2323 ***	444	125
Pneumoconiosis due to silica & silicates	515	1528 **	328	295	2395 ***	451	125
Bronchiectasis	518	---		6	---		10
Diseases of digestive system	520-577	51 ***	10	82	114	31	57
Peptic ulcer	531-533	---		5	---		20
Chronic enteritis & ulcerative colitis	563				---		2
Cirrhosis of liver	571				---		28
Diseases of genitourinary system	580-629	51	27	21	---		25
Nephritis & nephrosis	580-584	---		7	---		25
Chronic nephritis	582	---		7	---		25
Other diseases of urinary system	590-599	---		10			
Diseases of male genital organs	600-607	---		4			

TABLE 3 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Diseases of skin & sub-cutaneous tissue	680-709	163	97	28			
Disease of musculoskeletal system & connective tissue	710-738	138 **	9	1088	151 *	18	444
Rheumatoid arthritis	712	66	16	66	12 ***	12	3
Osteoarthritis	713	172 ***	16	396	147	21	136
Other & unspecified arthritis	710-711, 714-715	94	37	29	---		9
Displacement of inter-vertebral disc	725	166	29	375	227 *	43	168
Congenital anomalies	740-759	81	21	45	---		17
Symptoms & ill-defined conditions	780-796				---		10
Accidents, poisonings, & violence	800-999	187 ***	17	867	126	23	137

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 4: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E.(PMR), for white males employed in loading and conveying occupations (DOT 932) by disabling condition: Social Security Disability Awards, 1969-1973, and Allowances, 1975-1976.

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
All disabling conditions				2217			804
Infective and parasitic diseases	000-136	35	31	15	---		5
Tuberculosis	010-019	51	42	15	---		5
Pulmonary tuberculosis	011	58	49	15	---		5
Neoplasms	140-239	46 ***	8	99	32 **	18	25
Malignant neoplasms	140-199	34 ***	8	61	38 *	20	25
Buccal cavity & pharynx	140-149	---		6			
Digestive organs & peritoneum	150-159	12 ***	9	5	---		10
Respiratory system	160-163	52 *	19	35			
Bone, connective tissue, & skin	170-173	---		5			
Urinary organs	188-189	---		4			
Other & unspecified sites	190-199	22 ***	15	6	---		15
Neoplasms of lymphatic & hematopoietic tissue	200-209	132	70	38			
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	---		6			
Leukemia	204-207	---		10			
Endocrine, nutritional, & metabolic diseases	240-279	53	21	36	---		25
Diabetes mellitus	250	63	27	32	---		20
Diseases of blood & blood-forming organs	280-289				---		10
Mental disorders	290-315	75	11	165	58	20	40
Schizophrenia	295	69	22	60	---		5
Neuroses	300	69	26	27	---		5
Alcoholism	303	---		15			
Diseases of nervous system & sense organs	320-389	32 ***	10	42	67	33	32
Glaucoma	375	---		1	---		5
Blindness	379	---		3	---		5

TABLE 4 (Cont'd.)

	ICDA	1969-1973 PMR		SE(PMR)	TOTAL	1975-1976 PMR		SE(PMR)	TOTAL
Diseases of circulatory system	390-458	64	***	7	477	88		11	232
Heart & hypertensive disease	393-429	73	**	7	419	86		12	182
Hypertensive disease	400-404	247		69	48	---			10
Ischemic heart disease	410-414	63	***	8	322	90		14	167
Cerebrovascular disease	430-438	39	**	18	39	71		50	20
Cerebral thrombosis & embolism	433-434	---			8				
Arteriosclerosis	440	14	***	13	4	---			15
Diseases of respiratory system	460-519	337	***	24	634	368	***	44	228
Bronchitis & asthma	490-491,493	---			15	---			15
Emphysema	492	279	***	37	327	---			70
Pneumoconiosis & related diseases	515-516	2528	***	226	207	---			62
Pneumoconiosis due to silica & silicates	515	2581	***	226	207	---			62
Diseases of digestive system	520-577	65		23	44	---			15
Peptic ulcer	531-533	---			16	---			5
Cirrhosis of liver	571					---			5
Diseases of genitourinary system	580-629	---			14	---			5
Nephritis & nephrosis	580-584	---			9	---			5
Chronic nephritis	582	---			9	---			5
Diseases of skin & subcutaneous tissue	680-709	---			10	---			5
Disease of musculoskeletal system & connective tissue	710-738	120		13	384	132		24	171
Rheumatoid arthritis	712	132		40	55				
Osteoarthritis	713	104		23	99	161		47	70
Other & unspecified arthritis	710-711, 714-715	249		88	32	---			2
Displacement of intervertebral disc	725	134		25	122	123		34	38
Congenital anomalies	740-759	134		60	29				

TABLE 4 (Cont'd.)

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
Accidents, poisonings, & violence	800-999	156 **	16	268	33 ***	15	13

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 5: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E.(PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) by disabling condition: Social Security Disability Awards, 1969-1973, 1975-1976.

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
All disabling conditions				15829			4574
Infective and parasitic diseases	000-136	70 *	10	192	56	23	25
Tuberculosis	010-019	93	16	175	---		18
Silicotuberculosis	010	1109 *	349	31	---		2
Pulmonary tuberculosis	011	73 *	12	117	---		16
Neoplasms	140-239	42 ***	3	665	45 ***	7	195
Malignant neoplasms	140-199	43 ***	3	572	41 ***	7	151
Buccal cavity & pharynx	140-149	39 **	16	32	---		10
Digestive organs & peritoneum	150-159	34 ***	11	104	34 ***	8	28
Respiratory system	160-163	51 ***	8	260	43 ***	13	60
Bone, connective tissue, & skin	170-173	31 **	18	18	10 ***	10	2
Genital organs	180-187	62	26	56	37 *	26	10
Urinary organs	188-189	23 ***	8	20	---		14
Other & unspecified sites	190-199	43 **	14	82	49 *	22	27
Neoplasms of lymphatic & hematopoietic tissue	200-209	29 ***	9	56	80	30	42
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	42 *	21	25	---		15
Leukemia	204-207	23 ***	11	11	---		20
Benign neoplasms	210-228	33 **	18	9			
Neoplasms of unspecified nature	230-239	141	85	28	---		2
Endocrine, nutritional, & metabolic diseases	240-279	57 **	12	283	39 ***	12	56
Diabetes mellitus	250	51 **	13	189	25 ***	12	27
Diseases of blood & blood-forming organs	280-289	154	43	40			
Mental disorders	290-315	70 ***	3	918	68 **	8	274
Schizophrenia	295	47 ***	5	204	54 *	17	75
Neuroses	300	126	12	321	109	18	93
Alcoholism	303	34 ***	12	32	22 **	18	6

TABLE 5 (Cont'd.)

