Annual Report and Achievements Fiscal Year 1978 Part 1

U.S. Department of Labor
Mine Safety and Health Administration

Annual Report of the Secretary of Labor under the Federal Mine Safety and Health Act of 1977

TO THE CONGRESS OF THE UNITED STATES:

In accordance with Section 511(a) of the Federal Mine Safety and Health Act of 1977, as amended (30 U.S.C. 958(a)), I transmit herewith the 1978 Annual Report on Mine Safety and Health Activities as submitted by the Secretary of Labor.

Jimmy Carter

THE WHITE HOUSE,
March 28, 1980.

Annual Report and Achievements Fiscal Year 1978 Part 1

U.S. Department of Labor
Ray Marshall, Secretary

Mine Safety and Health Administration
Robert B. Lagather, Assistant Secretary

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introduction

For employees of the Mine Safety and Health Administration, the 1978 fiscal year, which covered most of the first year following enactment of the far-reaching Federal Mine Safety and Health Act of 1977, was a period of challenge, change and rededication to the agency's mission of reducing deaths, injuries and illnesses in the Nation's mines.

As the year ended on Sept. 30, 1978, it could be said both that promising beginnings had been made in embarking on important new courses under the 1977 Act and that a good deal more remained to be done to assure that all miners can fulfill their vital roles in meeting national energy and mineral needs at no cost to their safety or health. In the ensuing months of 1978 and early 1979, a number of additional difficult tasks required to implement the Act had been completed or were under way.

The Federal Mine Safety and Health Act was enacted on Nov. 9, 1977, and took effect on March 9, 1978. At that time, the Mining Enforcement and Safety Administration (MESA) was transferred from the Department of the Interior to the Department of Labor and renamed the Mine Safety and Health Administration (MSHA). The Act created a new position, that of Assistant Secretary of Labor for Mine Safety and Health, and Robert B. Lagather, a longtime Department of Labor official with the Office of the Solicitor and other department offices, assumed the post as head of the Federal mine safety and health program.

The new Act affected virtually every aspect of safety and health in the mining industry, providing changes ranging from how the law is administered and who is covered to the establishment of new avenues of appeal for mine operators who contest citations for violations and increased involvement of miners or their representatives in processes affecting their safety and health.

The greatest impact of changes required under the 1977 Act was felt in the metal and nonmetal mining industry. The legislation repealed the Federal Metal and Nonmetallic Mine Safety Act of 1966 and amended the Federal Coal Mine Health and Safety Act of 1969 to combine protection of both coal and metal and nonmetal (noncoal) miners under a single law, the 1977 Act, for the first time.

Because the 1977 Act was an amendment of the 1969 Coal Act and contained many provisions that had not been part of the Metal Act, the new law extended to workers in noncoal mining and milling operations the same protections coal miners already had under the law. At the same time, the Act significantly strengthened safety and health requirements governing both the coal and noncoal industry.

For one thing, the 1977 Act required that at least four complete inspections must be made yearly at underground mine operations—the same number as had previously been required for underground coal mines, but three more complete mandatory inspections than had been required for the metal and nonmetal mining industry under the old Metal Act. In addition, the Act also called for at least two surface mine inspections a year. Neither the Coal nor the Metal Act had required annual inspections of surface operations.

Among other important provisions, the new Act for the first time imposed mandatory civil dollar penalties on the metal and nonmetal mining industry for violations of safety and health regulations. Such assessments already had been part of Coal Act enforcement for seven years. Further, the Act directed that all metal and nonmetal mining advisory standards be reviewed and either deleted or made mandatory, as has been the case for coal mining. A review committee made its recommendations, and the revised list of mandatory standards was published in 1979.

Under the 1977 Act, the rights and entitlements of miners were significantly expanded. The Act provided that a miner or representative of miners be allowed to accompany an MSHA inspector during a mine inspection and attend any pre- or post-inspection conferences at full pay for time spent in such activities. Miners' rights to have inspections made at their request were increased. The Act provided that miners were to be paid during periods in which a mine or part of a mine is closed because of a withdrawal order. Moreover, avenues for the filing of discrimination complaints by miners were broadened and described more specifically. To assure early implementation of the miners' rights provisions, MSHA established and staffed offices to process and investigate complaints soon after the Act became effective.

During the 1978 fiscal year, the recruiting of qualified persons needed to considerably augment MSHA's inspection force under growing en-

forcement demands required by the new Act was a high-priority activity. By the end of the fiscal year, more than 320 new metal and nonmetal mine inspectors had been hired and had begun or completed initial training at the National Mine Health and Safety Academy near Beckley, W. Va.

In enforcement, MSHA directed special attention to reduction of potentially dangerous conditions in mines that generate high levels of explosive gas and at mines whose health and safety records show repeated violations.

Special enforcement programs set into motion during the year for coal mining included, among others, saturation or "impact" inspections of mines by teams of inspectors to provide a better overall picture of mine safety and health conditions and practices, and the assignment of "resident inspectors" to large, complex mines or excessively gassy mines and/or those mines with a need to improve management safety and health practices.

Also during 1978, the Program in Accident Reduction (PAR) in selected metal and nonmetal mines was expanded with beneficial results. Under the program, MSHA, working with management and labor at a group of mines which together had accounted for a high percentage of the industry's total disabling or lost-time accidents, recorded an overall reduction of 17 percent in disabling injuries in calendar 1978, as compared with 1977 figures.

MSHA's Technical Support activity expanded its operations in support of MSHA's stepped-up enforcement activities during the fiscal year. Among areas of intensified focus were Technical Support programs to investigate, evaluate and make engineering analyses of new mine safety and health technology and to promote the transfer of promising technology and procedures to wider industry use. Areas of concern included, among many others, mine roof control, industrial safety and health, mine waste disposal, mine radiation monitoring and the measurement of other mine atmospheric conditions, explosives safety and the reduction of electrical hazards.

A new Technical Support laboratory located in Triadelphia, W. Va., and designed to achieve improved procedures for testing, approval, and certification of products, materials, instruments and explosives in underground mines was put into operation. The goal of the laboratory is to assure that all products and materials in use are of the highest possible quality.

Significant improvements were made by personnel of MSHA's Health and Safety Analysis Center, a Technical Support facility in Denver, in methods of compiling, assessing and publicizing mine safety and health data which are useful in determining the most critical areas that should be addressed in accident prevention programs. Of major interest was a new mandatory mining injury reporting and recordkeeping system adopted by MSHA which makes mine injury data comparable with those in other industries.

During the fiscal year, the Office of Assessments expanded the scope of its operations and instituted other changes to meet its many added responsibilities under the 1977 Act, particularly the new civil penalties requirements for metal and nonmetal mining, as well as changes in the system for computing penalties for violations.

Under the new Act, penalties were set at a maximum of $10,000 for each violation, with provisions for added penalties of up to $1,000 a day for every day a violation remains uncorrected beyond the prescribed abatement period. In Fiscal Year 1978, the office collected $12.8 million in civil penalties for violations.

An Office of Standards, Regulations and Variances was established to coordinate all phases of the rulemaking process and to increase efficiency in issuing new rules as prescribed by the new Act, which set strict timetables for completing different stages of the process.

During the months immediately after the Act went into effect, much of the work of this office concerned issuance of standards and guidelines required for timely implementation of important provisions of the new law. These included standards dealing with changes in the civil penalty assessments program, procedures for notifying MSHA of hazardous mine conditions, modification of safety standards for special mine conditions, definition of the term, "representative of miners," and the filing of information with MSHA by metal and nonmetal mine operators. Moreover, the Office of the Solicitor for Mine Safety and Health prepared an "interpretive bulletin" issued by the Department of Labor on the new provision permitting a representative of miners to accompany an inspector during an inspection and participate in conferences before or after inspections.

Important regulations that were proposed or promulgated during Fiscal Year 1978 included standards on respirable coal dust control, the use of oxygen-generating self-rescue devices, mandatory safety and health training of miners, and instrumentation for monitoring noise levels and other mine environmental conditions.

MSHA's Education and Training division also stepped up its activities, both in headquarters and at 10 field training centers to administer the new mandatory miner training requirements. Under the new standards, the greatest number of training hours must be provided for those persons considered most likely to be involved in accidents—new miners or those who are new to a mine or are inexperienced at a specific mine job. Additional refresher training was required for experienced workers. Besides working with mine operators to develop training programs which require MSHA approval, education and training specialists held numerous seminars and information briefings for industry and labor representatives and others.

The new legislation placed increased emphasis on protecting the health of miners and stipulated that new health standards which are developed on toxic substances and harmful physical agents in mine atmospheres will assure that miners do not suffer material impairment of health or functional capacity due to exposure to such substances and agents. MSHA and the National Institute for Occupational Safety and

Health (NIOSH), in the Department of Health, Education, and Welfare, developed a close working relationship during the fiscal year in the joint effort to identify and establish criteria for toxic mine substances leading to development of standards to further protect miners from health hazards. To coordinate this effort, the two agencies developed a memorandum of understanding, which was signed May 4, 1978.

A major agreement that also was developed during the fiscal year and was signed March 29, 1979, defined jurisdiction between MSHA and the Labor Department's Occupational Safety and Health Administration (OSHA).

During FY 1978, a number of other interagency agreements were revised and renewed. These included agreements with the Bureau of Mines to coordinate activities in the field of research; with the National Bureau of Standards for technical support in development of improved test methods, standards and means of assessing fire risk in mining activities; with the National Park Service, to provide assistance to save lives of persons trapped in caves in National parks; with the Department of the Air Force, for airlift assistance in support of mine rescue and recovery operations; and others.

Along with many other sweeping changes mandated by the 1977 Act, the new legislation created an independent five-member Federal Mine Safety and Health Review Commission, succeeding the old Board of Mine Operations Appeals in the Department of the Interior. By the end of the 1978 fiscal year, the full commission was at work on pending appeals cases while developing permanent procedures for carrying out broad new responsibilities assigned to it in the Act.

Underlying all of MSHA's extensive and many-sided efforts to move rapidly during the 1978 fiscal year toward full, effective implementation of the Federal Mine Safety and Health Act of 1977 was the theme that the protection of the Nation's miners must be a shared commitment. As Secretary of Labor Ray Marshall put it following passage of the Act: "The Nation's mines must be made as safe and healthful as any other type of workplace in America. It will take the concerted efforts of all of us—industry, labor and government—to achieve that goal. . ."

The report that follows presents the activities and accomplishments in Fiscal Year 1978 to implement the provisions of the 1977 Act.

Changes in Injury Reporting and Recordkeeping

On Jan. 1, 1978, the Mine Safety and Health Administration adopted a new system of mandatory reporting and recordkeeping for injuries in the mining industry. The new system makes injury experience measurement for mining consistent with the system used for other industries by the Bureau of Labor Statistics.

Prior to Jan. 1, 1978, work injuries were classified according to the American National Standards Institute (ANSI) Method of Recording and Measuring Work Injury Experience (ANSI Z16.1–1967, reaffirmed 1973). Under the ANSI system, the disabling injury frequency rate was computed as the number of disabling injuries per 1,000,000 employee-hours of exposure. An injured person reassigned to a "regularly established job" without losing a full shift of work was not classified as a disabling injury.

The new system adopted in 1978 classified injuries as Fatal, Nonfatal occurrences with work days lost or restricted work activity (NFDL), and Nonfatal occurrences that require medical treatment but do not result in lost workdays (NDL). First aid cases are not reportable. Under this system, the injury incidence rate is computed as the number of injury cases times 200,000 divided by the number of hours of employee exposure; this is equivalent to the number of injuries incurred by 100 people working 40 hours a week for 50 weeks.

Thus, while there is a direct ratio of 5 to 1 (1,000,000 to 200,000) between the previous and the current systems for fatality rates and for all-injury rates, there is no direct correlation between the nonfatal disabling and nondisabling injury frequency rates computed under the previous system and the NFDL and NDL incidence rates computed under the current system.

For the above reasons, this report presents only current and historical injury data for fatalities and for all injuries combined. Fatality and all-injury frequency rates for 1977 and prior years have been converted to incidence rates based on the 5 to 1 relationship in this report to permit comparisons between data for the two categories for Fiscal Year 1978 and the rates in previous calendar years. Thus, rates in the two categories for all years reflect occurrences per 200,000 employee-hours.

This is the first annual report in which accident-injury experience is reported on a fiscal, rather than calendar, year basis. Persons interested in studying historical comparisons of frequency rates for the categories, "nonfatal disabling" and "nondisabling" injuries will find them in tables in MSHA's annual informational reports for previous years. For the reasons given above, no such data have been included in the 1978 report.

section I

Coal Mine Safety and Health

Legislative History

1977 **Public Law 95-164.** Increased emphasis on protection of miners' health. Requirements for two annual inspections at surface mines. Provisions for mandatory miner training. New, detailed inspection requirements for especially gassy or hazardous mines. Increased capability to deal with operators who establish a pattern of violations. Greater involvement of miners or their representatives in health and safety. Improved procedures for assessing and collecting civil penalties for violations. Streamlined regulations-making process. Enforcement responsibilities moved to Labor Department.

1969 **Public Law 91-173.** Enforcement powers increased vastly. Surface mines covered. Health problems addressed. Benefits provided to miners disabled by "black lung" disease. Procedure set for developing and promulgating health and safety standards. Significant research and development effort mandated.

1966 **Public Law 89-376.** Extended coverage of Public Law 82-522 to all underground coal mines. Included the concept of unwarrantable failure.

1952 **Public Law 82-522.** Federal inspectors given the authority to issue notices of violation and orders of withdrawal. Surface coal mines and underground coal mines employing less than 15 persons excluded. No provisions for eliminating day-to-day accidents that kill miners one at a time.

1947 **Public Law 80-328.** First code of regulations for mine safety formulated, but only advisory in nature.

1941 **Public Law 77-49.** Empowered Federal inspectors to enter mines to make investigations. No regulations mandated and no enforcement powers provided.

1910 **Public Law 61-179.** Bureau of Mines created. Federal role limited primarily to research. Inspection and investigative role advisory only.

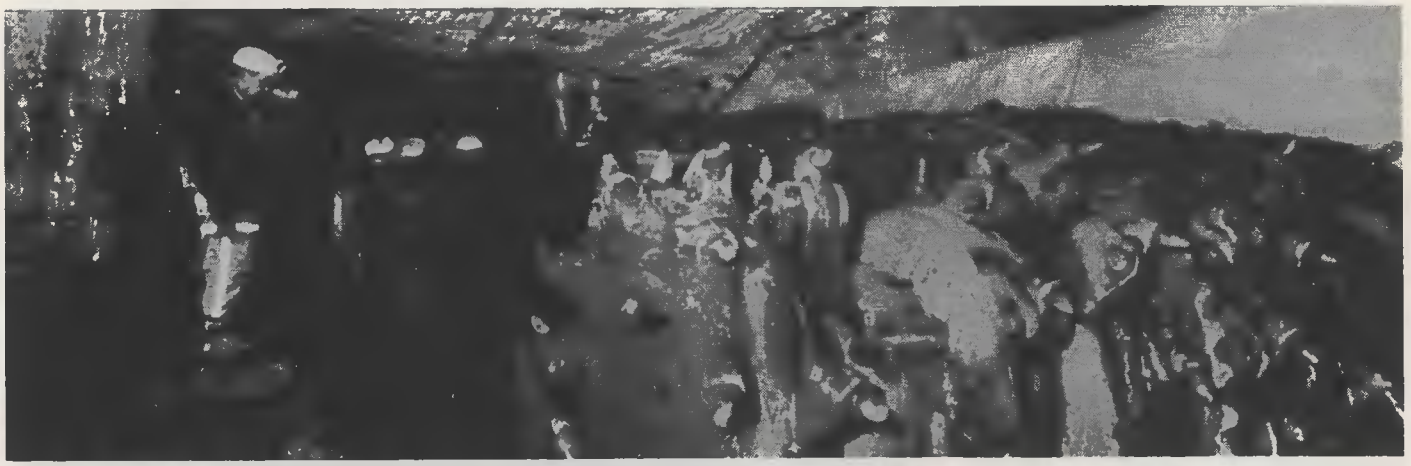
Although progress has been made in reducing both fatalities and injuries, coal mining is still one of the most hazardous occupations in the country. During the last two decades, improved technology, educational programs and enforcement undoubtedly have helped to reduce the total number of fatal accidents from an average of more than 1,000 coal miners killed each year in the 1940's to 114 in Fiscal Year 1978. Injuries in the 26 coal-producing States have been reduced from about 38,000 in 1950 to 18,410 last year. The rate of these injuries also has been significantly reduced since 1970. The incidence rate of fatalities in coal mines has been reduced from 0.2 deaths per 200,000 employee-hours in 1970 to 0.07 in FY 1978.

Enactment of the Federal Mine Safety and Health Act of 1977 is another step toward improved mine safety and health for about a quarter of a million coal miners in this country.

Beginning in 1970, MSHA has encouraged miners' representatives to participate in the inspection process of coal mining facilities. The new law, however, further encourages this participation by requiring that these representatives receive their regular rate of pay while on inspection with an MSHA inspector. In order to implement this provision, on April 25, 1978, an interpretive bulletin was issued to be used as a guide in enforcement of this requirement. This bulletin addressed the issues of relationship of participation right to inspection; enforcement of participation rights; types of activities giving rise to participation rights under section 103(f); activities which do not give rise to participation rights; and protection against loss of pay during participation.

The 1977 Act provides sanctions against mine operators who establish a pattern of violations of mandatory safety or health standards. To help implement this section of the Act, a pilot program was developed by Coal Mine Safety and Health. The system will provide documentation to support a determination that a pattern of violations does exist and that immediate review and appropriate action concerning an operator's safety and health practices is warranted.

The 1977 Act also requires the Secretary of Labor to publish proposed regulations providing that mine rescue teams shall be available for rescue and recovery work to each underground mine. In FY 1978, Coal Mine Safety and Health Specialists worked



The highly mechanized world of mining today is typified by the continuous mining machine shown here (above). Careless operation of such massive machines in close quarters of underground mines can be deadly. Left, two MSHA inspectors (foreground) pause to answer questions of two coal miners on provisions of the Federal Mine Safety and Health Act of 1977. Below, Secretary of Labor Ray Marshall discusses mine safety with a shuttle car operator at a Pennsylvania underground coal mine. The mine visit was one of several Secretary Marshall made to different operations to familiarize himself with mining procedures and problems.

to develop these standards, proposed Jan. 5, 1979.

In addition, the new Act requires that spot inspections be conducted at mines that liberate excessive quantities of methane or other explosive gases. The 1977 Act provides differing spot inspection frequency requirements of every five, 10 or 15 working days at irregular intervals for mines that liberate these gases in quantities of one million cubic feet or more during a 24-hour period, 500,000 cubic feet and 200,000 cubic feet, respectively. The Federal Coal Mine Health and Safety Act of 1969 required one spot inspection every five working days for mines that liberate what was only defined as "excessive" quantities of these gases. Coal Mine Safety and Health implemented the new inspection requirements in March 1978.

Additionally, Coal Mine Safety and Health is spending considerable effort to modernize and professionalize its organization. Major computer programs are being developed for management (Mine Information System)

and data handling (respirable dust data). A five-year structured training program for all inspectors in safety engineering and industrial hygiene practices is in its second year.

Several special enforcement programs are being put into effect to better use enforcement abilities and to improve protection provided to miners. Technical and enforcement personnel are conducting in-depth evaluations of mine operator plans addressing roof control, respirable dust, ventilation, fire control, hearing conservation, and shaft sinking. Exhaustive field evaluations and inspections of mine waste structures are being made. Saturation (impact) inspections of mines by teams of inspectors are providing a better total picture of mine health and safety conditions. Resident inspectors are being assigned to large complex mines and to very gassy mines with high incident rates and low mine profile ratings. Technical studies have demonstrated the effectiveness of cabs and canopies on mobile equipment, of infusing water directly in the coalbed on longwalls, of mounting sprays on auger miners, and of plugging abandoned oil/gas wells.

Recent regulations on the training of miners, use of noise dosimeters, and use of one-hour self-rescue devices will significantly reduce the hazards of coal mining. Inspector sampling to evaluate respirable dust control plans is leading to implementation of dust controls before the dust becomes excessive. Most of the pneumatic equipment that generates excessive noise has been removed from coal mines. Special studies on longwalls and auger miner sections are leading to manufacturer redesign in order to reduce noise and dust generation. Investigations are being made of alleged discrimination against miners. Injunctions are brought where mine operators refuse to obey a withdrawal order or refuse MSHA entry to their mines. Investigations are made when there appear to be willful violations of regulations. Modifications of safety regulations are allowed, but only where the mine operator can demonstrate that an alternate method exists which will at all times guarantee no less than the same measure of safety, or that application of the safety standard will result in less protection to miners due to conditions at the mine. Many other special ongoing MSHA programs help assure improved protection for the miner.

Proposed regulations in such areas as respirable dust control, mine rescue teams, and mine construction standards will also decrease related safety and health hazards. Experience gained through active participation in enforcement should greatly improve the miners' impact on removing hazards. Improved management programs, such as the computerized Mine Information System, offer new methods of efficiency and allow for a more effective use of the inspectorate. Technology under development shows real promise of breakthroughs in hazard controls. Of paramount interest is a machine-mounted respirable dust monitor which, if successful, could provide continuous monitoring of respirable dust, allow immediate initiation of dust control procedures, and replace the current mine operator sampling program. Significant progress is being made on the joint efforts with NIOSH in identifying toxic mine substances and in developing programs to effectively control the miner's exposure.

Coal Industry Statistics

During the 1978 calendar year, more than 230,000 miners were employed in the coal industry mining approximately 660 million tons of coal, 243 million tons underground and 417 million tons on the surface. The production of coal decreased by about an estimated 31 million tons, mainly due to a work stoppage of about 3½ months while a new wage agreement was under negotiation. Figure 1 shows coal industry employment by the size of the operation. The largest number of underground miners work at mines having 150 or more employees. On the surface, the largest number work at mines employing less than 50 miners. Figure 1 also shows the number of coal mines for each workforce size. The majority of underground and surface coal mines employ less than 50 miners.

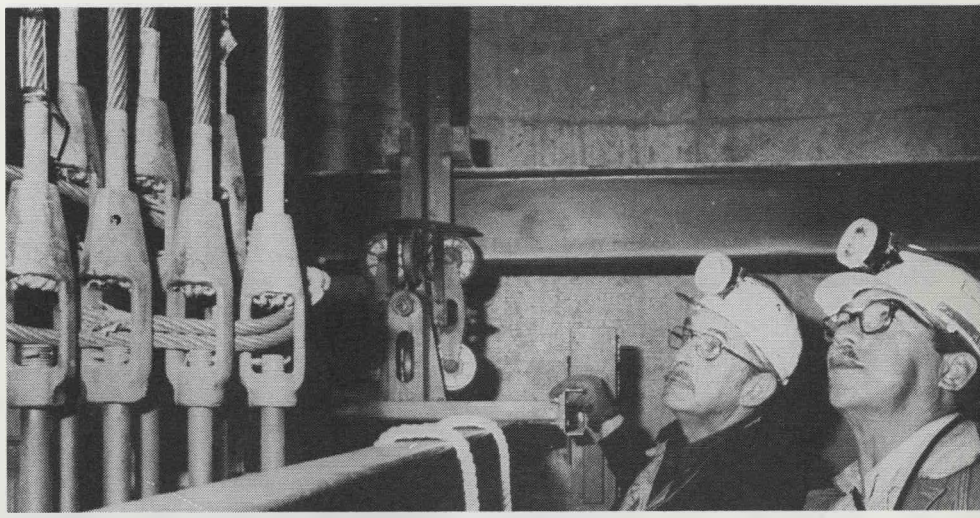
Every underground mine operator is required to have a check-in and check-out system which provides positive identification of each person underground. Here, an MSHA inspector picks up his "brass check" from a check station upon returning to the surface.

Inspection Work Force

More than 1,200 coal mine inspectors work to administer Federal coal mine safety and health regulations at 2,132 underground mines, 2,833 surface mines and 1,331 other surface operations. Inspectors operate from a network of 10 district offices, 14 subdistrict offices, and numerous field offices located throughout the 26 coal-producing States (see figure 2). The total coal mine inspection workforce numbered 1,940 on September 30, 1978, as compared to 1,764 at the end of calendar year 1977. Out of this total workforce, 1,228 were classified as Authorized Representatives (ARs) of the Secretary, 217 were in training to become ARs, and 495 were support personnel. The AR category includes inspectors, district and subdistrict managers, engineers, specialists, and management personnel.

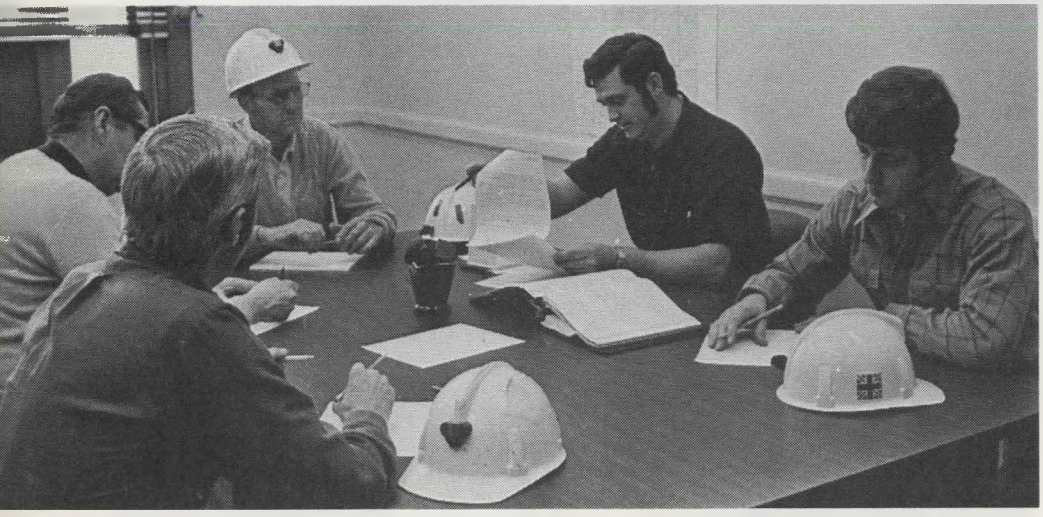
Inspection Statistics and Trends

During FY 1978, MSHA maintained a strong enforcement policy to assure compliance with the Federal Coal Mine Health and Safety Act of 1969 and the subsequent Federal Mine Safety and Health Act of 1977. A total of 56,493



MSHA inspectors check condition of wire rope during shaft inspection at an underground mine.

Post-inspection conferences afford MSHA inspectors, miners and mine management personnel an opportunity to discuss the mine's safety and health practices and conditions and to find ways of improving them.



inspections and investigations were conducted, 37,920 at underground and 18,573 at surface mines (figure 3). Included in the underground total are 4,944 spot inspections at particularly hazardous underground mines (see table 1). Tables 2 and 3 list all inspections and investigations by each MSHA district and by State.

Figure 4 shows the number of notices of violation/citations issued by MSHA since 1970. MSHA inspectors issued 80,346 notices of violation/citations and 2,843 orders to coal mine operators at underground mines during the course of official inspections in FY 1978. These notices/citations and orders encompass virtually the entire range of safety and health conditions and practices. Most frequently cited violations of underground standards are summarized in figure 5.

MSHA also issued a total of 30,807 notices of violation/citations at surface mines and surface operations of underground mines. The most frequently cited violations of surface standards are presented in figure 6.

Tables 4 through 10 provide additional data on notices/citations and orders issued in FY 1978.

Coal Mine Fatalities

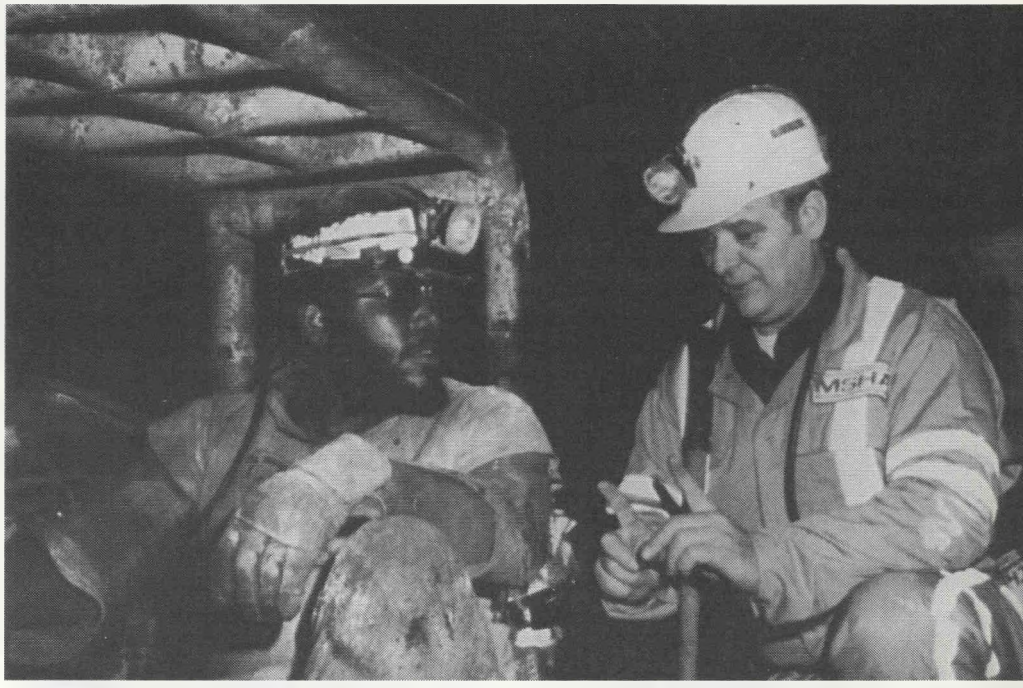
In FY 1978, there were 114 coal mining fatalities, an 18 percent reduction from the 139 fatalities in calendar year 1977. Although the total number of fatalities decreased during FY 1978, a period during which there was a coal mine work stoppage, the fatal injury incidence rate remained at 0.07 per 200,000 employee-hours worked, the same rate recorded in 1977 and 1976 (figure 7). Historically, those individuals with the least experience either in mining or in a job classification are more likely to be victims of fatal mining accidents than are more experienced persons. An analysis of FY 1978 fatal accident statistics indicates that new employees and workers inexperienced in a job classification were involved in the greatest number of fatal accidents. As table 11 figures show, 51 (44 percent) of the victims of fatal accidents had one year or less experience in the job they were performing when they were killed, while 77 (67 percent) had less than five years experience. Falls of roof have traditionally been the No. 1 killer in coal mines, and in FY 1978 they claimed 42 (52 percent) out of the 83 lives lost in underground mining. Fatalities by occupation and by work location/accident classification are summarized in tables 12 and 13 respectively for FY 1978. Figure 8 presents the fatal injury incidence rate by State during 1978.

Coal Mine Injuries

Preliminary figures indicate that the total number of reported injuries decreased to 18,410 in 1978, continuing a two-year downward trend. The corresponding all-injury incidence rate also decreased, dropping to 10.74 per 200,000 employee-hours worked in FY 1978, from 12.90 in 1977 (figure 9). Table 14 summarizes the all-injury incidence rate for the various types of

Development of "automated temporary roof support systems" has made it possible for miners to install roof bolts without having to go under unsupported roof. In recent years, roof or rib falls have been involved in roughly half of all underground coal mining deaths.

An inspector talks over safety measures, required under the Federal Mine Safety and Health Act of 1977, with the operator of a shuttle car which has been fitted with a protective canopy.



mines for the years 1972 through FY 1978. Figure 10 presents the all-injury incidence rate by State during FY 1978.

Special Enforcement Activities

In addition to performing the primary function of administering Federal mine health and safety laws, and in support of the mission of reducing hazards to mine workers, MSHA is constantly improving existing activities to accelerate the benefits derived from the law and the ensuing regulations. Several programs have been initiated to focus resources toward critical areas.

Illumination standards

Illumination standards designed to improve safety in the working places of underground coal mines became effective on July 30, 1978. This represents a major accomplishment on the part of the Bureau of Mines and the Mine Safety and Health Administration since, over the years, the inability to provide suitable face illumination has been a major factor in coal mine accidents. These standards require that the face, roof, ribs, exposed mine floor, and machines in working places be illuminated to a surface brightness of 0.06 footlamberts while self-propelled equipment is operating. The new standards will provide miners with considerably greater peripheral vision than is now offered by the narrow band of light from cap lamps.

Achieving compliance with the new illumination standards is an extremely difficult undertaking for mine operators. To aid in the task, MSHA has trained over 100 inspectors and engineers in the requirements of the new standards and in the characteristics of lighting hardware. These specialists are actively working with the coal industry and the United Mine Workers of America to achieve compliance with the illumination standards.