	ICDA	1969-1973 PMR		SE(PMR)	TOTAL	1975-1976 PMR		SE(PMR)	TOTAL
Diseases of nervous system & sense organs	320-389	56	***	7	503	62	***	8	161
Multiple sclerosis	340	22	**	20	15	---			4
Cataract	374	94		42	34	---			14
Glaucoma	375	67		28	19	13	***	1	1
Blindness	379	68		42	30	---			14
Diseases of circulatory system	390-458	65	***	2	3693	69	***	4	1027
Heart & hypertensive disease	393-429	70	***	1	3045	73	***	4	861
Hypertensive disease	400-404	94		20	141	71		19	42
Ischemic heart disease	410-414	68	***	3	2651	75	***	5	774
Cerebrovascular disease	430-438	30	***	3	236	69		16	112
Cerebral thrombosis & embolism	433-434	46	***	11	80	95		41	26
Arteriosclerosis	440	80		20	182	79		21	36
Diseases of respiratory system	460-519	385	***	6	5808	440	***	21	1535
Bronchitis & asthma	490-491,493	215	**	27	241	232		71	92
Emphysema	492	328	***	6	3123	327	***	39	425
Pneumoconiosis & related diseases	515-516	2514	***	89	1668	3542	***	351	532
Pneumoconiosis due to silica & silicates	515	2565	***	91	1668	3643	***	361	532
Bronchiectasis	518	---			6	---			7
Diseases of digestive system	520-577	---			6	80		17	102
Peptic ulcer	531-533	115		18	86	---			33
Chronic enteritis & ulcerative colitis	563					---			6
Cirrhosis of liver	571					57		21	36
Diseases of genitourinary system	580-629	59	*	17	63	71		48	23
Nephritis & nephrosis	580-584	36		32	19	---			8
Chronic nephritis	582	43		35	19	---			8
Other diseases of urinary system	590-599	74		36	34	---			15
Diseases of male genital organs	600-607	---			10				

TABLE 5 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Diseases of skin & subcutaneous tissue	680-709	84	39	41	---		20
Disease of musculoskeletal system & connective tissue	710-738	94	4	2133	113	10	833
Rheumatoid arthritis	712	61 ***	7	186	69	23	45
Osteoarthritis	713	111	7	862	118	24	292
Other & unspecified arthritis	710-711, 714-715	103	28	102	89	42	28
Displacement of intervertebral disc	725	97	8	554	143 *	19	253
Congenital anomalies	740-759	53 *	15	71	40 **	17	17
Symptoms & ill-defined conditions	780-796	---		14			
Accidents, poisonings, & violence	800-999	113	61	1145	130	17	304
Unknown or not classifiable					---		2

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

Table 6: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in the extraction of minerals (DOT 930-939) in mining industries (SIC 100-149) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	1975-1976 PMR	SE(PMR)	TOTAL
All disabling conditions				6075
Infective & parasitic diseases	000-136	44 *	20	26
Tuberculosis	010-019	65	29	19
Pulmonary tuberculosis	011	---		19
Neoplasms	140-239	47 ***	8	274
Malignant neoplasms	140-199	44 ***	9	216
Digestive organs & peritoneum	150-159	36 ***	10	40
Respiratory system	160-163	44 ***	11	81
Bone, connective tissue, & skin	170-173	8 ***	8	2
Genital organs	180-187	109	51	39
Urinary organs	188-189	48	25	14
Other & unspecified sites	190-199	54	27	40
Neoplasms of lymphatic & hematopoietic tissue	200-209	77	21	54
Sarcoma (lympho-,reticulo-), other lymphomas	200,202	68 ***	4	15
Leukemia	204-207	---		20
Neoplasms of unspecified nature	230-239	---		4
Endocrine, nutritional, & metabolic diseases	240-279	34 ***	9	64
Diabetes mellitus	250	24 ***	8	35
Diseases of blood & blood-forming organs	280-289	---		10
Mental disorders	290-315	67 ***	7	362
Schizophrenia	295	41 ***	10	76
Neuroses	300	138	19	156
Alcoholism	303	17 ***	15	6
Diseases of nervous system & sense organs	320-389	64 ***	6	221
Multiple sclerosis	340	---		14
Cataract	374	---		10
Glaucoma	375	---		6
Blindness	379	---		29

TABLE 6 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of circulatory system	390-458	71 ***	4	1393
Heart & hypertensive disease	393-429	74 ***	4	1160
Hypertensive disease	400-404	116	20	90
Ischemic heart disease	410-414	74 ***	4	1018
Cerebrovascular disease	430-438	60 *	15	129
Cerebral thrombosis & embolism	433-434	77	31	28
Arteriosclerosis	440	118	27	71
Diseases of respiratory system	460-519	435 ***	18	2009
Bronchitis & asthma	490-491,493	260 *	65	137
Emphysema	492	297 ***	28	512
Pneumoconiosis & related diseases	515-516	3641 ***	278	718
Pneumoconiosis due to silica & silicates	515	3746 ***	278	718
Bronchiectasis	518	---		2
Diseases of digestive system	520-577	85	13	144
Peptic ulcer	531-533	---		53
Chronic enteritis & ulcerative colitis	563	---		8
Cirrhosis of liver	571	62	19	52
Diseases of genitourinary system	580-629	89	37	38
Nephritis & nephrosis	580-584	---		23
Chronic nephritis	582	---		23
Other diseases of urinary system	590-599	---		15
Diseases of skin & subcutaneous tissue	680-709	---		20
Diseases of musculoskeletal system & connective tissue	710-738	116 *	7	1136
Rheumatoid arthritis	712	40 **	17	35
Osteoarthritis	713	121	14	397
Other & unspecified arthritis	710-711, 714-715	94	44	39
Displacement of intervertebral disc	725	157 *	18	369
Congenital anomalies	740-759	59	21	33
Accidents, poisonings, & violence	800-999	110	12	342
Unknown or not classifiable		---		3

TABLE 6 (Cont'd.)

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 7: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) in mining industries (SIC 100-149) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				1183
Neoplasms	140-239	58 *	17	63
Malignant neoplasms	140-199	51 *	20	47
Digestive organs & peritoneum	150-159	10 ***	8	2
Respiratory system	160-163	59	32	20
Genital organs	180-187	---		25
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		14
Neoplasms of unspecified nature	230-239	---		2
Endocrine, nutritional, & metabolic diseases	240-279	22 ***	14	8
Diabetes mellitus	250	29 **	19	8
Mental disorders	290-315	80	24	92
Schizophrenia	295	47 *	23	20
Neuroses	300	---		38
Diseases of nervous system & sense organs	320-389	75	22	52
Multiple sclerosis	340	---		10
Blindness	379	---		10
Diseases of circulatory system	390-458	80	10	297
Heart & hypertensive disease	393-429	85	10	252
Hypertensive disease	400-404	---		36
Ischemic heart disease	410-414	82	10	211
Cerebrovascular disease	430-438	27 ***	13	11
Cerebral thrombosis & embolism	433-434	---		2
Arteriosclerosis	440	---		20
Diseases of respiratory system	460-519	339 ***	38	294
Bronchitis & asthma	490-491,493	---		30
Emphysema	492	161	46	52
Pneumoconiosis & related diseases	515-516	3364 ***	636	120
Pneumoconiosis due to silica & silicates	515	3461 ***	647	120

TABLE 7 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of digestive system	520-577	114	40	37
Peptic ulcer	531-533	---		15
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		19
Diseases of genitourinary system	580-629	---		10
Nephritis & nephrosis	580-584	---		10
Chronic nephritis	582	---		10
Diseases of musculoskeletal system & connective tissue	710-738	130	20	248
Osteoarthritis	713	142	31	88
Other & unspecified arthritis	710-711, 714-715	---		9
Displacement of intervertebral disc	725	208 *	42	98
Congenital anomalies	740-759	---		16
Accidents, poisonings, & violence	800-999	98	19	65
Unknown or not classifiable		---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level