Self-Contained Self-Rescuers

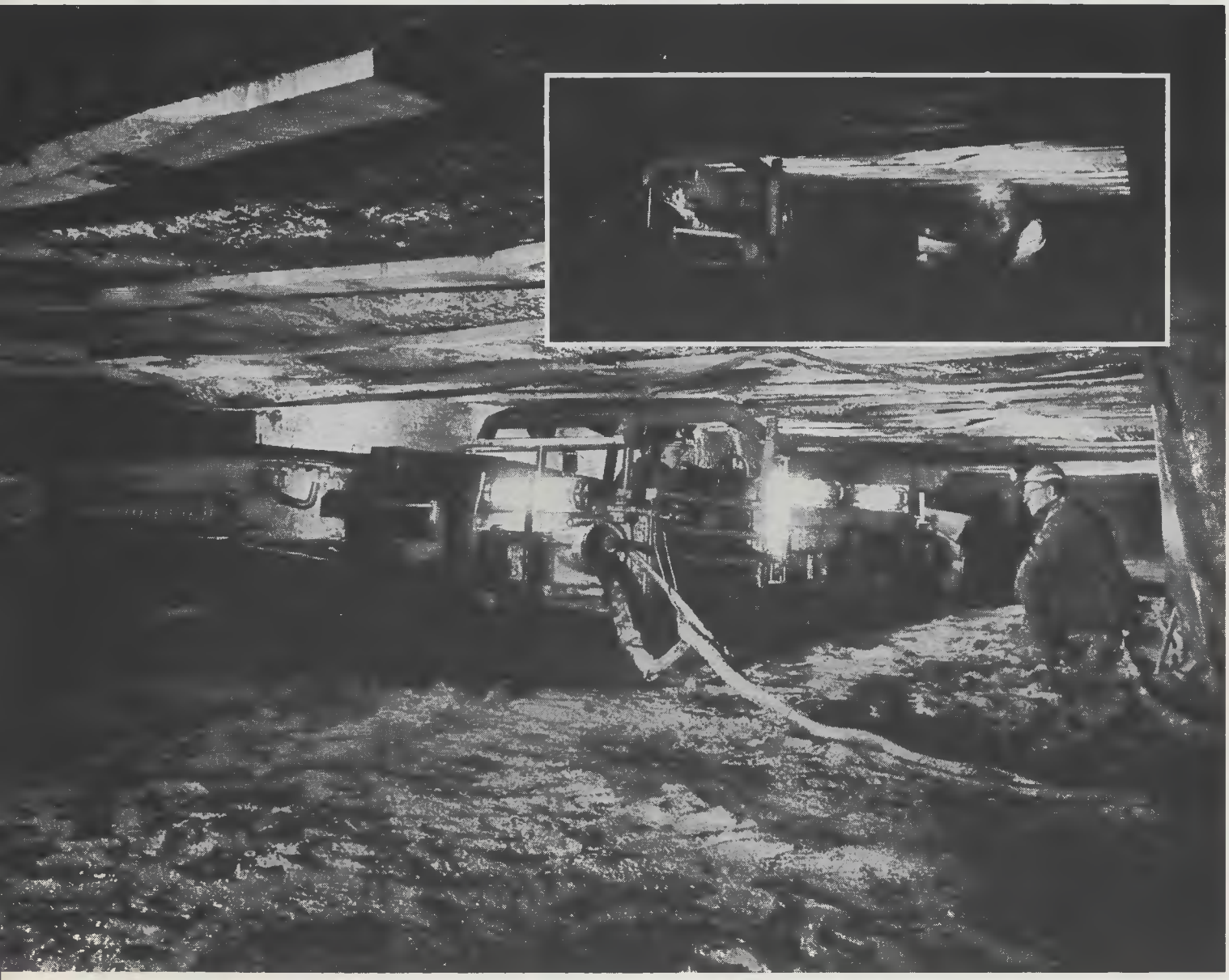
Past experience had indicated that many deaths resulting from the occurrence of a mine fire or explosion can be attributed to the inhalation of carbon dioxide, carbon monoxide, or other gases or to lack of oxygen. Although the availability and use of the self-rescuer has been directly responsible for saving many lives, MSHA recognized that the carbon monoxide (CO), filter-type, self-rescuer, which is provided to all miners and is used for emergency escape, has several major limitations. These are (1) lack of protection against oxygen-deficient air; (2) lack of protection against carbon dioxide (CO_2); (3) high inhalation temperatures at high CO concentrations; and (4) limited protection against other toxic gases.

To eliminate these problems and to provide miners with an increased chance for survival following a mine fire or explosion, proposed revisions to the regulations were published on Nov. 16, 1977, in the Federal Register relating to the availability, use and location of self-rescue devices in underground coal mines. The revisions require, after a two-year phase-in period, replacement of the present filter-type self-rescuers, which do not generate oxygen, with self-contained self-rescuers, which generate oxygen. These regulations, which became final late in 1978, also set forth alternative methods of using and providing access to self-contained self-rescuers and impose training, inspection, testing, maintenance, and recordkeeping requirements. During the two-year phase-in period, MSHA intends to conduct a program to examine how these regulations will affect the miners. The program will involve the use of self-contained self-rescuers by MSHA personnel and miners at selected mines of varying seam heights, chosen by MSHA in cooperation with industry and employee representatives.

Protection from Roof Falls

The installation of cabs and canopies continues to have a tremendous impact on the reduction of injuries or fatalities involving operators of self-propelled electric face equipment. Reports indicate that at least 114 equip-

Inset photo shows poor visibility common in mining for many years. The safety potential resulting from new illumination requirements for underground coal mines is dramatically illustrated in the large photo showing visibility provided by modern machine-mounted lighting systems.

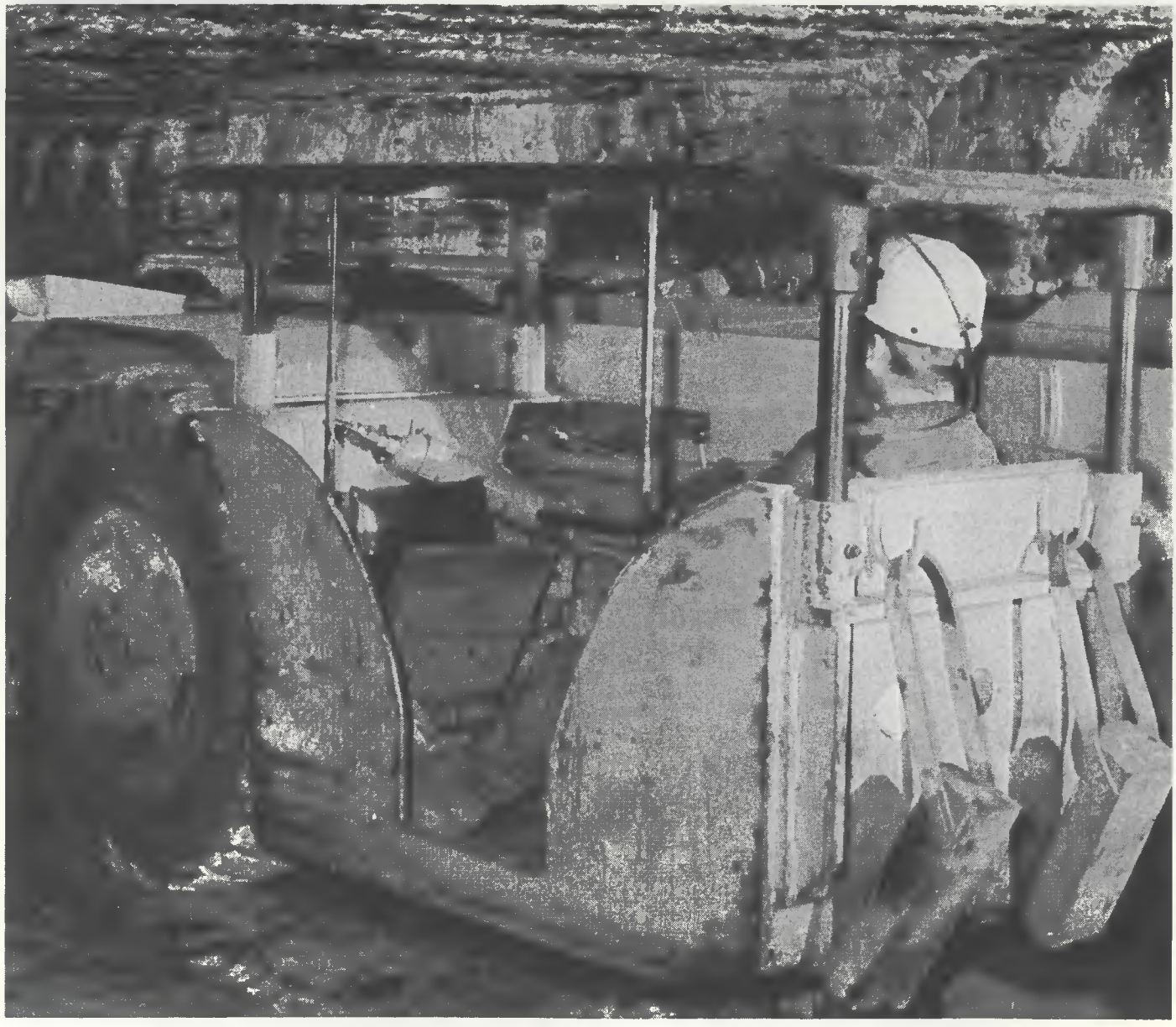


Improved oxygen-generating self-rescue devices are being phased into use in underground coal mines under new Federal requirements. The 60-minute oxygen-generating device pictured here is one of several alternative types allowed in the regulations. The improved types are superseding less effective filter-type devices.

MSHA accident reports confirm that many miners have been saved from death or serious injury due to mine roof falls through the installation of protective cabs or canopies on self-propelled electric face equipment.

ment operators have been saved from certain death or serious injury because a cab or canopy protected the operator from falls of roof, face, or rib. Moreover, an analysis of haulage fatalities indicates that the number of equipment operators killed due to being pinned, squeezed, or crushed against the roof, rib, or equipment has also been significantly reduced.

Progress in installing cabs and canopies has been substantial for equipment used in coalbed heights of 42 inches or more; however, based on research as well as experience gained in the course of MSHA enforcement,



certain human engineering problems had not been solved, particularly in coalbed heights below 42 inches. While these problems varied depending upon the particular mining equipment, they included impaired operator vision, operator cramping and fatigue. Because of these unsolved engineering problems the Secretary suspended indefinitely the time period for operators to design and install cabs and canopies on self-propelled electric face equipment used in underground coal mines where coalbed heights are less than 42 inches.

Because of the resulting benefits in terms of lives saved and injuries prevented by the installation of cabs and canopies on electric face equipment, MSHA intends to utilize the authority provided in the statutory standard to the fullest extent possible consistent with the technology, designs, and human engineering developed and available to require cab and canopy installation for coalbed heights less than 42 inches. The solutions remain a challenge to industry and the Government.

Resident Inspection Program

Recognizing the fact that large complex mines and those mines liberating significant amounts of methane gas can present potentially greater hazards, Coal Mine Safety and Health instituted the Resident Inspection Program which requires that one mine inspector be responsible for conducting the required number of regular inspections and Section 103(i) inspections at the subject mine. The Resident Inspection Program was based on two factors:

Factor A. Mines which liberate one million or more cubic feet of methane in a 24-hour period or have had a gas ignition or explosion which resulted in death or serious injury during the past five years, and have an incident rate (Degrees 1-5) greater than the National Average and scored less than 800 points (80 percent) on their Mine Profile (Mine Profile Rating System).

Factor B. Mines that are of such size that an inspection of the entire mine requires the assignment of an inspector for a period of 50 days or more during a quarter.

Federal regulations require that regular methane checks be made in underground coal mines by qualified personnel. Right, an inspector checks for the possible presence of dangerous levels of methane.

Some mines have installed elaborate underground pipeline systems to drain methane from the coalbed to the surface or another part of the mine for venting in the interest of both safety and — where the recovered gas is sold — economy. Below, an MSHA inspector checks part of a drainage system for safe operation.

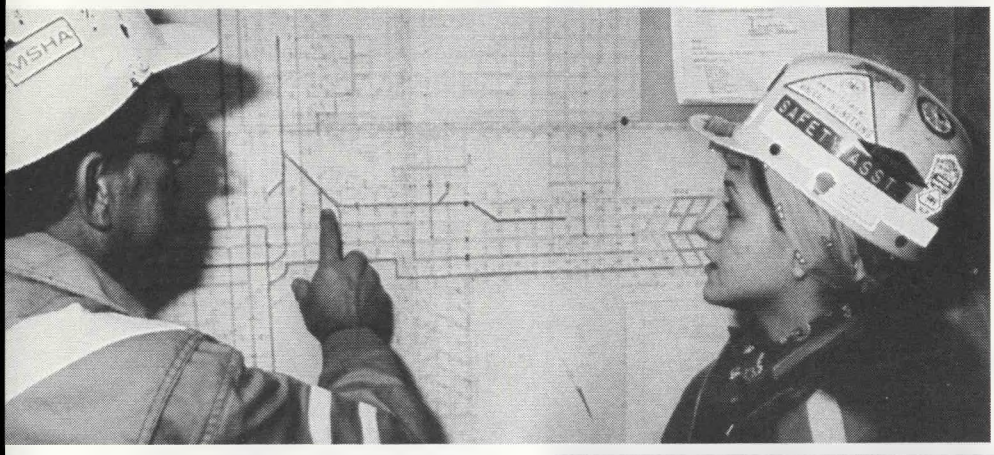
The purpose of the Resident Inspection Program is to reduce accidents and injuries, and the program is based on the principle that accidents will not happen, or will happen less frequently, with a full-time inspector at the mine conducting a concentrated inspection, education and hazards analysis program.

Mine Profile Rating System

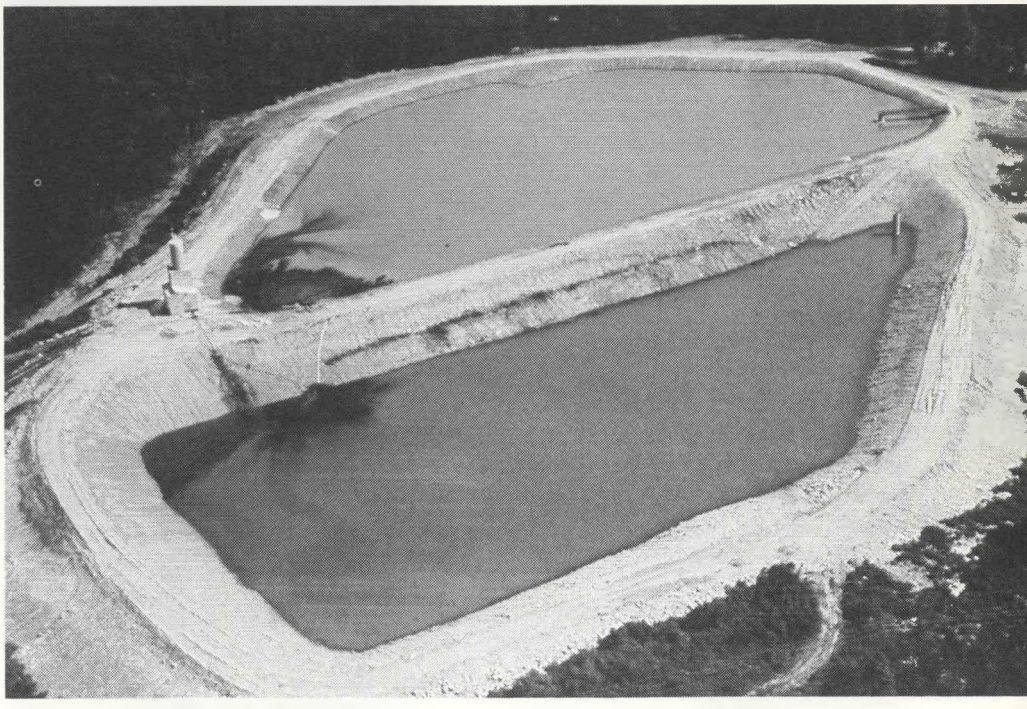
The Mine Profile Rating System is a management tool used by MSHA to evaluate the relative health and safety record of both surface and underground mines. The measurement system is based upon a mine's disabling injury frequency rate, its record of compliance with mandatory health and safety regulations, and the health and safety management system at the rated mine. The performance of coal mines is measured, not to compare one against the other, but rather to identify those mines having a large number of disabling injuries, a poor compliance record, or a weak health and safety management system. Once such mines are identified, MSHA then takes remedial action within the framework of the 1977 Act.

Plan Review and Evaluation

In an effort to improve plan effectiveness, Coal Mine Safety and Health technical and enforcement personnel conduct in-depth evaluations of proposed plans submitted by mine operators addressing roof control, ventilation, fire control and evacuation, and slope and shaft sinking activities. This evaluation will, in most cases, involve both a technical review of the design parameters noted in the plans as well as an on site field evaluation. Any discrepancies found in the plan or at the mine site are directed to the mine operator for remedial action.



An accurate, up-to-date mine map must be located in a fireproof structure in a coal mine surface area where there is little chance that it can be destroyed. Above, an MSHA inspector discusses a mine's ventilation plan with a company mine safety assistant.



MSHA uses aerial photos of mine waste impoundment facilities to detect long-term changes in these structures and to spot potentially hazardous defects that may be missed in ground-level observation.