TABLE 8: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) in mining industries (SIC 100-149) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				4199
Infective & parasitic diseases	000-136	52	24	21
Tuberculosis	010-019	---		14
Pulmonary tuberculosis	011	---		14
Neoplasms	140-239	41 ***	6	166
Malignant neoplasms	140-199	36 ***	6	124
Digestive organs & peritoneum	150-159	36 ***	9	28
Respiratory system	160-163	35 ***	11	45
Bone, connective tissue, & skin	170-173	11 ***	11	2
Genital organs	180-187	---		10
Urinary organs	188-189	---		14
Other & unspecified sites	190-199	49	24	25
Neoplasms of lymphatic & hematopoietic tissue	200-209	83	28	40
Sarcoma (lympho-,reticulo-), other lymphomas	200,202	---		15
Leukemia	204-207	---		20
Neoplasms of unspecified nature	230-239	---		2
Endocrine, nutritional, & metabolic diseases	240-279	39 ***	13	51
Diabetes mellitus	250	27 ***	12	27
Mental disorders	290-315	65 **	8	235
Schizophrenia	295	42 ***	13	51
Neuroses	300	120	19	93
Alcoholism	303	24 **	20	6
Diseases of nervous system & sense organs	320-389	60 ***	8	141
Multiple sclerosis	340	---		4
Cataract	374	---		10
Glaucoma	375	14 ***	1	1
Blindness	379	---		14
Diseases of circulatory system	390-458	68 ***	4	927
Heart & hypertensive disease	393-429	71 ***	5	784
Hypertensive disease	400-404	77	21	42
Ischemic heart disease	410-414	73 ***	5	702

TABLE 8 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Cerebrovascular disease	430-438	65 *	15	98
Cerebral thrombosis & embolism	433-434	103	45	26
Arteriosclerosis	440	86	24	36
Diseases of respiratory system	460-519	460 ***	24	1489
Bronchitis & asthma	490-491,493	251	77	92
Emphysema	492	322 ***	39	389
Pneumoconiosis & related diseases	515-516	3830 ***	370	532
Pneumoconiosis due to silica & silicates	515	3938 ***	383	532
Bronchiectasis	518	---		2
Diseases of digestive system	520-577	76	18	90
Peptic ulcer	531-533	---		33
Chronic enteritis & ulcerative colitis	563	---		6
Cirrhosis of liver	571	44 **	15	26
Diseases of genitourinary system	580-629	79	49	23
Nephritis & nephrosis	580-584	---		8
Chronic nephritis	582	---		8
Other diseases of urinary system	590-599	---		15
Diseases of skin & subcutaneous tissue	680-709	---		10
Diseases of musculoskeletal system & connective tissue	710-738	112	10	758
Rheumatoid arthritis	712	58	24	35
Osteoarthritis	713	119	23	274
Other & unspecified arthritis	710-711, 714-715	97	48	28
Displacement of intervertebral disc	725	141	22	228
Congenital anomalies	740-759	45 **	17	17
Accidents, poisonings, & violence	800-999	129	17	269
Unknown or not classifiable		---		2

TABLE 8 (Cont'd.)

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 9: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in bituminous, lignite, and anthracite coal mining (SIC 110-121) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				2629
Infective & parasitic diseases	000-136	79	43	20
Tuberculosis	010-019	---		15
Pulmonary tuberculosis	011	---		15
Neoplasms	140-239	39 ***	10	100
Malignant neoplasms	140-199	42 ***	10	90
Digestive organs & peritoneum	150-159	35 *	22	17
Respiratory system	160-163	33 **	17	27
Genital organs	180-187	---		20
Urinary organs	188-189	---		5
Other & unspecified sites	190-199	66	36	21
Neoplasms of lymphatic & hematopoietic tissue	200-209	33 *	23	10
Endocrine, nutritional, & metabolic diseases	240-279	17 ***	13	14
Diabetes mellitus	250	6 ***	5	4
Diseases of blood & blood-forming organs	280-289	---		10
Mental disorders	290-315	85	10	187
Schizophrenia	295	50 **	15	36
Neuroses	300	197 *	37	95
Alcoholism	303	---		6
Diseases of nervous system & sense organs	320-389	46 **	15	67
Cataract	374	---		10
Blindness	379	---		10
Diseases of circulatory system	390-458	68 ***	6	590
Heart & hypertensive disease	393-429	78 *	8	541
Hypertensive disease	400-404	120	37	41
Ischemic heart disease	410-414	78 *	8	473
Cerebrovascular disease	430-438	25 ***	14	24
Cerebral thrombosis & embolism	433-434	---		10
Arteriosclerosis	440	56	27	15

TABLE 9 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of respiratory system	460-519	507 ***	28	1040
Bronchitis & asthma	490-491,493	---		87
Emphysema	492	318 ***	49	244
Pneumoconiosis & related diseases	515-516	4758 ***	512	424
Pneumoconiosis due to silica & silicates	515	4894 ***	530	424
Diseases of digestive system	520-577	92	26	68
Peptic ulcer	531-533	---		30
Cirrhosis of liver	571	63	28	23
Diseases of genitourinary system	580-629	---		21
Nephritis & nephrosis	580-584	---		16
Chronic nephritis	582	---		16
Other diseases of urinary system	590-599	---		5
Diseases of skin & subcutaneous tissue	680-709	---		5
Diseases of musculoskeletal system & connective tissue	710-738	93	12	396
Rheumatoid arthritis	712	5 ***	6	2
Osteoarthritis	713	89	18	129
Other & unspecified arthritis	710-711, 714-715	---		12
Displacement of intervertebral disc	725	118	26	117
Congenital anomalies	740-759	---		13
Accidents, poisonings, & violence	800-999	77	23	98

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 10: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) in bituminous, lignite and anthracite coal mining (SIC 110-121) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				1833
Infective & parasitic diseases	000-136	---		15
Tuberculosis	010-019	---		10
Pulmonary tuberculosis	011	---		10
Neoplasms	140-239	29 ***	9	52
Malignant neoplasms	140-199	34 ***	11	52
Digestive organs & peritoneum	150-159	15 **	22	5
Respiratory system	160-163	28 **	17	16
Genital organs	180-187	---		5
Urinary organs	188-189	---		5
Other & unspecified sites	190-199	---		21
Endocrine, nutritional, & metabolic diseases	240-279	24 **	19	14
Diabetes mellitus	250	9 ***	8	4
Mental disorders	290-315	85	13	127
Schizophrenia	295	34 **	17	16
Neuroses	300	194	54	65
Alcoholism	303	---		6
Diseases of nervous system & sense organs	320-389	45 *	17	46
Cataract	374	---		10
Diseases of circulatory system	390-458	70 ***	6	428
Heart & hypertensive disease	393-429	79 *	8	384
Hypertensive disease	400-404	---		26
Ischemic heart disease	410-414	79 *	8	336
Cerebrovascular disease	430-438	36 **	18	24
Cerebral thrombosis & embolism	433-434	---		10
Arteriosclerosis	440	---		15
Diseases of respiratory system	460-519	500 ***	38	721
Bronchitis & asthma	490-491,493	---		62
Emphysema	492	273 **	51	147