Impact Inspections

Impact inspections are conducted by teams of inspectors who examine many or all of the working sections of a mine simultaneously. This procedure provides a better picture of safety and health practices in a mine in its en-

tirety, and minimizes the possibility of having inadequate mine ventilation or other poor operating practices go undetected.

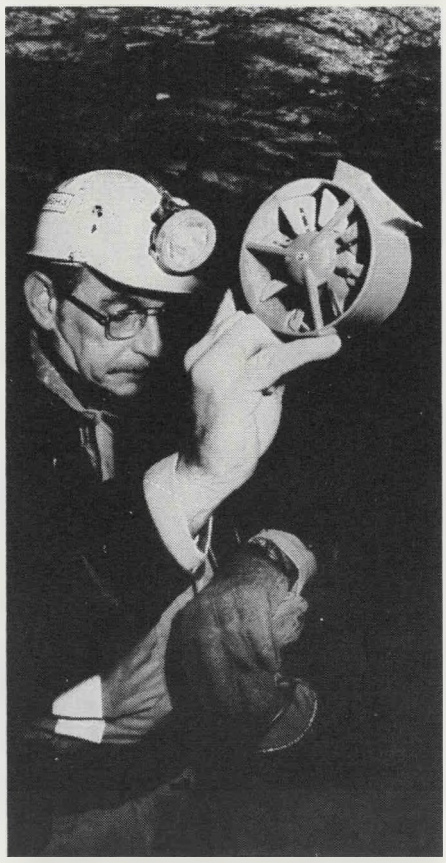
Waste Impoundments

Coal Mine Safety and Health personnel conduct exhaustive field evaluations of mine waste structures to ensure that the structure has been built in accordance with an approved plan. Large, complex mine waste structures are inspected a minimum of 12 times a year. In addition, staff personnel from the Division of Safety with the cooperation of Technical Support have developed a comprehensive 18-hour training course in this area for presentation to both MSHA enforcement personnel and representatives from the mining industry, colleges and universities and the vocational-technical school system.

Toxic Substances

The Secretary of Health, Education, and Welfare is charged with identifying and notifying the Department of Labor of toxic substances and harmful physical agents used or found in mines in potentially toxic concentrations. HEW is carrying out this mandate through the National Institute for Occupational Safety and Health (NIOSH). Following such notification, NIOSH is to submit recommended criteria required in the proposal of health standards by the Secretary of Labor. MSHA is working closely with NIOSH to provide information and aid in identifying hazards and in developing useful criteria for preparation of standards. A MSHA committee providing guidance and liaison with NIOSH has been established for this purpose.

Shortly after passage of the 1977 Act, several committees, charged with planning for its implementation, deliberated in several areas of responsibility. In Coal Mine Safety and Health, the committee on Toxic Substances and Harmful Physical Agents, with representatives from both headquarters and district offices, considered all of the requirements for standards dealing with toxic materials and harmful physical agents outlined in the Act. These provisions relate to labels or other appropriate forms of warning, so that miners are apprised of hazards in the mining environment; engineering and environmental control measures; proper conditions and precautions for safe exposure; monitoring of exposures and type and frequency of medical examinations, among other factors. This committee has drafted a general regulation of health standards for such materials and agents which contains these various provisions and, in addition, contains a format whereby the physical properties, exposure limits, monitoring provisions, and other requirements for specific substances and agents as mandated by the new Act may be incorporated. Requirements for recordkeeping are also included.

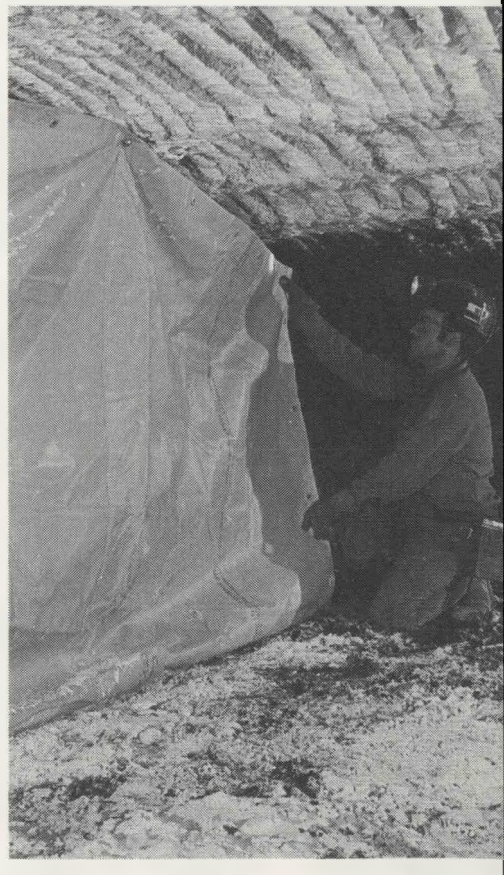


Proper installation of a "line brattice" is important in providing a strong flow of fresh air from the mine's ventilation system to working areas. The line brattice, in effect, forms a partition between incoming or "intake" air and the return airway carrying return air to the surface.

MSHA reviews NIOSH reports on mining health hazard evaluations to be sure their recommendations are consistent with MSHA regulations. Such evaluations may be requested by coal operators or miners' representatives, and allow for evaluation of hazards and recommendation for controls beyond the requirements of regulations.

Coal Mine Safety and Health is working towards complying with the intent of the new Act in providing greater health protection for the coal miner. New regulations will, in general, necessarily be more comprehensive and detailed to accomplish this goal and, in addition, will consider the miners' rights in being kept informed of exposures.

An air velocity reading is taken in a mine passage with an anemometer. Good underground ventilation is vital in keeping coal mine dust levels low, diluting and carrying away potentially hazardous gases.



Respirable Dust: Lung Disease

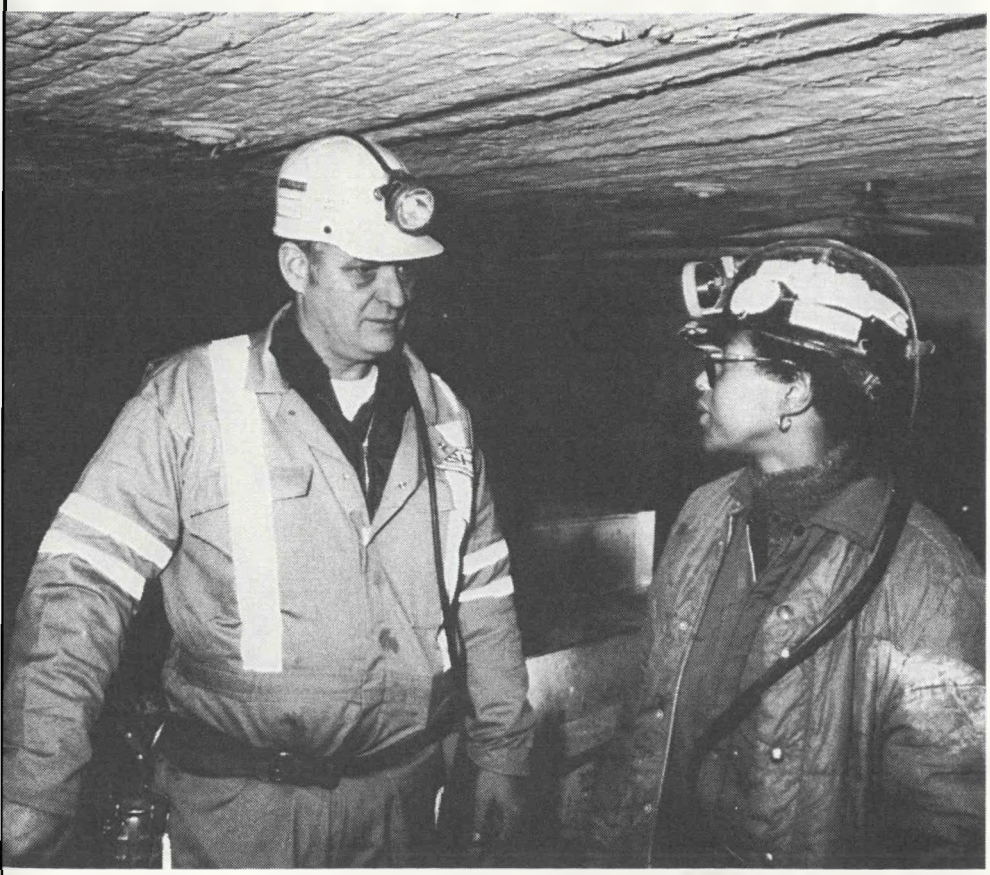
Over 385,000 miners and survivors of miners have been found eligible for Federal "black lung" benefits. (There are now about 230,000 active coal miners.) Federal benefits payments totaled $960.6 million in FY 1977, the latest year for which complete data are available. Due to the magnitude of the black lung problem, MSHA's major health effort has been directed toward reducing and controlling respirable dust in coal mines.

Underground Respirable Dust Levels

There have been major improvements in the underground respirable dust levels since the health portion of the 1969 Coal Act became effective in 1970, as shown for several high-risk occupations in the accompanying table 16. Vigorous enforcement efforts were successful in further reducing dust levels on longwall sections in 1978.

Another indicator of compliance with the respirable dust standard is the set of data, initiated in 1975, shown in table 17. These data give the percentage of underground sections that were continuously in compliance throughout each calendar year. The apparent decrease in 1976 was probably due to faulty sampling filters that gained weight with exposure to heat and moisture. The improvements in 1977 and 1978 were, in part, the result of decreased sampling which was caused by a shortage of sampling equipment and by work stoppages. The 1978 data cover January-September 1978.

This relatively high level of continuous compliance must be considered in the context that there were sections which were in almost continuous noncompliance through much of 1978. Many of these sections used longwall shearers. Actions taken on longwall health problems are discussed in another section of this report.



An MSHA inspector and a dust sampling technician discuss sampling procedures in a West Virginia underground coal mine. During the 1978 fiscal year, MSHA proposed revisions to the regulations designed to further tighten procedures for controlling this health hazard and to simplify and speed up the enforcement process.

Surface Dust Levels

Both mine operator and MSHA sampling of surface occupations at underground and at surface mines showed a high degree of compliance with the 2.0 mg/m³ standard in 1978. Ninety-five percent of the samples taken by mine operators and 97 percent of these taken by MSHA during 1978 were at or below the 2.0 mg/m³ standard. These samples resulted in 105 citations for excessive dust.

Respirable Dust Controls

As in previous years, MSHA put more effort toward solving respirable dust problems in 1978 than to any other health problems, and this effort continued throughout 1979. Bi-annual sampling inspections, to assess the effectiveness of underground mine operators' respirable dust control plans, are a major part of our health efforts. The program was started in late 1975 and early 1976. Approximately 28 percent of the scheduled assessments were made in 1976; 35 percent in 1977; and 29 percent in FY 1978. During FY 1978, MSHA hired and began training 110 new inspectors for this program to permit a significant increase in the number of sampling inspections.

Quartz (Free Silica)

The 1977 Act requires that the Secretary of HEW prescribe an appropriate formula for determining the applicable standard when respirable dust contains more than 5 per centum quartz. Respirable dust samples taken by MSHA are used to determine the quartz content of respirable dust. Prior

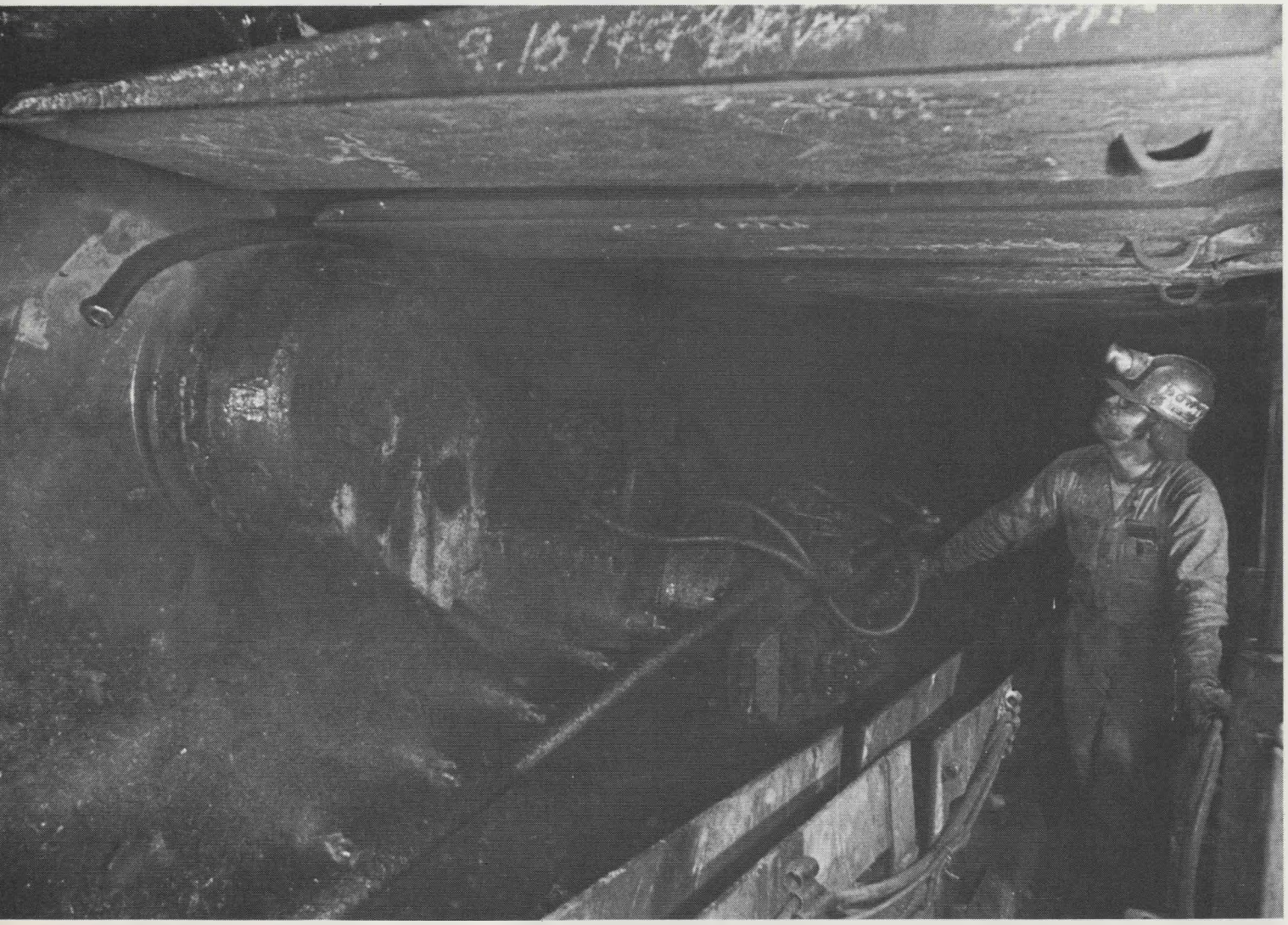
to 1977, the amount of respirable dust on these samples was usually too small to determine the quartz content. A supplemental sampling program now provides an adequate amount of dust on many samples. As a result, 15 sections and pits were found to have excessive quartz in 1977 and 35 were found to have excessive quartz in 1978.

Transfers Due to Pneumoconiosis

The 1977 Act provides miners with an option to transfer to a position where the respirable dust level is not over 1.0 mg/m^3 (except when the 1.0 mg/m^3 level cannot be obtained) if the results of an x-ray taken under Section 203(a) of the Act show evidence of pneumoconiosis. The latest data available from the Department of Health, Education, and Welfare show that at the end of 1978, about 173,000 miners had been x-rayed and 7,005 had been found eligible for transfer. At the end of 1978, about 1,240 of these miners had exercised their option, and 320 were actively employed in underground mines with the protection provided by Section 203(b) of the Act.

Noise

Since the enactment of the 1969 Coal Act, a total of about 2,290 citations (1,334 on the surface and 956 underground) have been issued for exceeding the noise standard as a result of noise surveys conducted by the operators and by the Federal inspectors. During 1978, a total of 77 such citations were issued. During 1978, mine operators conducted noise surveys on approximately 173,000 miners, of which 103,000 worked underground and 70,000 worked in surface worksites of surface and underground mines.



Longwall mining machines, used to mine coal on long, straight faces, are highly productive, but also generate large amounts of coal dust. The water spraying devices attached to this machine reduce airborne dust concentrations.

The largest number of surveys showing excessive noise exposure reported in 1977 and 1978 by mine operators were on miners exposed to noise generated by the approximately 200 underground auger continuous mining machines. These machines normally work over longer periods of time than other continuous mining machines and several miners work very close to the machine. Research funding and technical assistance are being provided to design engineering controls for reducing the noise level on these machines.