TABLE 10 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Pneumoconiosis & related diseases	515-516	4929 ***	676	311
Pneumoconiosis due to silica & silicates	515	5065 ***	708	311
Diseases of digestive system	520-577	103	35	53
Peptic ulcer	531-533	---		20
Cirrhosis of liver	571	71	33	18
Diseases of genitourinary system	580-629	---		11
Nephritis & nephrosis	580-584	---		6
Chronic nephritis	582	---		6
Other diseases of urinary system	590-599	---		5
Diseases of musculoskeletal system & connective tissue	710-738	91	15	271
Rheumatoid arthritis	712	8 ***	7	2
Osteoarthritis	713	90	30	92
Other & unspecified arthritis	710-711, 714-715	---		10
Displacement of intervertebral disc	725	117	28	81
Congenital anomalies	740-759---		7	
Accidents, poisonings, & violence	800-999	101	29	88

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 11: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in oil and gas extraction industries (SIC 130-138) by disabling condition: Social Security Allowances, 1975-1976

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				666
Neoplasms	140-239	56	24	34
Malignant neoplasms	140-199	49	25	25
Respiratory system	160-163	---		21
Genital organs	180-187	---		4
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		9
Endocrine, nutritional, & metabolic diseases	240-279	---		12
Diabetes mellitus	250	---		12
Mental disorders	290-315	39	28	26
Schizophrenia	295	23	60	6
Neuroses	300	---		6
Diseases of nervous system & sense organs	320-389	148	41	59
Multiple sclerosis	340	---		10
Blindness	379	---		14
Diseases of circulatory system	390-458	105	19	215
Heart & hypertensive disease	393-429	104	16	170
Ischemic heart disease	410-414	118	18	168
Cerebrovascular disease	430-438	---		26
Arteriosclerosis	440	---		10
Diseases of respiratory system	460-519	83	32	40
Emphysema	492	---		17
Diseases of digestive system	520-577	---		22
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		20
Diseases of musculoskeletal system & connective tissue	710-738	187 *	33	201
Osteoarthritis	713	205	69	71
Displacement of inter-vertebral disc	725	424	102	113

TABLE 11 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Congenital anomalies	740-759	---		10
Accidents, poisonings, & violence	800-999	119	26	46
Unknown or not classifiable				1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 12: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E.(PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) in oil and gas extraction industries (SIC 130-138) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				447
Neoplasms	140-239	60	33	24
Malignant neoplasms	140-199	60	30	20
Respiratory system	160-163	---		20
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		4
Endocrine, nutritional, & metabolic diseases	240-279	15 ***	12	2
Diabetes mellitus	250	19 ***	16	2
Mental disorders	290-315	40 *	19	20
Neuroses	300	---		6
Diseases of nervous system & sense organs	320-389	152	44	42
Multiple sclerosis	340	---		10
Diseases of circulatory system	390-458	106	25	139
Heart & hypertensive disease	393-429	106	25	111
Ischemic heart disease	410-414	121	29	111
Cerebrovascular disease	430-438	---		9
Arteriosclerosis	440	---		10
Diseases of respiratory system	460-519	39	31	12
Emphysema	492	---		2
Diseases of digestive system	520-577	---		14
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		12
Diseases of musculoskeletal system & connective tissue	710-738	199 *	40	143
Osteoarthritis	713	---		43
Displacement of intervertebral disc	725	---		83
Congenital anomalies	740-759	---		10

TABLE 12 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Accidents, poisonings, & violence	800-999	140	44	40
Unknown or not classifiable		---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE 13: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, (S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in metal mining and nonmetallic minerals (SIC 100-109, 140-149) by disabling condition: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				412
Infective & parasitic diseases	000-136	---		1
Tuberculosis	010-019	---		1
Pulmonary tuberculosis	011	---		1
Neoplasms	140-239	102	42	40
Malignant neoplasms	140-199	84	47	28
Respiratory system	160-163	---		13
Bone, connective tissue, & skin	170-173	---		2
Urinary organs	188-189	---		4
Other & unspecified sites	190-199	---		9
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		10
Leukemia	204-207	---		10
Neoplasms of unspecified nature	230-239	---		2
Mental disorders	290-315	46	25	16
Schizophrenia	295	---		6
Diseases of nervous system & sense organs	320-389	---		12
Multiple sclerosis	340	---		4
Glaucoma	375	---		6
Diseases of circulatory system	390-458	79	20	107
Heart & hypertensive disease	393-429	65	17	70
Hypertensive disease	400-404	---		7
Ischemic heart disease	410-414	65	17	61
Cerebrovascular disease	430-438	---		20
Cerebral thrombosis & embolism	433-434	---		7
Arteriosclerosis	440	---		10
Diseases of respiratory system	460-519	337 *	75	108
Emphysema	492	---		32
Pneumoconiosis & related diseases	515-516	---		30
Pneumoconiosis due to silica & silicates	515	---		30

TABLE 13 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of digestive system	520-577	---		15
Peptic ulcer	531-533	---		10
Cirrhosis of liver	571	---		5
Diseases of genitourinary system	580-629	---		7
Nephritis & nephrosis	580-584	---		7
Chronic nephritis	582	---		7
Diseases of skin & subcutaneous tissue	680-709	---		5
Diseases of musculoskeletal system & connective tissue	710-738	102	28	68
Rheumatoid arthritis	712	---		5
Osteoarthritis	713	---		23
Other & unspecified arthritis	710-711, 714-715	---		7
Displacement of intervertebral disc	725	---		5
Accidents, poisonings, & violence	800-999	---		33

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-1: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E.(PMR), for white males employed in the extraction of minerals (DOT 930-939) by disabling condition other than respiratory: Social Security Disability Awards, 1969-1973, and Allowances, 1975-76.

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
All disabling conditions				16138			5114
Infective and parasitic diseases	000-136	101	13	332	21 *	25	7
Tuberculosis	010-019	127	18	287			
Silicotuberculosis	010	1333	733	39			
Pulmonary tuberculosis	011	113	16	220			
Neoplasms	140-239	64 ***	4	1104	66 **	8	341
Malignant neoplasms	140-199	64 ***	6	909	63 **	10	274
Buccal cavity & pharynx	140-149	63	18	55	---		10
Digestive organs & peritoneum	150-159	52 ***	10	170	41 **	15	40
Respiratory system	160-163	73 *	10	392	73	14	116
Bone, connective tissue, & skin	170-173	63	30	44	---		12
Genital organs	180-187	71	18	67	124	52	40
Urinary organs	188-189	51 *	17	46	55	33	14
Other & unspecified sites	190-199	62 *	13	135	63	25	42
Neoplasms of lymphatic & hematopoietic tissue	200-209	69	14	158	94	36	61
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	75	23	51	---		15
Leukemia	204-207	75	28	42	---		25
Benign neoplasms	210-228	27 **	19	9	---		2
Neoplasms of unspecified nature	230-239	118	63	28	---		4
Endocrine, nutritional, & metabolic diseases	240-279	74 **	7	402	54 **	14	92
Diabetes mellitus	250	69 **	9	282	43 *	16	56
Diseases of blood & blood-forming organs	280-289	164	56	49	---		10
Mental disorders	290-315	81 ***	3	1391	83	10	451
Schizophrenia	295	57 ***	6	342	67	17	136
Neuroses	300	143 **	10	432	150	23	160
Alcoholism	303	53 **	14	56	18 ***	15	6