There are more bulldozers in use than any other type of mining equipment that generates excessive noise. Because most bulldozers have seating for only the operator, a person measuring noise exposure using a sound level meter cannot safely ride such equipment to make measurements. On Oct. 1, 1978, MSHA regulations took effect which permit the use of noise dosimeters to measure noise exposure in underground coal mines. The personal noise dosimeters, which can be worn by mobile equipment operators and those working in areas where there is space for only one person, are intended to complement, not replace, the handheld sound level meters permitted under regulations before Oct. 1, 1978. Noise dosimeters, or integrating sound level meters, compute and register cumulative noise exposure for a given period, such as a working shift, and display this as a percentage of the permissible exposure. Hand-held sound level meters require constant monitoring and do not afford proximity to many mining operations.

The results of noise surveys where there is safe seating, as well as other tests, suggest that the bulldozer is the greatest source of excessive noise exposure in coal mines today. Equipment manufacturers, with encouragement from Federal agencies, are making available soundproofed cabs that can significantly reduce excessive noise levels for bulldozers.

Technical Survey of U.S. Longwall Mining Sections

During July and August, MSHA conducted a technical survey of all longwall mining sections. The purpose of the survey was to see how we stood nationwide in longwall respirable dust and noise level control, and develop a data base of longwall compliance information at a given point in time. MSHA intends to use the information collected during the survey to assist in longwall mining research as an aid in solving longwall compliance problems. Forty-eight percent of the longwall sections that were surveyed were found to be in compliance with the 2.0 mg/m^3 respirable dust standard and 96 percent were in compliance with the 90 dBA noise level standard.

Proposed Revision of Coal Mine Health Standards

On Nov. 16, 1977, there appeared in the Federal Register a proposal to revise certain coal mine safety and health regulations, pertaining to respirable dust and airborne contaminants. The proposed amendments were designed to accomplish the following, among other purposes: (1) provide for increased training in the maintenance and calibration of sampling equipment and in the collection of samples of respirable coal mine dust and other airborne contaminants; (2) substitute area sampling for periodic sampling of miners working in areas not directly associated with removal of coal from its seam; (3) revise sampling schedules and procedures to remove ambiguities and extraneous requirements; and (4) revise the definition of respirable dust.

Respirable coal mine dust samples are presently collected at periodic intervals from the mine atmosphere to which each individual underground coal miner is exposed. Experience has shown that it is difficult to track individual miners in a highly mobile work situation. In general, records of individual exposures have not served to increase the protection afforded miners. Thus, it is proposed that the present individual sampling requirements be replaced with an area sampling concept, except in the case of the miner who shows medical evidence of pneumoconiosis and has elected to be transferred to a less dusty occupation.

New provisions for the maintenance and calibration of sampling devices are contained in the proposed amendments. These are intended to ensure greater reliability and accuracy in the sampling of contaminants.

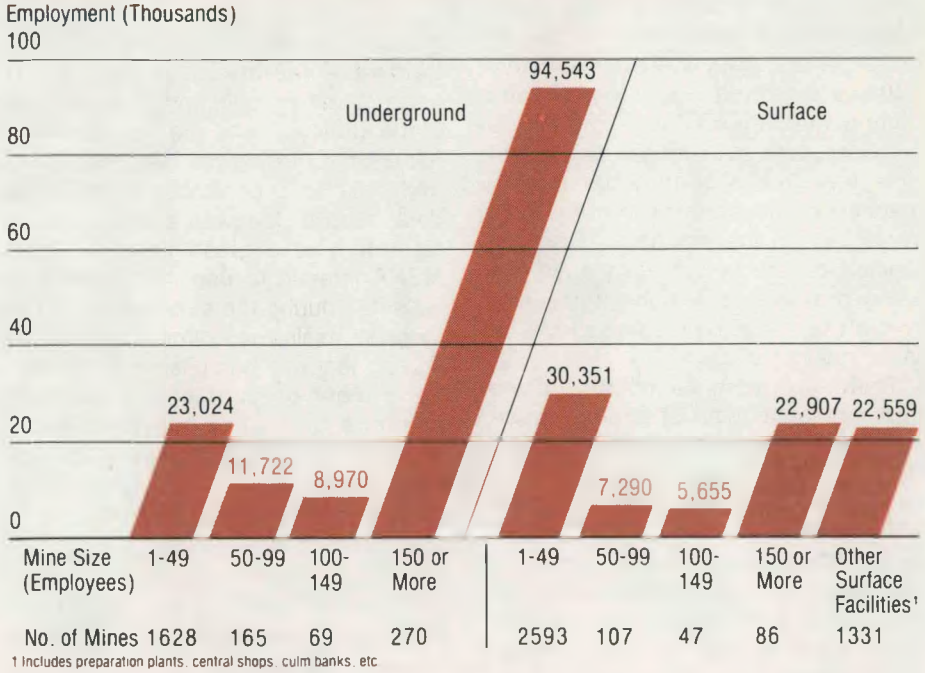
The definition of respirable dust is also revised in terms of the instrument or device for collection. This redefinition was necessary to conform to a decision of the Interior Board of Mine Operations Appeals, which held that coal dust particulates in excess of 5 microns in size are not respirable dust. The new definition in the proposed amendments conforms with the approved method of sampling.

Following publication of the proposed amendments to Part 70, many comments, suggestions, and objections were received, as well as requests for public hearings which were held in July and August of 1978.

TABLE 1.—Number of underground coal mines designated for spot inspections, by State, September 30, 1978

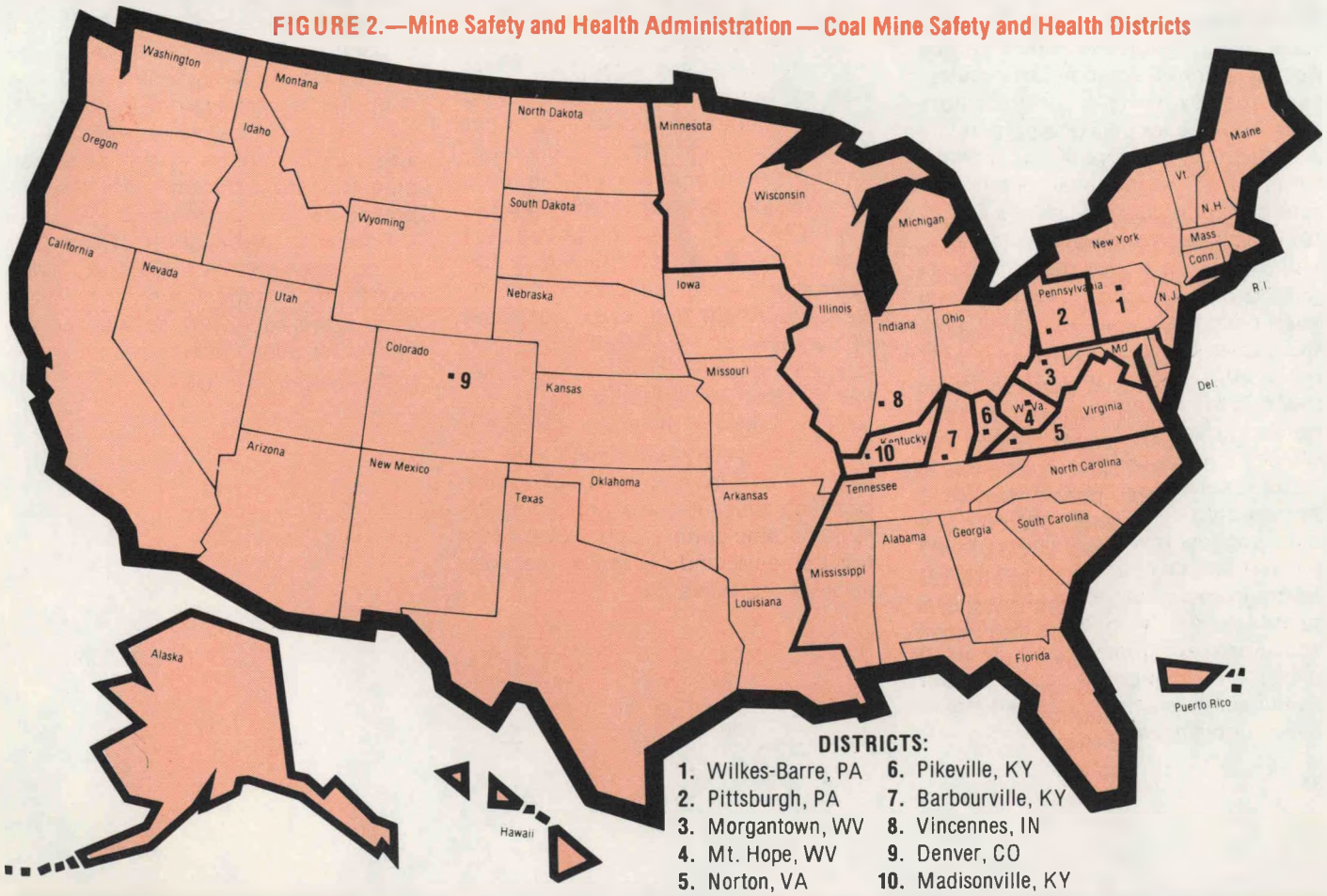
State	Mines Designated for Spot Inspections 103(i)
Alabama	14
Colorado	10
Illinois	18
Kentucky	18
New Mexico	1
Ohio	13
Pennsylvania	47
Tennessee	1
Utah	4
Virginia	15
West Virginia	50
Total	191

FIGURE 1.—Coal industry employment by size of operation (1978).



1 Includes preparation plants, central shops, culm banks, etc.

FIGURE 2.—Mine Safety and Health Administration — Coal Mine Safety and Health Districts



DISTRICTS:

1. Wilkes-Barre, PA
2. Pittsburgh, PA
3. Morgantown, WV
4. Mt. Hope, WV
5. Norton, VA
6. Pikeville, KY
7. Barbourville, KY
8. Vincennes, IN
9. Denver, CO
10. Madisonville, KY

TABLE 2.—Active underground coal mines and inspection data by State, FY 1978

District	State	Active Mines	INSPECTIONS								
			Safety and Health	Safety and Health Spot	HAAP	Spot 103(i)	Electrical	Technical	Reopening	Spot 103(g)	Total Inspections
1	Pennsylvania (Anth.)	69	266	309	0	269	28	268	20	5	1,165
2	Pennsylvania (Bit.)	129	557	1,442	10	1,055	406	653	4	23	4,150
3	Maryland	4	20	25	0	0	0	11	0	0	56
	West Virginia	89	382	538	23	700	305	486	5	28	2,467
4	West Virginia	535	1,751	2,615	14	645	590	1,770	42	52	7,479
5	Virginia	417	1,342	1,968	70	371	333	1,300	71	8	5,463
6	Kentucky	400	1,002	1,091	73	69	412	1,067	25	15	3,754
7	Alabama	18	71	68	15	302	35	65	0	0	556
	Kentucky	252	587	1,027	18	78	364	628	24	19	2,745
	Tennessee	67	278	388	11	12	196	260	6	1	1,152
8	Illinois	27	105	257	7	398	164	252	2	1	1,186
	Indiana	4	13	16	0	0	18	17	0	0	64
	Ohio	28	111	319	5	214	100	151	0	20	920
9	Arkansas	1	2	2	0	0	4	1	0	0	9
	Colorado	30	102	214	14	334	117	107	4	4	896
	Iowa	1	6	12	0	0	4	0	0	0	22
	Montana	1	0	2	0	0	0	0	0	0	2
	New Mexico	2	6	2	0	11	2	14	0	1	36
	Oklahoma	0	4	4	0	0	0	1	0	0	9
	Utah	25	96	223	23	91	93	79	0	1	606
	Wyoming	2	8	10	0	0	6	9	0	0	33
10	Kentucky	30	124	980	21	395	101	224	0	26	1,871
	Total	2,131	6,833	11,512	304	4,944	3,278	7,363	203	204	34,641

District	State	INVESTIGATIONS					
		Electrical	Technical	Accident	Special Investigations	Mine Profile	Total Investigations
1	Pennsylvania (Anth.)	2	53	4	2	2	63
2	Pennsylvania (Bit.)	109	210	163	14	38	534
3	Maryland	0	2	1	1	2	6
	West Virginia	13	39	54	29	27	162
4	West Virginia	156	98	56	46	280	636
5	Virginia	97	62	72	28	131	390
6	Kentucky	19	70	58	33	56	236
7	Alabama	11	35	17	0	2	65
	Kentucky	17	54	121	11	27	230
	Tennessee	29	18	27	9	3	86
8	Illinois	24	21	36	4	2	87
	Indiana	0	0	1	0	0	1
	Ohio	33	50	90	10	5	188
9	Arkansas	1	0	1	0	0	2
	Colorado	9	67	47	2	14	139
	Iowa	0	6	0	1	0	7
	Montana	0	1	0	0	0	1
	New Mexico	0	5	0	0	0	5
	Oklahoma	0	0	0	0	0	0
	Utah	31	121	37	0	11	200
	Wyoming	3	8	1	0	0	12
10	Kentucky	6	108	88	24	3	229
	Total	560	1,028	874	214	603	3,279

Note: Total impact inspections: 315

TABLE 3.—Active number of surface coal mines and surface facilities and inspection data by State, FY 1978

District	State	Active Strip & Auger Mines	Culm Banks, Dredges & Refuse Piles Being Reclaimed With Own ID Number	Prep. Plants, Loading Docks, Central Shops etc. With Own ID Numbers	Slopes and Shafts Under Construction	Construction Sites At Active Mines	Construction Sites Not At Active Mines
1	Pennsylvania(Anth)	100	36	79	2	4	0
2	Pennsylvania(Bit)	665	10	87	18	5	4
3	Maryland	52	0	3	0	4	0
	West Virginia	140	0	28	10	16	0
4	West Virginia	143	2	215	11	16	10
5	Virginia	164	0	111	3	0	20
6	Kentucky	219	2	195	3	1	0
7	Alabama	216	0	17	0	0	0
	Georgia	5	0	3	0	0	0
	Kentucky	303	0	142	1	18	29
	Tennessee	133	0	66	0	0	2
8	Illinois	41	7	18	8	6	4
	Indiana	91	0	4	0	4	0
	Ohio	266	1	36	1	5	1
9	Alaska	1	0	0	0	1	0
	Arizona	2	0	1	0	0	0
	Arkansas	17	0	2	0	0	0
	Colorado	17	0	1	0	8	0
	Iowa	7	0	0	0	0	0
	Kansas	12	0	0	0	0	0
	Missouri	16	0	1	0	0	0
	Montana	8	0	0	0	2	0
	North Dakota	8	0	0	0	4	0
	New Mexico	4	0	1	0	4	0
	Oklahoma	45	0	1	0	0	0
	Texas	6	0	0	0	3	0
	Utah	5	1	3	0	0	0
	Washington	2	0	0	0	1	0
	Wyoming	18	0	1	0	10	2
10	Kentucky	131	0	24	0	12	5
	Total	2,837	59	1,039	57	124	77

FIGURE 3.—Coal mine inspections and investigations, CY 1970-1977 and FY 1978

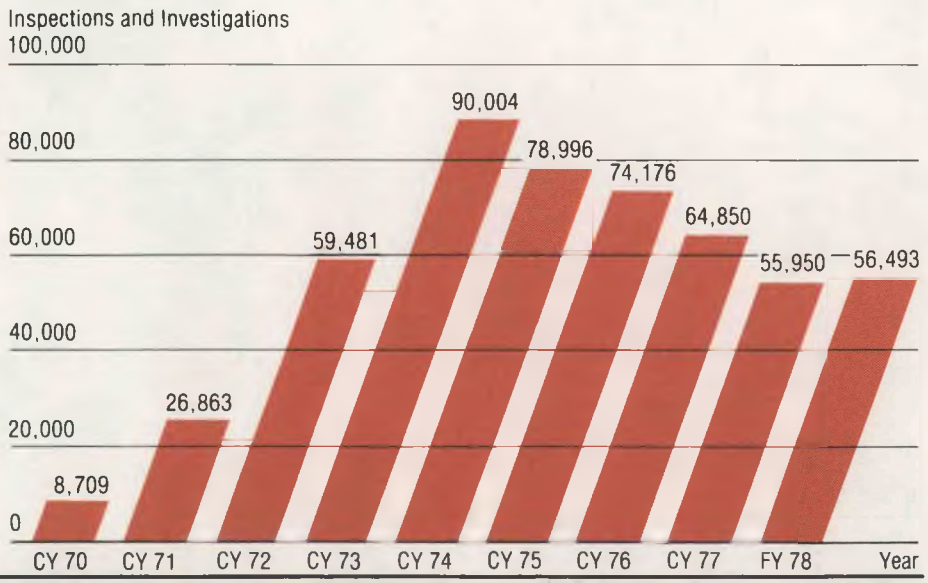


TABLE 3.—(continued)

Inspections									Investigations					
Safety and Health	Safety and Health Spot	HAAP	Spot 103(i)	Electrical	Technical	Re-opening	Spot 103(g)	Total In-spections	Electrical	Technical	Accident	Special Investigations	Mine Profile	Total Investi-gations
257	457	0	0	71	98	35	3	921	0	64	17	0	35	116
1,295	1,040	0	0	97	37	0	1	2,468	0	115	8	1	481	605
141	94	0	0	0	9	0	0	244	0	3	2	3	46	54
407	286	0	0	38	34	3	1	769	0	2	6	7	94	109
553	708	2	0	56	937	9	23	2,288	20	25	24	6	214	289
625	364	0	0	1	118	1	4	1,113	7	10	8	8	106	139
718	923	1	0	54	378	7	5	2,086	0	32	9	8	53	102
332	172	0	1	35	11	0	6	557	1	6	4	3	1	15
14	12	0	0	0	0	1	0	27	0	0	0	0	0	0
723	794	3	0	41	67	3	3	1,634	0	15	5	0	2	22
444	202	0	0	7	3	2	0	658	0	5	1	0	0	6
174	208	1	0	97	75	0	3	558	4	1	7	0	22	34
181	174	0	1	76	50	0	0	482	0	35	11	1	26	73
570	494	0	0	35	8	5	1	1,113	3	4	18	4	177	206
2	15	0	0	0	0	0	0	17	0	0	0	0	0	0
5	14	0	0	3	3	0	0	25	1	2	2	0	2	7
30	42	0	0	6	0	1	0	79	0	0	2	0	5	7
44	63	0	0	11	4	0	3	125	0	3	3	1	10	17
11	11	0	0	0	0	1	0	23	0	0	0	0	2	2
27	14	0	0	1	2	0	0	44	2	1	0	3	5	11
28	31	0	0	2	6	0	3	70	0	1	2	5	4	12
18	49	0	0	7	1	0	1	76	0	2	2	1	3	8
21	53	0	0	11	1	0	0	86	0	0	1	0	9	10
19	27	0	0	9	1	3	0	59	0	5	2	0	3	10
99	64	0	0	13	1	2	0	179	7	7	2	2	17	35
12	27	0	0	8	5	0	1	53	1	0	2	1	0	4
6	14	0	0	0	0	0	0	20	6	3	0	0	1	10
2	6	0	0	1	3	0	0	12	0	0	1	0	0	1
47	90	0	0	26	7	0	3	173	2	3	6	2	6	19
335	179	0	0	53	6	8	14	595	0	10	2	6	78	96
7,140	6,627	7	2	757	1,865	81	75	16,554	54	354	147	62	1,402	2,019

Note. Total impact inspections, 12.

FIGURE 4.—Notices of violation and citations issued, CY 1970-1977 and FY 1978

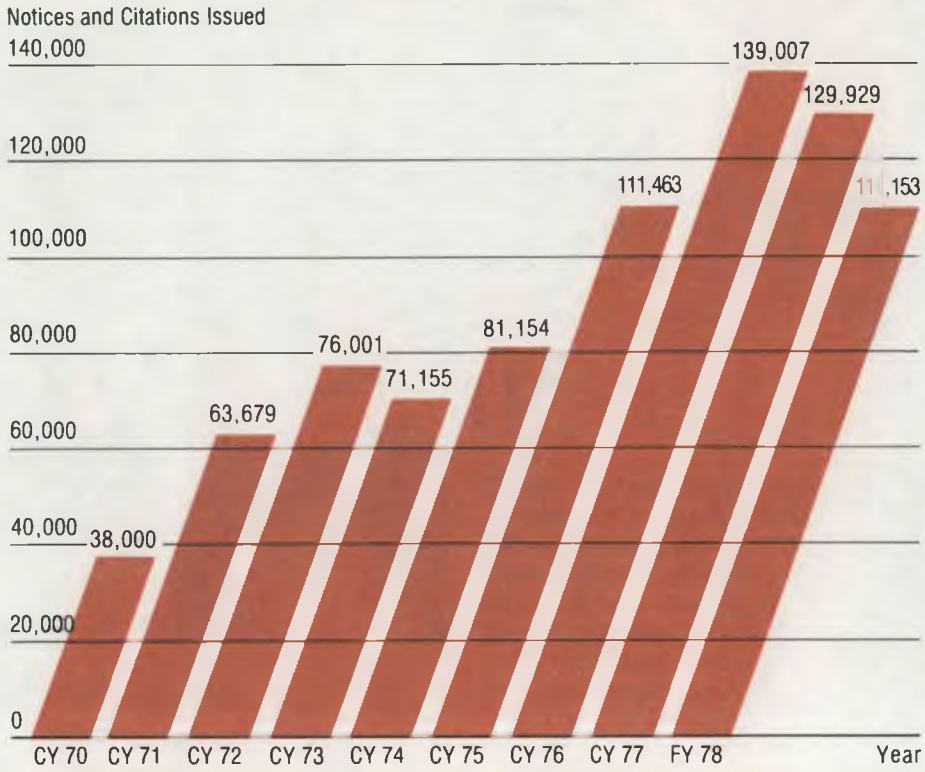


FIGURE 5.—Most frequently cited violations in underground coal mining (30 CFR, Part 75), FY 1978

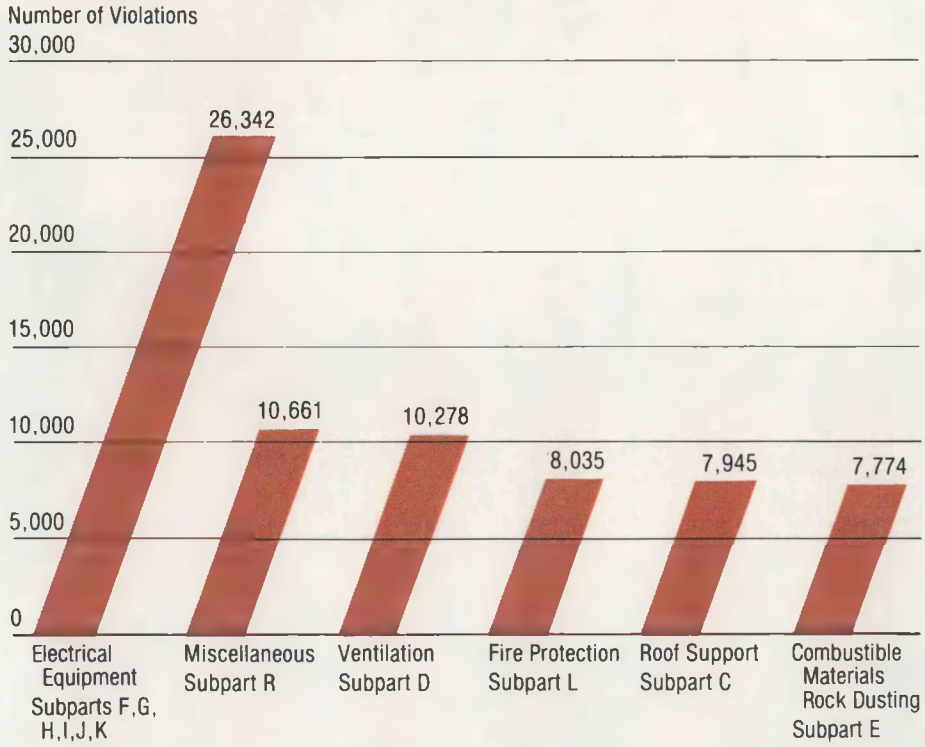


FIGURE 6.—Most frequently cited violations in surface coal mining operations (30 CFR, Part 77), FY 1978

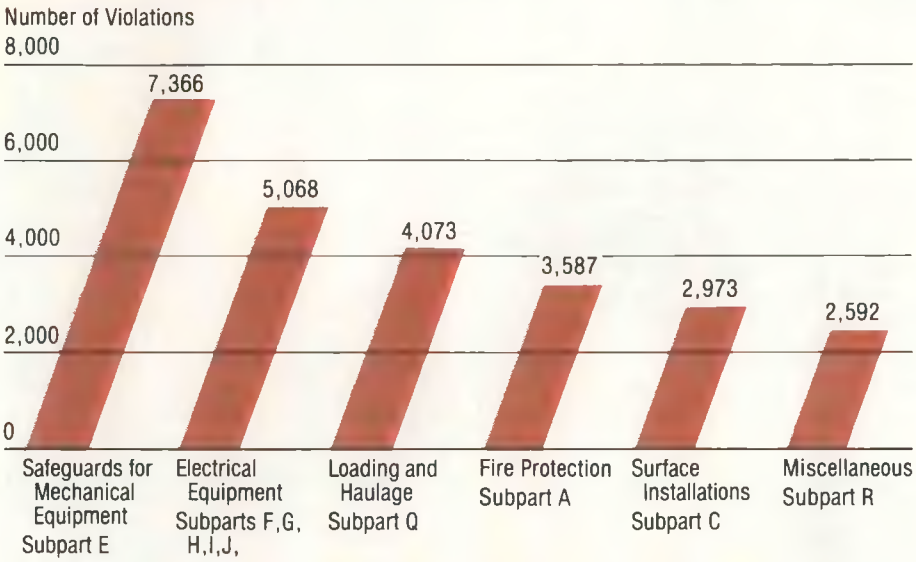


TABLE 4.—Notices of violation, citations and orders of withdrawal: Part 75—Mandatory Safety Standards, Underground Coal Mines—FY 1978

Part 75 Subpart Violated	NOTICES AND CITATIONS 104(b) and 104(a)	104(c)(1) and 104(d)(1)	Safeguards	Total	ORDERS OF WITHDRAWAL 104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)	Total
B	108	7	0	115	3	1	0	4
C	7,737	208	0	7,945	107	157	104	368
D	9,925	120	233	10,278	177	101	101	379
E	7,726	47	1	7,774	144	88	91	323
F	16,657	23	1	16,681	116	33	46	195
G	4,416	12	0	4,428	20	26	12	58
H	1,441	4	0	1,445	8	6	3	17
I	1,293	6	0	1,299	13	1	7	21
J	1,591	2	60	1,653	21	1	6	28
K	836	0	0	836	4	2	3	9
L	8,019	16	0	8,035	87	20	18	125
M	403	1	0	404	136	1	0	137
N	485	10	0	495	4	2	6	12
O	2,560	6	661	3,227	38	1	7	46
P	3	0	372	375	3	2	0	5
Q	259	7	0	266	5	0	1	6
R	10,585	28	48	10,661	243	44	30	317
S	302	0	0	302	2	4	1	7
Total	74,346	497	1,376	76,219	1,131	490	436	2,057

TABLE 5.—Notices of violation, citations and orders of withdrawal: Part 77—Mandatory Safety Standards, Surface Coal Mines and Surface Areas of Underground Mines—FY 1978

Part 77 Subpart Violated	NOTICES AND CITATIONS 104(b) and 104(a)	104(c)(1) and 104(d)(1)	Safeguards	Total	ORDERS OF WITHDRAWAL 104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)	Total
B	421	0	0	421	40	0	2	42
C	2,962	11	0	2,973	59	14	5	78
D	219	0	0	219	3	0	1	4
E	7,339	22	5	7,366	90	25	5	120
F	3,332	18	0	3,350	31	21	4	56
G	133	4	0	137	1	1	0	2
H	993	5	0	998	3	0	3	6
I	342	1	0	343	3	0	0	3
J	240	0	0	240	3	1	0	4
K	709	14	0	723	32	4	1	37
L	3,583	4	0	3,587	33	10	0	43
M	48	0	0	48	4	0	0	4
N	892	6	0	898	13	3	7	23
O	30	1	0	31	0	0	0	0
P	80	1	0	81	11	0	0	11
Q	4,060	13	0	4,073	80	6	4	90
R	2,578	14	0	2,592	63	4	2	69
S	23	0	0	23	0	0	0	0
T	145	2	1	148	1	8	1	10
Total	28,129	116	6	28,251	470	97	35	602

TABLE 6.—Notices of violation, citations and orders of withdrawal: Part 70—Mandatory Health Standards, Underground Coal Mines—FY 1978

Part 70 Subpart Violated	NOTICES OF VIOLATION AND CITATIONS 104(b) and 104(a)	104(c)(1) and 104(d)(1)	104(i) and 104(f)	Safeguards	Total	ORDERS OF WITHDRAWAL 104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)	104(i) and 104(f)	Total
B	86	1	1,527	0	1,614	2	0	0	67	69
C	2,159	11	21	0	2,191	17	1	1	1	20
D	1	0	0	0	1	8	0	0	0	8
E	12	0	0	0	12	0	0	0	0	0
F	309	0	0	0	309	5	0	0	0	5
Total	2,567	12	1,548	0	4,127	32	1	1	68	102

TABLE 7.—Notices of violation, citations and orders of withdrawal: Part 71—Mandatory Health Standards—Surface Work Areas of Underground Coal Mines and Surface Coal Mines —FY 1978

Part 71 Subpart Violated	NOTICES OF VIOLATION AND CITATIONS 104(b) and 104(a)	104(c)(1) and 104(d)(1)	Safeguards	Total	ORDERS OF WITHDRAWAL 104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)	Total
B	1,524	1	0	1,525	45	0	0	45
C	2	0	0	2	0	0	0	0
D	415	0	0	415	24	0	0	24
E	292	0	0	292	7	0	0	7
F	239	0	0	239	5	0	0	5
G	82	1	0	83	1	0	0	1
Total	2,554	2	0	2,556	82	0	0	82

TABLE 8.—Notices of violation, citations and orders of withdrawal: Part 90—Procedures for Transfer of Miners with Evidence of Pneumoconiosis—FY 1978

Subpart Violated	NOTICES OF VIOLATION AND CITATION 104(b) and 104(a)	104(c)(1) and 104(d)(1)	ORDERS OF WITHDRAWAL 104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)
D	4	0	0	0	0
E	1	0	0	0	0
Total	5	0	0	0	0

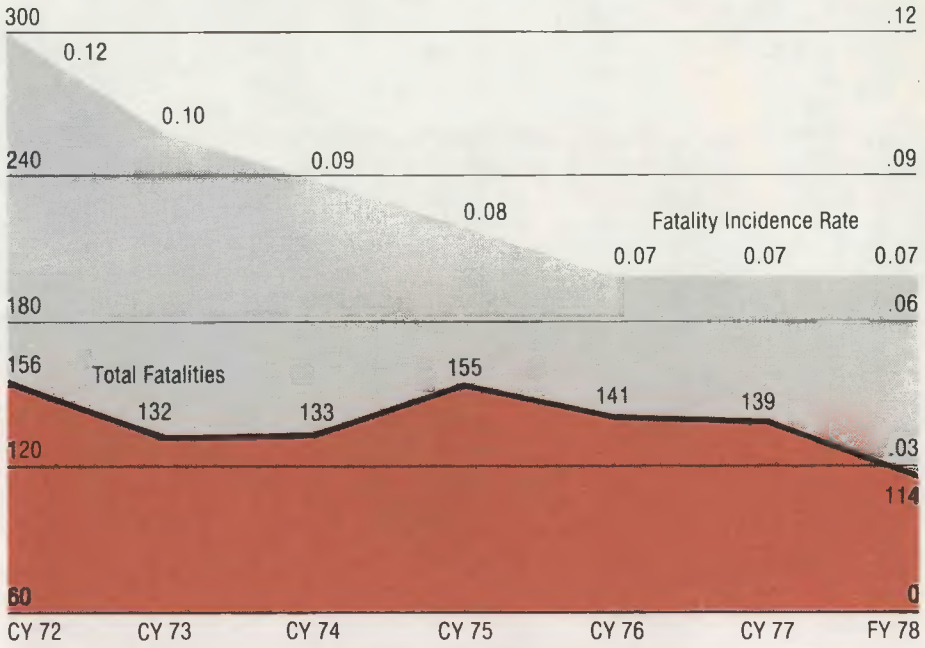
TABLE 9.—Summary of notices of violation, citations and orders of withdrawal issued at coal mines: Title 30, Code of Federal Regulations and Federal Mine Safety and Health Act of 1977—FY 1978

30 CFR P.L. 91-173	CITATIONS 104(b) and 104(a)	104(c)(1) and 104(d)(1)	104(i) and 104(f)	317(c)	Safeguards	ORDERS 104(a) and 107(a)	104(b)	104(c)(1) and 104(d)(1)	104(c)(2) and 104(d)(2)	103(e)(f) and 103(j)	103(f) and 103(k)	104(i) and 104(f)
Part 50	134	0	0	0	0	0	3	0	0	0	0	0
Part 70	2,567	12	1,548	0	0	0	32	1	1	0	0	68
Part 71	2,554	2	0	0	0	0	82	0	0	0	0	0
Part 75	74,346	497	6	0	1,376	509	1,131	490	436	11	166	0
Part 77	28,129	116	0	0	6	346	470	97	35	2	51	0
Part 82	29	0	0	0	0	0	0	0	0	0	0	0
Part 90	5	0	0	0	0	0	0	0	0	0	0	0
Sections of the Act	306	0	0	11	1	0	32	0	0	2	36	0
TOTAL	108,070	627	1,554	11	1,383	855	1,750	588	472	15	253	68

TABLE 10.—Letter written for violations of Title I of the Federal Coal Mine Health and Safety Act of 1969, Part 50, Part 80 and Part 82, by subpart or section of the Act violated, October 1, 1977-March 8, 1978

Part 50; 80; 82 and Title 1, Subpart or Section Violated	Total
Part 50	41
Part 80 - Subpart A	0
Part 80 - Subpart B	21
Part 80 - Subpart C	12
Part 80 - Subpart D	1,656
Part 82 - Subpart B	12
Part 82 - Subpart C	0
103(b)(1)	2
107(a)	4
Total	1,748

FIGURE 7.—Coal mining fatalities and incidence rates,* CY 1972-1977 and FY 1978†



* Number of fatalities per 200,000 employee-hours worked. Prior to fiscal 1978, fatality rates had been based on 1,000,000 employee-hours of exposure. For fiscal 1978, a base of 200,000 employee-hours was adopted. For purposes of direct comparison, rates for all years before 1978 have been adjusted to the 200,000-hour basis. For a more detailed discussion of these changes, see the box on page 3.