TABLE A-1 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Diseases of nervous system & sense organs	320-389	68 ***	6	711	86	11	281
Multiple sclerosis	340	16 ***	14	15	---		19
Cataract	374	159	77	59	---		12
Glaucoma	375	84	35	25	---		6
Blindness	379	86	25	44	---		31
Disease of circulatory system	390-458	91 *	3	5431	100	5	1714
Heart & hypertensive disease	393-429	98	3	4502	102	6	1408
Hypertensive disease	400-404	149	25	235	130	29	90
Ischemic heart disease	410-414	95	4	3870	103	6	1241
Cerebrovascular disease	430-438	50 ***	6	405	93	17	174
Cerebral thrombosis & embolism	433-434	65	22	118	104	64	33
Arteriosclerosis	440	94	22	216	136	33	71
Diseases of digestive system	520-577	79 **	6	412	114	20	176
Peptic ulcer	531-533	138	26	112	---		58
Chronic enteritis & ulcerative dolitis	563				---		8
Cirrhosis of liver	571				93	26	71
Diseases of genitourinary system	580-629	76	12	98	131	38	53
Nephritis & nephrosis	580-584	52	30	35	---		38
Chronic nephritis	582	61	34	35	---		38
Other diseases of urinary system	590-599	84	31	44	---		15
Diseases of male genital organs	600-607	---		19			
Diseases of skin & subcutaneous tissue	680-709	142	25	79	---		30
Diseases of musculoskeletal system and connective tissue	710-738	143 ***	5	3652	163 ***	9	1453
Rheumatoid arthritis	712	94	7	313	61	21	48
Osteoarthritis	713	175 ***	10	1377	174 **	22	498
Other & unspecified arthritis	710,711 714-715	161	37	167	107	38	39
Displacement of intervertebral disc	725	150 **	14	1062	209 ***	20	464

TABLE A-1 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Congenital anomalies	740-759	85	11	145	61	19	34
Symptoms & ill-defined conditions	780-796	---		14	---		10
Accidents, poisonings, & violence	800-999	171 ***	8	2318	147 **	13	459
Unknown or not classifiable					---		3

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

Table A-2: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) by disabling condition other than respiratory: Social Security Disability Awards, 1969-1973, and Allowances, 1975-1976.

		1969-1973			1975-1976		
	ICDA	PMR	SE(PMR)	TOTAL	PMR	SE(PMR)	TOTAL
All disabling conditions				4242			1457
Infective and parasitic diseases	000-136	123	29	109			
Tuberculosis	010-019	150	42	91			
Silicotuberculosis	010	---		8			
Pulmonary tuberculosis	011	156	49	82			
Neoplasms	140-239	72 *	9	312	71	17	101
Malignant neoplasms	140-199	73 *	9	263	106	21	78
Buccal cavity & pharynx	140-149	---		17			
Digestive organs & peritoneum	150-159	75	18	61	8 ***	6	2
Respiratory system	160-163	73 *	12	97	93	35	40
Bone, connective tissue, & skin	170-173	---		10	---		10
Genital organs	180-187	---		11	---		26
Urinary organs	188-189	---		22			
Other & unspecified sites	190-199	78	26	45			
Neoplasms of lymphatic & hematopoietic tissue	200-209	78	31	49	---		19
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	---		10			
Leukemia	204-207	---		21	---		5
Benign neoplasms	210-228				---		2
Neoplasms of unspecified nature	230-239				---		2
Endocrine, nutritional, & metabolic diseases	240-279	59 *	16	83	23 ***	11	11
Diabetes mellitus	250	58	20	61	24 ***	14	9
Diseases of blood & blood-forming organs	280-289	---		9			
Mental disorders	290-315	56 ***	8	281	75	21	127
Schizophrenia	295	36 ***	8	78	74	37	51
Neuroses	300	93	25	75	137	40	42
Alcoholism	303	34 **	18	9			

TABLE A-2 (Cont'd.)

	ICDA	1969-1973 PMR		SE(PMR)	TOTAL	1975-1976 PMR		SE(PMR)	TOTAL
Diseases of nervous system & sense organs	320-389	56	***	10	159	94		17	90
Multiple sclerosis	340					---			15
Cataract	374	275		128	25	---			2
Glaucoma	375	---			5				
Blindness	379	---			11	---			12
Diseases of circulatory system	390-458	80	***	4	1158	93		9	437
Heart & hypertensive disease	393-429	187	*	26	941	95		12	357
Hypertensive disease	400-404	108		22	42	---			36
Ischemic heart disease	410-414	85	*	5	839	91		13	296
Cerebrovascular disease	430-438	49	***	11	98	63		36	32
Cerebral thrombosis & embolism	433-434	55		29	24	---			7
Arteriosclerosis	440	55		34	30	---			20
Diseases of digestive system	520-577	61	*	16	82	133		46	57
Peptic ulcer	531-533	---			5	---			20
Chronic enteritis & ulcerative colitis	531-533					---			2
Cirrhosis of liver	571					---			28
Diseases of genitourinary system	580-629	59		30	21	---			25
Nephritis & nephrosis	580-584	---			7	---			25
Chronic nephritis	582	---			7	---			25
Other diseases of urinary system	590-599	---			10				
Diseases of male genital organs	600-607	---			4				
Diseases of skin & subcutaneous tissue	680-709	191		101	28				
Diseases of musculoskeletal system & connective tissue	710-738	163	***	13	1088	176	***	15	444
Rheumatoid arthritis	712	78		22	66	14	***	7	3
Osteoarthritis	713	210	**	27	396	174	*	32	136
Other & unspecified arthritis	710-711, 714-715	112		39	29	---			9
Displacement of intervertebral disc	725	190	**	27	375	261	**	46	168

TABLE A-2 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Congenital anomalies	740-759	92	28	45	111		17
Symptoms & ill-defined conditions					---		10
Accidents, poisonings, & violence	800-999	208 ***	16	867	140	29	137
Unknown or not classifiable					---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-3: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in loading and conveying occupations (DOT 932) by disabling condition other than respiratory: Social Security Disability Awards, 1969-1973, and Allowances, 1975-1976.

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
All disabling conditions				1583			571
Infective and parasitic diseases	000-136	45	35	15			
Tuberculosis	010-019	---		15			
Silicotuberculosis	010			1			
Pulmonary tuberculosis	011	---		15			
Neoplasms	140-239	60 *	13	99	43	25	25
Malignant neoplasms	140-199	45 **	15	61	50	29	25
Buccal cavity & pharynx	140-199	45 **	15	61	50	29	25
Digestive organs & peritoneum	150-159	16 ***	17	5	---		10
Respiratory system	160-163	69	32	35			
Bone, connective tissue, & skin	170-173	---		5			
Urinary organs	188-189	---		4			
Other & unspecified sites	190-199	---		6	---		15
Neoplasms of lymphatic & hematopoietic tissue	200-209	166	64	38			
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	---		6			
Leukemia	204-207	---		10			
Benign neoplasms	210-288						
Endocrine, nutritional, & metabolic diseases	240-279	69	25	36	---		25
Diabetes mellitus	250	81	33	32	---		20
Diseases of blood & blood-forming organs	280-289				---		10
Mental disorders	290-315	91	15	165	71	24	40
Schizophrenia	295	81	27	60	---		5
Neuroses	300	88	34	27	---		25
Alcoholism	303	---		15			
Diseases of nervous system & sense organs	320-389	40 *	19	42	85	32	30

TABLE A-3 (Cont'd.)

	ICDA	1969-1973 PMR	1969-1973 SE(PMR)	1969-1973 TOTAL	1975-1976 PMR	1975-1976 SE(PMR)	1975-1976 TOTAL
Glaucoma	375	---		1	---		5
Blindness	379	---		3	---		5
Diseases of circulatory system	390-458	85	7	477	117	20	232
Heart & hypertensive disease	393-429	97	10	419	114	21	182
Hypertensive disease	400-404	324	183	48	---		10
Ischemic heart disease	410-414	84	12	322	119	24	167
Cerebrovascular disease	430-438	51 *	16	39	---		20
Cerebral thrombosis & embolism	433-434	---		8			
Arteriosclerosis	440	---		4	---		15
Diseases of digestive system	520-577	85	31	44	---		15
Peptic ulcer	531-533	---		16	---		5
Cirrhosis of liver	571				---		5
Diseases of genitourinary system	580-629	---		14	---		5
Nephritis & nephrosis	580-584	---		9	---		5
Chronic nephritis	582	---		9	---		5
Diseases of male genital organs	600-607	---		5			
Diseases of skin & subcutaneous tissue	680-709	---		10	---		5
Diseases of musculoskeletal system & connective tissue	710-738	153 **	16	384	170 *	30	171
Rheumatoid arthritis	712	171	53	55			
Osteoarthritis	713	137	34	99	215	66	70
Other & unspecified arthritis	710-711, 714-715	326	171	32	---		2
Displacement of intervertebral disc	725	167	37	122	---		38
Congenital anomalies	740-759	165	66	29			
Accidents, poisonings, & violence	800-999	187 *	30	268	41 **	15	13

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-4: Estimated number and age-adjusted proportionate morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) by disabling condition other than respiratory: Social Security Disability Awards, 1969-1973, and Allowances, 1975-1976.

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
All disabling conditions				10021			3021
Infective & parasitic disease	000-136	96	7	192	---		7
Tuberculosis	010-019	127	14	175			
Silicotuberculosis	010	1632 *	576	31			
Pulmonary tuberculosis	011	99	10	117			
Neoplasms	140-239	62 ***	6	665	64 *	12	195
Malignant neoplasms	140-199	63 ***	8	572	59 *	14	151
Buccal cavity & pharynx	140-149	57	23	32	---		10
Digestive organs & peritoneum	150-159	50 **	15	104	48 **	13	28
Respiratory system	160-163	75	16	260	63	21	60
Bone, connective tissue, & skin	170-173	43	32	18	14 ***	16	2
Genital organs	180-187	93	27	56	---		10
Urinary organs	188-189	35 **	16	20	---		14
Other & unspecified sites	190-199	61 *	13	82	68	33	27
Neoplasms of lymphatic & hematopoietic tissue	200-209	41 **	15	56	110	40	42
Sarcoma (lympho-, reticulo-), other lymphomas	200,202	59	31	25	---		15
Leukemia	204-207	32 **	20	11	---		20
Benign neoplasms	210-228	---		9			
Neoplasms of unspecified nature	230-239	195	98	28	2		2
Endocrine, nutritional, & metabolic diseases	240-279	83	10	283	55 *	14	56
Diabetes mellitus	250	73	12	189	35 ***	15	27
Diseases of blood & blood-forming organs	280-289	218	96	40			
Mental disorders	290-315	92	4	918	88	10	274
Schizophrenia	295	56 ***	9	204	66 *	12	75
Neuroses	300	174 *	23	321	148	26	93
Alcoholism	303	48 *	20	32	---		6

TABLE A-4 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Diseases of nervous system & sense organs	320-389	79 ***	5	503	84	15	161
Multiple sclerosis	340	28 *	23	15	---		4
Cataract	374	142	71	34	---		10
Glaucoma	375	---		19	19 ***	2	1
Blindness	379	96	30	32	---		14
Diseases of circulatory system	390-458	96	3	3693	100	7	1027
Heart & hypertensive disease	393-429	103	4	3045	104	8	861
Hypertensive disease	400-404	139	22	141	102	33	42
Ischemic heart disease	410-414	101	4	2651	107	9	774
Cerebrovascular disease	430-438	45 ***	7	236	100	24	112
Cerebral thrombosis & embolism	433-434	69	29	80	---		26
Arteriosclerosis	440	122	28	182	116	48	36
Diseases of digestive system	520-577	79 **	5	260	111	21	102
Peptic ulcer	531-533	167	32	86	---		33
Chronic enteritis & ulcerative colitis	563				---		6
Cirrhosis of liver	571				80	31	36
Diseases of genitourinary system	580-629	81	23	63	---		23
Nephritis & nephrosis	580-584	48	32	19	---		8
Chronic nephritis	582	57	36	19	---		8
Other diseases of urinary system	590-599	105	48	34	---		15
Diseases of male genital organs	600-607	---		10			
Diseases of skin & subcutaneous tissue	680-709	119	45	41	---		20
Diseases of musculoskeletal system & connective tissue	710-738	134 ***	5	2133	157 ***	9	833
Rheumatoid arthritis	712	89	14	186	97	33	45
Osteoarthritis	713	168 ***	11	862	171	29	292
Other & unspecified arthritis	710-711, 714-715	154	45	102	---		28
Displacement of intervertebral disc	725	131 *	14	554	193 **	26	253

TABLE A-4 (Cont'd.)

	ICDA	1969-1973 PMR	SE(PMR)	TOTAL	1975-1976 PMR	SE(PMR)	TOTAL
Congenital anomalies	740-759	71	17	71	53 *	20	17
Symptoms & ill-defined conditions	780-796	---		14			
Accidents, poisonings, & violence	800-999	148 ***	10	1145	169 **	20	304

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-5: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in the extraction of minerals (DOT 930-939) in mining industries (SIC 100-149) by disabling condition other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				4047
Infective & parasitic diseases	000-136	27 *	29	7
Neoplasms	140-239	67 **	9	274
Malignant neoplasms	140-199	62 **	10	216
Digestive organs & peritoneum	150-159	52 *	20	40
Respiratory system	160-163	63	17	81
Bone, connective tissue, & skin	170-173	11 ***	10	2
Genital organs	180-187	153	60	39
Urinary organs	188-189	---		14
Other & unspecified sites	190-199	75	29	40
Neoplasms of lymphatic & hematopoietic tissue	200-209	105	42	54
Sarcoma (lympho-,reticulo-), other lymphomas	200,202	---		15
Leukemia	204-207	---		20
Neoplasms of unspecified nature	230-239	---		4
Endocrine, nutritional, & metabolic diseases	240-279	47 **	13	64
Diabetes mellitus	250	34 ***	12	35
Diseases of blood & blood-forming organs	280-289	---		10
Mental disorders	290-315	87	9	362
Schizophrenia	295	50 ***	9	76
Neuroses	300	186 **	26	156
Alcoholism	303	23 **	18	6
Diseases of nervous system & sense organs	320-389	87	11	221
Multiple sclerosis	340	---		14
Cataract	374	---		10
Glaucoma	375	---		6
Blindness	379	---		29
Diseases of circulatory system	390-458	101	6	1393
Heart & hypertensive disease	393-429	105	7	1160