† Data are preliminary for Fiscal Year 1978.

TABLE 11.—Coal mining fatalities by experience of victims, FY 1978*

Part 1: By total mining experience

Years	Number	Years	Number
0-1	20	20-21	-
1-2	13	21-22	-
2-3	9	22-23	-
3-4	10	23-24	1
4-5	6	24-25	2
5-6	3	25-26	-
6-7	2	26-27	2
7-8	2	27-28	3
8-9	2	28-29	-
9-10	5	29-30	3
10-11	-	30-31	5
11-12	3	31-32	1
12-13	-	32-33	1
13-14	2	33-34	1
14-15	5	34-35	2
15-16	-	36-37	1
16-17	-	40	1
17-18	-	41	1
18-19	-	46	1
19-20	1	Unknown	6

Part 2: By experience on regular job

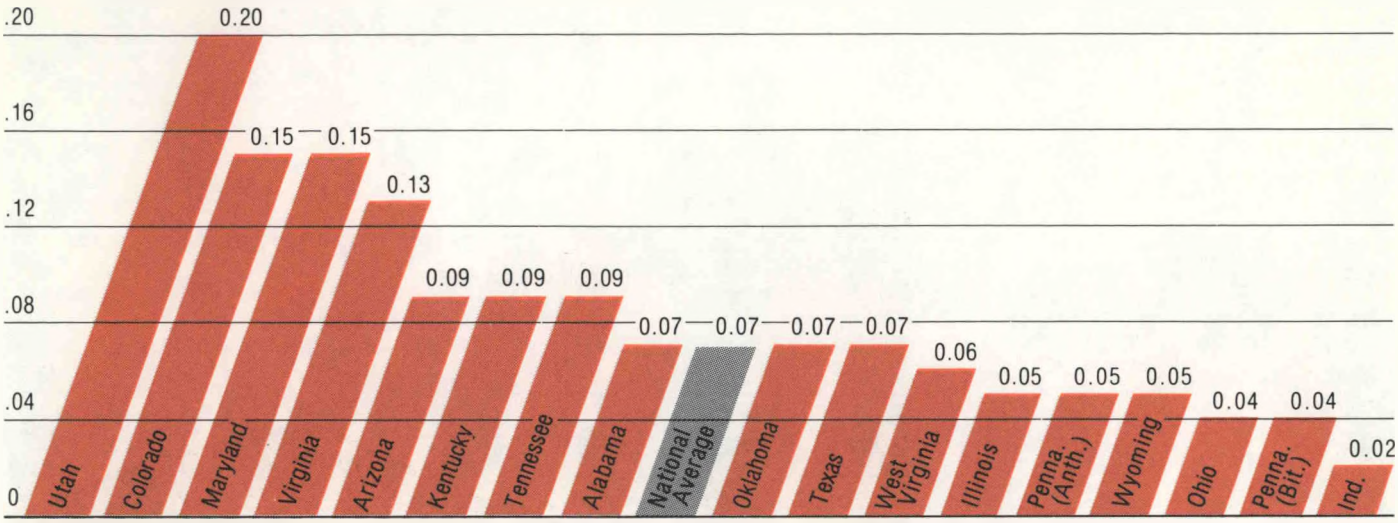
Years	Number	Years	Number
0-1	51	17-18	1
1-2	10	18-19	-
2-3	12	19-20	2
3-4	4	20-21	-
4-5	-	21-22	-
5-6	2	22-23	-
6-7	1	23-24	1
7-8	-	24-25	2
8-9	2	25-26	-
9-10	3	26-27	-
10-11	2	27-28	-
11-12	2	28-29	-
12-13	3	29-30	1
13-14	-	30-31	-
14-15	1	-	-
15-16	-	-	-
16-17	1	Unknown	13

Part 3: By total experience in this mine

Years	Number	Years	Number
0-1	47	20-21	1
1-2	10	21-22	-
2-3	10	22-23	1
3-4	6	23-24	-
4-5	4	24-25	1
5-6	3	25-26	-
6-7	1	26-27	-
7-8	2	27-28	2
8-9	2	28-29	-
9-10	2	29-30	1
10-11	3	30-31	-
11-12	1	31-32	-
12-13	3	32-33	-
13-14	2	33-34	1
14-15	-	34-35	1
15-16	-	35-36	-
16-17	-	36-37	-
17-18	1	37-38	-
18-19	-	38-39	-
19-20	-	Unknown	9

* Data are preliminary

FIGURE 8.—Fatal injury incidence rate* at coal mines by State, FY 1978†



* Fatalities per 200,000 employee-hours.
† Data are preliminary.

TABLE 12.—Coal mining fatalities by victim's occupation, FY 1978 (excluding officeworkers)*

	Number
Roof Bolter/Rock Bolter (underground)	7
Section Foreman/Shiftboss (underground)	7
Continuous Miner Operator/Mole (underground)	6
Roof Bolter Helper/Rock Helper (underground)	6
Scoop Car Operator/Unitrac Operator (underground)	6
Bulldozer Operator/Tractor/Heavy Equipment (surface)	6
Mine Foreman/Manager/Owner	6
Unknown	6
Continuous Miner Helper (underground)	4
Oiler/Greaser (surface)	4
Shotfirer/Shooter/Blaster (underground)	3
Shuttle Car Operator/Ram Car (underground)	3
Laborer/Mucking Machine Operator/Pipe Gin (underground)	3
Mechanic/Repairman (surface)	3
Laborer/Pumpman (surface)	3
Welder (surface)	3
Truck Driver (surface)	3
Mechanic/Repairman (underground)	2
Utility Man (underground)	2
Mechanic/Repairman (underground)	2
Highwall Drill Operator (surface)	2
Master Electrician	2
Superintendent	2
Other	23
Total	114

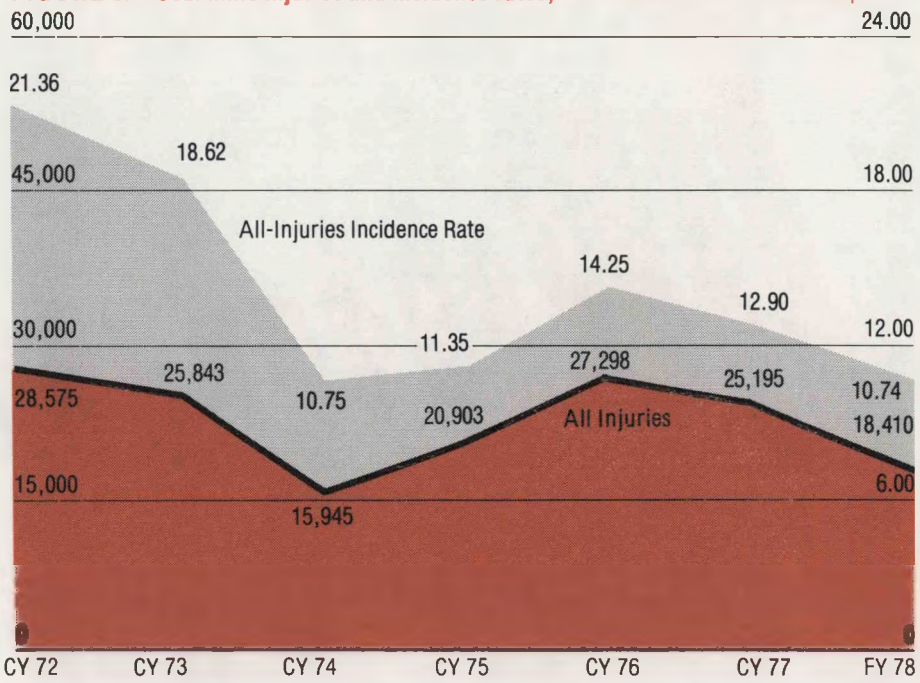
* Data are preliminary

TABLE 13.—Coal mining fatalities by work location and accident classification, FY 1978 (excluding officeworkers)*

Accident Classification	Underground	Surface	Preparation Plants	Total
Electrical	7	3	3	13
Entrapment	-	-	-	-
Exploding vessels under pressure	-	-	-	-
Explosives and breaking agents	3	-	-	3
Falling, rolling, or sliding material	-	1	-	1
Fall of face, rib, side or highwall	10	3	-	13
Fall of roof (underground mines only)	32	-	-	32
Fire	1	-	-	1
Handling material	1	-	-	1
Hand tools	-	-	-	-
Nonpowered haulage	-	-	-	-
Powered haulage:				
Haulage trucks	-	1	2	3
Front-end loaders	2	6	-	8
All other powered haulage	20	-	1	21
Hoisting	1	-	-	1
Ignition or explosion of gas or dust	-	-	-	-
Impoundment	-	-	-	-
Inundation	4	-	-	4
Machinery:				
Dozer	-	3	-	3
Drill	-	-	-	-
All other machinery	1	-	2	3
Slips or falls of person	1	4	2	7
Stepping or kneeling on object	-	-	-	-
Striking or bumping	-	-	-	-
Other	-	-	-	-
Total	83	21	10	114

* Data are preliminary

FIGURE 9.—Coal mine injuries and incidence rates,* CY 1972-1977 and FY 1978†



* Number of injuries per 200,000 employee-hours worked. Prior to fiscal 1978, the all-injury frequency rates for calendar years 1972-1977 had been based on 1,000,000 employee-hours of exposure. For fiscal 1978, a base of 200,000 employee-hours was adopted. The 1972-1977 rates shown above have been adjusted to the 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of these changes, see the box on injury reporting changes on page 3.

† Data are preliminary for Fiscal Year 1978.

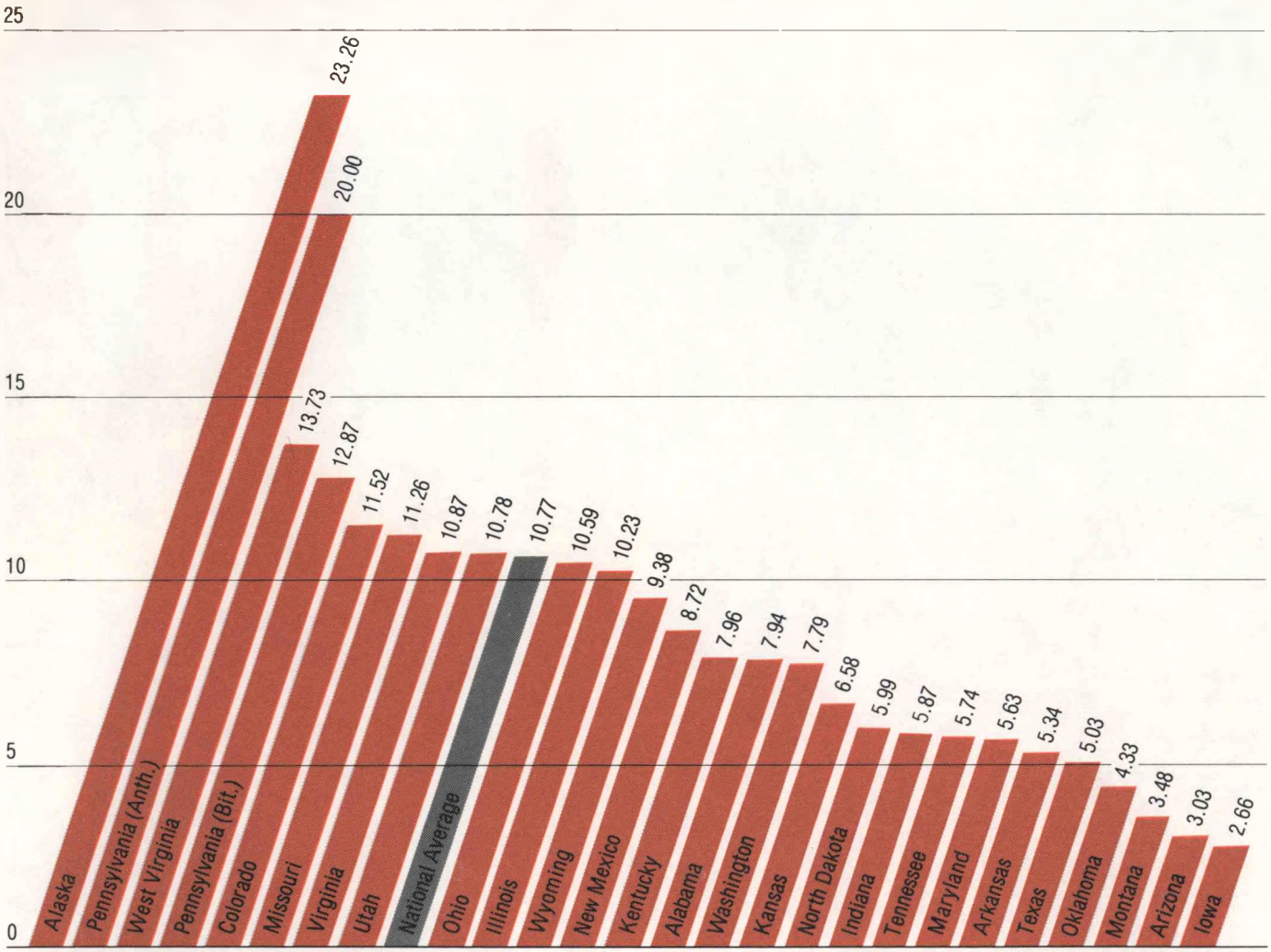
TABLE 14.—All-injury incidence rates* for coal mining for calendar years 1972-1977 and Fiscal Year 1978† (excludes office workers)

Type of mines	1972	1973	1974	1975	1976	1977	FY 1978
Underground	25.14	21.96	12.94	13.98	17.57	16.56	14.23
Surface area of underground mine	19.00	13.31	9.11	10.72	12.74	11.29	9.20
Strip	13.69	11.51	6.68	6.83	8.76	8.02	6.19
Auger	9.25	9.12	6.16	7.98	9.76	7.30	6.80
Culm bank	17.44	13.53	11.25	10.83	7.47	9.68	12.36
Dredge	8.74	10.56	—	4.36	—	—	—
Independent shops and yards	11.87	16.60	7.35	6.58	10.14	8.02	7.83
Mechanical cleaning plants	14.76	16.69	9.67	9.19	11.39	10.03	9.25
Total	21.36	18.62	10.75	11.35	14.25	12.90	10.74

* Number of injuries per 200,000 employee-hours worked. Prior to fiscal 1978, the all-injury frequency rates for calendar years 1972-1977 had been based on 1,000,000 employee-hours of exposure. For fiscal 1978, a base of 200,000 employee-hours was adopted. The 1972-1977 rates shown above have been adjusted to the 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of these changes, see the box on injury reporting changes on page 3.

† Data are preliminary for Fiscal Year 1978.

FIGURE 10.—Coal mine all-injury incidence rate* by State, Fiscal Year 1978.



* Rate per 200,000 employee-hours.

TABLE 15.—Number of underground coal mine ignitions and explosions, by State, FY 1978

State	Number of Ignitions and explosions
Alabama	12
Kentucky	1
Ohio	1
Pennsylvania (Bit.)	11
Utah	1
Virginia	5
West Virginia	22
Total	53

TABLE 16.—Results of MSHA respirable dust samples on high risk occupations (milligrams of respirable coal mine dust per cubic meter of air)

Occupation	1968-69*	1973†	1977†	1978‡
Longwall (Jacksetter, Tailgate, Shearer operator, Stall driver)		2.6	2.2	1.8
Jacksetter, Auger continuous miner		4.2	1.9	2.2
Continuous miner operator	6.5	2.1	1.3	1.3
Cutting machine operator	5.9	1.8	1.1	1.1

* 29-mine survey.

† Averages of all full shift samples taken by MSHA inspectors on each occupation each calendar year.