TABLE A-5 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Hypertensive disease	400-404	163	38	90
Ischemic heart disease	410-414	105	7	1018
Cerebrovascular disease	430-438	86	18	129
Cerebral thrombosis & embolism	433-434	110	70	28
Arteriosclerosis	440	169	41	71
Diseases of digestive system	520-577	117	22	144
Peptic ulcer	531-533	---		53
Chronic enteritis & ulcerative colitis	563	---		8
Cirrhosis of liver	571	85	31	52
Diseases of genitourinary system	580-629	120	47	38
Nephritis & nephrosis	580-584	---		23
Chronic nephritis	582	---		23
Other diseases of urinary system	590-599	---		15
Diseases of skin & subcutaneous tissue	680-709	---		20
Diseases of musculoskeletal system & connective tissue	710-738	160 ***	10	1136
Rheumatoid arthritis	712	56	21	35
Osteoarthritis	713	173 *	26	397
Other & unspecified arthritis	710-711, 714-715	134	53	39
Displacement of intervertebral disc	725	211 ***	24	369
Congenital anomalies	740-759	77	24	33
Accidents, poisonings, & violence	800-999	143 *	18	342
Unknown or not classifiable		---		3

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-6: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) in mining industries (SIC 100-149) by disabling condition other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				889
Neoplasms	140-239	71	18	63
Malignant neoplasms	140-199	64	20	47
Digestive organs & peritoneum	150-159	---		2
Respiratory system	160-163	74	39	20
Genital organs	180-187	---		25
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		14
Neoplasms of unspecified nature	230-239	---		2
Endocrine, nutritional, & metabolic diseases	240-279	27 ***	14	8
Diabetes mellitus	250	---		8
Mental disorders	290-315	94	24	92
Schizophrenia	295	53	22	20
Neuroses	300	---		38
Diseases of nervous system & sense organs	320-389	91	36	52
Multiple sclerosis	340	---		10
Blindness	379	---		10
Diseases of circulatory system	390-458	101	11	297
Heart & hypertensive disease	393-429	107	15	252
Hypertensive disease	400-404	---		36
Ischemic heart disease	410-414	103	15	211
Cerebrovascular disease	430-438	34 *	23	11
Cerebral thrombosis & embolism	433-434	---		2
Arteriosclerosis	440	---		20
Diseases of digestive system	520-577	141	75	37
Peptic ulcer	531-533	---		15
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		19
Diseases of genitourinary system	580-629	---		10
Nephritis & nephrosis	580-584	---		10
Chronic nephritis	582	---		10

TABLE A-6 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of musculoskeletal system & connective tissue	710-738	160 *	25	248
Osteoarthritis	713	177	41	88
Other & unspecified arthritis	710-711, 714-715	---		9
Displacement of intervertebral disc	725	254 *	62	98
Congenital anomalies	740-759	---		16
Accidents, poisonings, & violence	800-999	115	72	65
Unknown or not classifiable		---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-7: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) in mining industries (SIC 100-149) by disabling condition other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				2696
Infective & parasitic diseases	000-136	---		7
Neoplasms	140-239	60 **	10	166
Malignant neoplasms	140-199	53 **	12	124
Digestive organs & peritoneum	150-159	54 **	14	28
Respiratory system	160-163	52 *	20	45
Bone, connective tissue, & skin	170-173	16 ***	17	2
Genital organs	180-187	---		10
Urinary organs	188-189	---		14
Other & unspecified sites	190-199	70	36	25
Neoplasms of lymphatic & hematopoietic tissue	200-209	117	39	40
Sarcoma (lympho-,reticulo-), other lymphomas	200,202	---		15
Leukemia	204-207	---		20
Neoplasms of unspecified nature	230-239	---		2
Endocrine, nutritional, & metabolic diseases	240-279	56 *	15	51
Diabetes mellitus	250	39 **	17	27
Mental disorders	290-315	86	12	235
Schizophrenia	295	53 **	13	51
Neuroses	300	166 *	28	93
Alcoholism	303	---		6
Diseases of nervous system & sense organs	320-389	83	14	141
Multiple sclerosis	340	---		4
Cataract	374	---		10
Glaucoma	375	21 ***	2	1
Blindness	379	---		14
Diseases of circulatory system	390-458	100	7	927
Heart & hypertensive disease	393-429	105	8	784
Hypertensive disease	400-404	114	40	42
Ischemic heart disease	410-414	108	9	702

TABLE A-7 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Cerebrovascular disease	430-438	98	27	98
Cerebral thrombosis & embolism	433-434	---		26
Arteriosclerosis	440	128	50	36
Diseases of digestive system	520-577	109	23	90
Peptic ulcer	531-533	---		33
Chronic enteritis & ulcerative colitis	563	---		6
Cirrhosis of liver	571	63	26	26
Diseases of genitourinary system	580-629	---		23
Nephritis & nephrosis	580-584	---		8
Chronic nephritis	582	---		8
Other diseases of urinary system	590-599	---		15
Diseases of skin & subcutaneous tissue	680-709	---		10
Diseases of musculoskeletal system & connective tissue	710-738	160 ***	9	758
Rheumatoid arthritis	712	84	30	35
Osteoarthritis	713	179 *	31	274
Other & unspecified arthritis	710-711, 714-715	---		28
Displacement of intervertebral disc	725	196 *	33	228
Congenital anomalies	740-759	60	22	17
Accidents, poisonings, & violence	800-999	172 *	27	269
Unknown or not classifiable		---		2

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-8: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in bituminous, lignite, and anthracite coal mining (SIC 110-121) by disabling condition other than respiratory: Social Security Disability Awards, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				1574
Infective & parasitic diseases	000-136	---		5
Neoplasms	140-239	62	17	100
Malignant neoplasms	140-199	66	20	90
Digestive organs & peritoneum	150-159	55	43	17
Respiratory system	160-163	53	26	27
Genital organs	180-187	---		20
Urinary organs	188-189	---		5
Other & unspecified sites	190-199	---		21
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		10
Endocrine, nutritional, & metabolic diseases	240-279	26 **	22	14
Diabetes mellitus	250	10 ***	11	4
Diseases of blood & blood-forming organs	280-289	---		10
Mental disorders	290-315	122	14	187
Schizophrenia	295	68	27	36
Neuroses	300	294 **	57	95
Alcoholism	303	---		6
Diseases of nervous system & sense organs	320-389	69	15	67
Cataract	374	---		10
Blindness	379	---		10
Diseases of circulatory system	390-458	107	9	590
Heart & hypertensive disease	393-429	123	11	541
Hypertensive disease	400-404	---		41
Ischemic heart disease	410-414	123	12	473
Cerebrovascular disease	430-438	40	28	24
Cerebral thrombosis & embolism	433-434	---		10
Arteriosclerosis	440	---		15

TABLE A-8 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of digestive system	520-577	142	40	68
Peptic ulcer	531-533	---		30
Cirrhosis of liver	571	---		23
Diseases of genitourinary system	580-629	---		21
Nephritis & nephrosis	580-584	---		16
Chronic nephritis	582	---		16
Other diseases of urinary system	590-599	---		5
Diseases of skin & subcutaneous tissue	680-709	---		5
Diseases of musculoskeletal system & connective tissue	710-738	143 *	16	396
Rheumatoid arthritis	712	8 ***	7	2
Osteoarthritis	713	141	35	129
Other & unspecified arthritis	710-711, 714-715	---		12
Displacement of intervertebral disc	725	175	41	117
Congenital anomalies	740-759	---		13
Accidents, poisonings, & violence	800-999	110	26	98

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-9: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in occupations in the extraction of minerals, n.e.c. (DOT 939) in bituminous, lignite, and anthracite coal mining (SIC 110-121) by disabling conditions other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				1102
Infective & parasitic diseases	000-136	---		5
Neoplasms	140-239	46 **	14	52
Malignant neoplasms	140-199	54 *	17	52
Digestive organs & peritoneum	150-159	---		5
Respiratory system	160-163	44 *	20	16
Genital organs	180-187	---		5
Urinary organs	188-189	---		5
Other & unspecified sites	190-199	---		21
Endocrine, nutritional, & metabolic diseases	240-279	38	31	14
Diabetes mellitus	250	14 ***	13	4
Mental disorders	290-315	119	16	127
Schizophrenia	295	44 **	15	16
Neuroses	300	---		65
Alcoholism	303	---		6
Diseases of nervous system & sense organs	320-389	67	18	46
Cataract	374	---		10
Diseases of circulatory system	390-458	111	11	428
Heart & hypertensive disease	393-429	125	14	384
Hypertensive disease	400-404	---		26
Ischemic heart disease	410-414	124	14	336
Cerebrovascular disease	430-438	57	37	24
Cerebral thrombosis & embolism	433-434	---		10
Arteriosclerosis	440	---		15
Diseases of digestive system	520-577	157	49	53
Peptic ulcer	531-533	---		20
Cirrhosis of liver	571	---		18
Diseases of genitourinary system	580-629	---		11
Nephritis & nephrosis	580-584	---		6
Chronic nephritis	582	---		6
Other diseases of urinary system	590-599	---		5

TABLE A-9 (Cont'd.)

	ICDA	1975-1976 PMR	1975-1976 SE(PMR)	TOTAL
Diseases of musculoskeletal system & connective tissue	710-738	139 *	17	271
Rheumatoid arthritis	712	12 ***	11	2
Osteoarthritis	713	144	41	92
Other & unspecified arthritis	710-711, 714-715	---		10
Displacement of intervertebral disc	725	171	45	81
Congenital anomalies	740-759	---		7
Accidents, poisonings, & violence	800-999	143	43	88

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-10: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in oil and gas extraction industries (SIC 130-138) by disabling condition other than respiratory: Social Security Disability Awards, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				626
Neoplasms	140-239	55	32	34
Malignant neoplasms	140-199	48	29	25
Respiratory system	160-163	---		21
Genital organs	180-187	---		4
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		9
Endocrine, nutritional, & metabolic diseases	240-279	---		12
Diabetes mellitus	250	---		12
Mental disorders	290-315	38	31	26
Schizophrenia	295	23	63	6
Neuroses	300	---		6
Diseases of nervous system & sense organs	320-389	146	50	59
Multiple sclerosis	340	---		10
Blindness	379	---		14
Diseases of circulatory system	390-458	103	19	215
Heart & hypertensive disease	393-429	102	22	170
Ischemic heart disease	410-414	116	25	168
Cerebrovascular disease	430-438	---		26
Arteriosclerosis	440	---		10
Diseases of digestive system	520-577	---		22
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		20
Diseases of musculoskeletal system & connective tissue	710-738	184 *	32	201
Osteoarthritis	713	202	55	71
Displacement of inter-vertebral disc	725	416 *	101	113

TABLE A-10 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Congenital anomalies	740-759	---		10
Accidents, poisonings, & violence	800-999	117	82	46
Unknown or not classifiable		---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-11: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in boring, drilling, cutting, and related occupations (DOT 930) in oil and gas extraction industries (SIC 130-138) by disabling condition other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				435
Neoplasms	140-239	57	32	24
Malignant neoplasms	140-199	57	29	20
Respiratory system	160-163	---		20
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		4
Endocrine, nutritional, & metabolic diseases	240-279	14 ***	9	2
Diabetes mellitus	250	18 ***	13	2
Mental disorders	290-315	39 *	26	20
Neuroses	300	---		6
Diseases of nervous system & sense organs	320-389	145	58	42
Multiple sclerosis	340	---		10
Diseases of circulatory system	390-458	100	22	139
Heart & hypertensive disease	393-429	100	24	111
Ischemic heart disease	410-414	115	27	111
Cerebrovascular disease	430-438	---		9
Arteriosclerosis	440	---		10
Diseases of digestive system	520-577	---		14
Chronic enteritis & ulcerative colitis	563	---		2
Cirrhosis of liver	571	---		12
Diseases of musculoskeletal system & connective tissue	710-738	190 *	36	143
Osteoarthritis	713	---		43
Displacement of intervertebral disc	725	---		83
Congenital anomalies	740-759	---		10

TABLE A-11 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Accidents, poisonings, & violence	800-999	135	112	40
Unknown or not classifiable		---		1

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

TABLE A-12: Estimated number and age-adjusted proportional morbidity ratios, PMR, and standard errors, S.E. (PMR), for white males employed in extraction of minerals (DOT 930-939) in metal mining and nonmetallic minerals (SIC 100-109, 140-149) by disabling condition other than respiratory: Social Security Disability Allowances, 1975-1976.

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
All disabling conditions				303
Neoplasms	140-239	128	46	40
Malignant neoplasms	140-199	106	45	28
Respiratory system	160-163	---		13
Bone, connective tissue, & skin	170-173	---		2
Urinary organs	188-189	---		4
Other & unspecified sites	190-199	---		9
Neoplasms of lymphatic & hematopoietic tissue	200-209	---		10
Leukemia	204-207	---		10
Neoplasms of unspecified nature	230-239	---		2
Mental disorders	290-315	54	46	16
Schizophrenia	295	---		6
Diseases of nervous system & sense organs	320-389	---		12
Multiple sclerosis	340	---		4
Glaucoma	375	---		6
Diseases of circulatory system	390-458	102	18	107
Heart & hypertensive disease	393-429	83	21	70
Hypertensive disease	400-404	---		7
Ischemic heart disease	410-414	83	25	61
Cerebrovascular disease	430-438	---		20
Cerebral thrombosis & embolism	433-434	---		7
Arteriosclerosis	440	---		10
Diseases of digestive system	520-577	---		15
Peptic ulcer	531-533	---		10
Cirrhosis of liver	571	---		5
Diseases of genitourinary system	580-629	---		7
Nephritis & nephrosis	580-584	---		7
Chronic nephritis	582	---		7
Diseases of skin & subcutaneous tissue	680-709	---		5

TABLE A-12 (Cont'd.)

	ICDA	PMR	1975-1976 SE(PMR)	TOTAL
Diseases of musculoskeletal system & connective tissue	710-738	128	29	68
Rheumatoid arthritis	712	---		5
Osteoarthritis	713	---		23
Other & unspecified arthritis	710-711, 714-715	---		7
Displacement of intervertebral disc	725	---		5
Accidents, poisonings, & violence	800-999	---		33

--- The expected total number of disabled workers is less than 25 and the PMR is not significant at the .001 level.
* The difference between PMR and 100 is statistically significant at the .05 level.
** The difference between PMR and 100 is statistically significant at the .01 level.
*** The difference between PMR and 100 is statistically significant at the .001 level.

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