‡ Fiscal year.

TABLE 17.—Percentage of active underground sections always meeting the 2.0 milligrams per cubic meter respirable dust standard throughout the year*

Year	1975	1976	1977	1978†
Percent	68.9	63.5	74.3	79.0

* Based on all MSHA and mine operator sampling during the year.

† Fiscal year.

section 2

Metal and Nonmetal Mine Safety and Health

Legislative History

1977 **Public Law 95-164.** Put metal and nonmetal mines and coal mines under one law. Four annual inspections required at underground mines, two at surface mines. Mandatory penalties established for violations of regulations. Increased health activity mandated. Discrimination protection included. Advisory standards, State Plans eliminated. Training required for all miners. Enforcement activity moved to Department of Labor.

1966 **Public Law 89-577.** Set procedure for developing and promulgating mandatory safety and health standards. One annual inspection of underground mines required. Federal inspectors given authority to issue notices of violation and orders of withdrawal. Mandatory reporting of injuries established. Education and training program expanded. State Plans for enforcement allowed.

1961 **Public Law 87-300.** Authorized study of causes and prevention of injuries and health hazards in metal and nonmetal mines. Right of entry given to collect information.

1910 **Public Law 61-179.** Bureau of Mines created in Department of Interior. Federal role limited primarily to research. Inspection and investigative role advisory only.

On March 9, 1978, enforcement of safety and health regulations in metal and nonmetal mines came under the Federal Mine Safety and Health Act of 1977. The new law repealed the Federal Metal and Nonmetallic Mine Safety Act of 1966 and brought the enforcement of safety and health regulations in both coal and noncoal mines under a single law.

The 1977 Act for the first time imposed mandatory civil penalties for violations of safety and health regulations in the metal and nonmetal mining industry. It also requires at least four safety and health inspections yearly of each underground mine "in its entirety" and at least two yearly of each surface mine. The old Metal Act required one yearly inspection at underground mines only. Primary enforcement responsibility can no longer be delegated to a State under a State Plan agreement, as the earlier law permitted.

Training on provisions of the 1977 Act was provided to all inspection personnel. In addition to general orientation briefings, all metal and nometal mine inspectors attended a special one-week training program. A new inspection manual was issued in the summer of 1978. Sessions on new operating procedures established as a result of the 1977 Act were also held for clerical and administrative personnel.

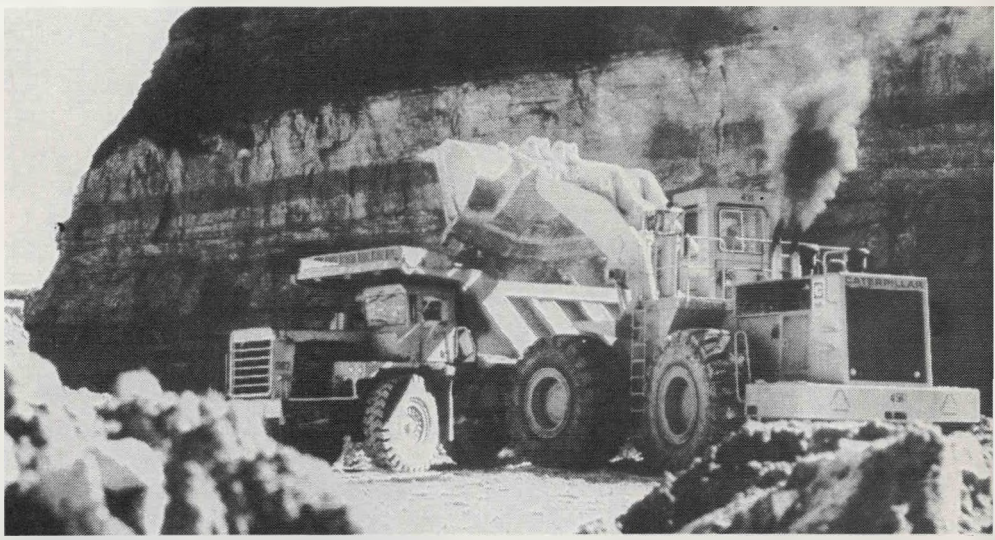
At the same time, nearly 40 recruitment meetings were held near mining centers in all parts of the country to recruit additional metal and nonmetal mine inspectors in order to meet increased inspection requirements under the new Act.

Over 1,200 job applications were received, and the recruitment goal was met by the end of Fiscal Year 1978, with over 320 new inspectors hired. These inspectors were given 12 weeks of intensive training at the National Mine Health and Safety Academy in Beckley, W.Va.

The 1977 Act eliminated the category of advisory safety and health standards that had existed under the Metal Act. During Fiscal Year 1978, Metal and Nonmetal enforcement personnel assisted in the rulemaking process for conversion of advisory standards to mandatory standards. The new mandatory standards were published during FY 1979.

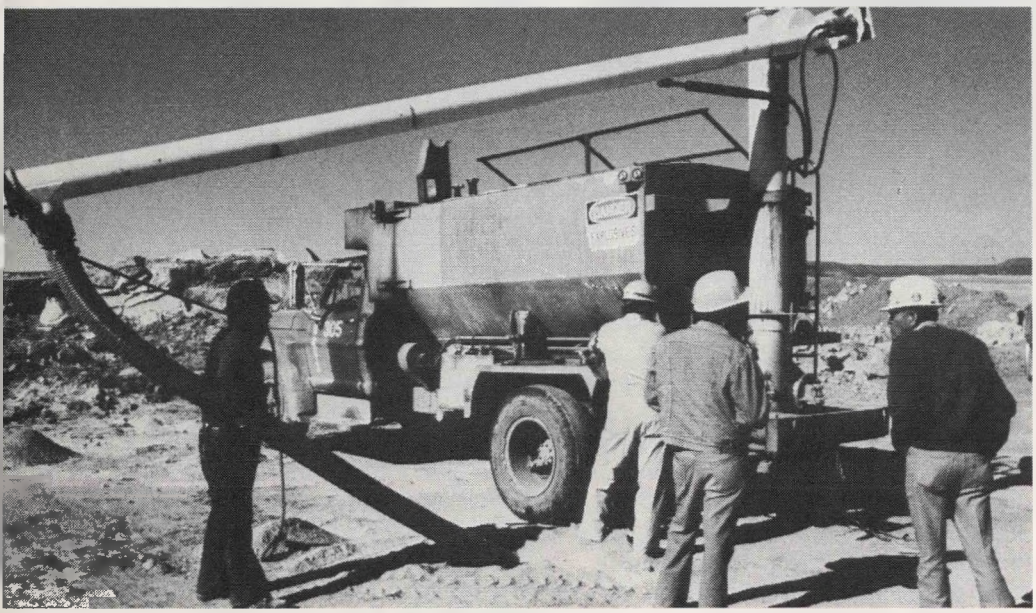
The new Act also stresses protection of miners from toxic substances and harmful physical agents found in mine environments. The core of the metal and nonmetal health enforcement program is the systematic monitoring of miners' exposure to harmful airborne contaminants and physical agents. The emphasis has been on silica dust, mineral fibers, certain metals and their oxides, noise, and radiation. The Act requires development of specific health standards covering sampling procedures, medical surveillance, recordkeeping, and job transfers for miners suffering from occupational illness. In the development of these standards the National Institute for Occupational Safety and Health (NIOSH) is to play a key role.

During the fiscal year, detailed instructions for assessing the "gravity" of health hazards were drafted, and the Metal and Nonmetal enforcement activity cooperated in NIOSH's "Mine



Uranium-bearing material is dumped onto a truck by a front-end loader at a large western open-pit mine.

ANFO, an explosive in common use in mining, is loaded into blastholes at a metal mining surface operation.



Surveillance" activity, the purpose of which is to produce an inventory of all toxic substances and harmful physical agents in mine environments. The "Industrial Hygiene and Health Standards" section of the formal training course for metal and nonmetal entry-level inspectors was increased from 44 to 60 hours. During the year, MSHA conducted or participated in several health surveys in connection with its metal and nonmetal health enforcement activity.

During fiscal 1978, six health hazards were targeted for standards development under the new Act: radiation in uranium mills, milling reagents (e.g. cyanides), silica dust, mineral fibers (e.g. asbestos), welding fumes, and noise. Early in Fiscal Year 1979, a new asbestos standard was promulgated, and two new and more stringent radiation sampling and recordkeeping standards were promulgated later in the year.

In fiscal 1978 the metal and nonmetal Program in Accident Reduction, aimed at individual operations with particularly high injury rates, was continued. MSHA continued investigating all fatalities and many serious nonfatal accidents, and under the new Act, for the first time began investigating complaints of discrimination against metal and nonmetal miners for exercising their safety- and health-related rights.

Metal and nonmetal mining industry statistics

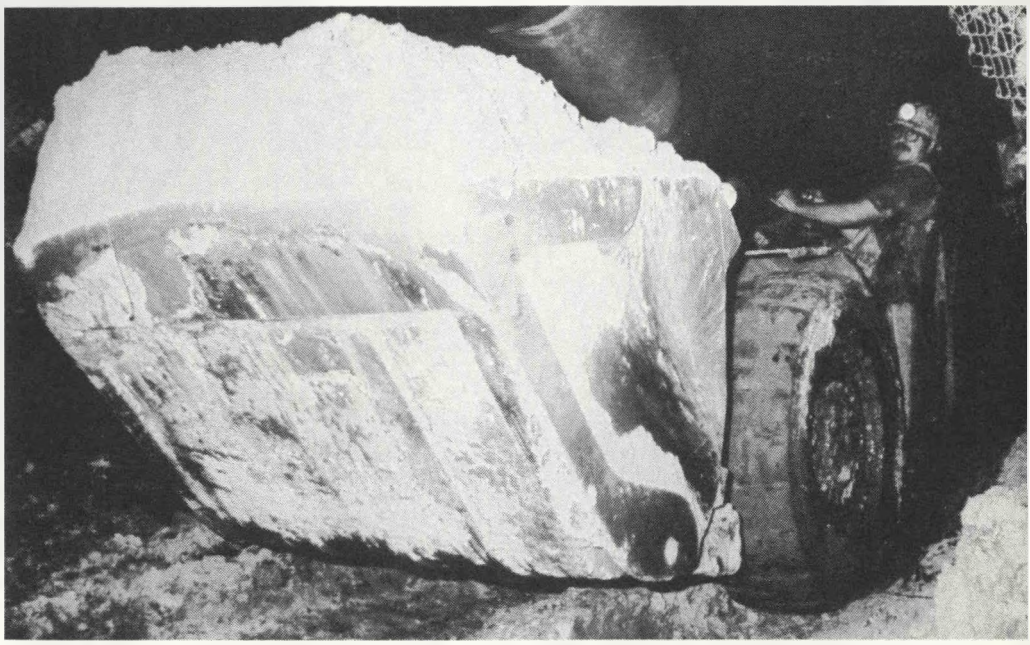
Metal and nonmetal mining in the United States is a complex and diverse industry producing about 55 different mineral commodities. At the end of Fiscal Year 1978 there were more than 11,000 continuously active metal and nonmetal mining operations located in all 50 States (table 18). In addition, some 4,000 other mines worked intermittently, either seasonally or according to demand.

Some metal and nonmetal mines are complex, multilevel underground operations; most, however, are surface mines. These range from some of the world's largest open pit mines to small sand and gravel pits and dredges, and stone quarries. Over 20 different mining methods are used in the metal and nonmetal mining industry.

The average number of people working in these mines in Fiscal Year 1978 was about 268,000 (table 19). Employment in individual mines ranges from fewer than five to as many as 2,600. Reported employee-hours in metal and nonmetal mining totaled 504 million for fiscal 1978, slightly down from the CY 1977 figure of 512 million.

Operation of a jackleg air drill at a molybdenum mine. In recent years, accidents and injuries involving jackleg drills have been significantly reduced through analysis of the hazards in using the equipment, changes in drill designs, and improved operator training.

A diesel-powered front-end loader hauls uranium ore to a dumping point in an underground mine in New Mexico. Health researchers are continuing to study the effects of diesel emissions, among other airborne substances, on underground metal and nonmetal miners.



Inspection Work Force

Metal and nonmetal mine inspection is carried out from 6 district offices, 12 subdistrict offices, and 71 field offices located in nearly every State (figure 11).

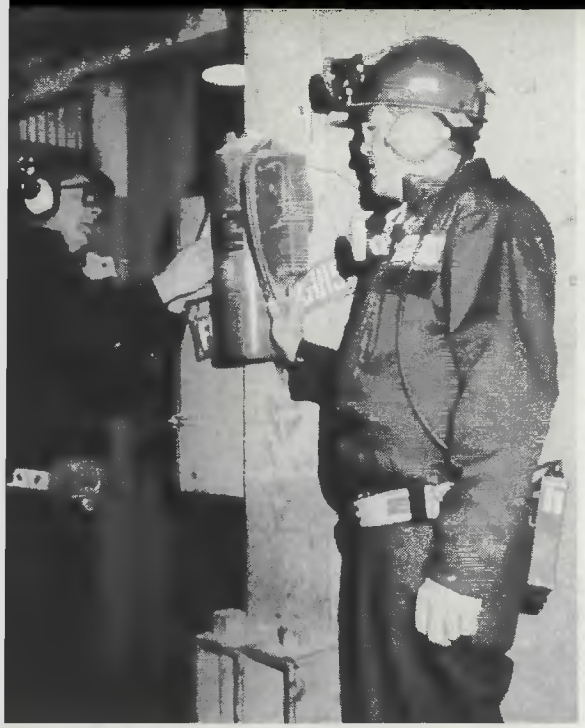
The hiring of more than 320 new metal and nonmetal mine inspectors during Fiscal Year 1978 nearly doubled the number of inspectors and inspector trainees that there were before the new Act. At the end of the fiscal year, most of the new inspectors were still classified as trainees. The metal and nonmetal enforcement program included 317 regular inspectors and 318 inspector trainees, as well as district and subdistrict managers, technical specialists, and administrative and clerical personnel for a total of 891 employees.

Inspection Statistics and Trends

Based on preliminary data, MSHA inspectors conducted 22,737 inspections in metal and nonmetal mines and mills during Fiscal Year 1978. Of these, 12,450 were regular inspections, and 10,287 were spot inspections, largely to check for compliance with notices and citations issued during the regular inspection. The number of inspections in FY 1978 was considerably below the level recorded in previous years (see table 20). Tables 21 and 22 show metal and non-metal mine inspection data for the fiscal year by type of mining operation and by State.

The 1977 Act requires an inspection to cover a mine "in its entirety" and considerably more health work than might be interpreted under the previous law. As a result, average inspection time in 1978 more than doubled that in previous years with a corresponding decrease of recorded inspections. Another more time-consuming factor under the new law is the actual writing of citations, which calls for considerably more detailed information because of the mandated civil penalty and potential for litigation. Thus, the decrease in inspections merely reflected a change of inspection policy as a result of the 1977 Act and was not a reduction of enforcement efforts.

In Fiscal Year 1978, metal and nonmetal mine inspectors also conducted 2,715 inspections of explosives storage facilities under MSHA's Memorandum of Understanding with the Treasury Department's Bureau of Alcohol, Tobacco, and Firearms.



MSHA inspectors check a fire extinguisher in the mill of a large metal mining operation.

Ventilation airflow in an underground mine working area is measured by use of an anemometer.

During Fiscal Year 1978 Federal inspectors issued a total of 57,227 notices and citations to metal and nonmetal mine operators for violations of mandatory safety and health standards—32,637 notices under the Metal Act and 24,590 citations under the 1977 Act. This represents a sharp drop from the number of notices issued in previous years (see table 23). Health-related inspection is time-consuming and results in fewer citations as compared to other inspection activities. Further, the mandatory penalty provision of the 1977 Act encouraged operators to correct violations before they could be cited by inspectors.

Figure 12 shows the groups of metal and nonmetal standards most frequently violated in FY 1978. As in previous years, four groups of standards accounted for the majority of notices and citations: Electricity; Guarding and Use of Equipment; Loading, Hauling and Dumping; and Travelways and Escapeways. These standards accounted for 72 percent of all notices and citations in Fiscal Year 1978.

About 92 percent of the notices and citations issued in Fiscal Year 1978 were for violations of safety standards and about 8 percent for violations of health standards. More than 90 percent of the 4,773 notices and citations for violations of health standards cited excessive exposure to or failure to guard against noise and dust (see table 24). Compared to previous years, there was sharp decrease in citations for overexposure to dust.

In Fiscal Year 1978, mine operators abated 73,851 violations of Federal metal and nonmetal safety and health standards—53,151 notices issued under the Metal Act, some of which had been issued prior to Fiscal Year 1978, and 20,700 citations issued under the 1977 Act.

MSHA metal and nonmetal inspectors issued 2,899 closure orders in Fiscal Year 1978, a 43-percent decrease from the 5,039 orders issued in calendar year 1977. This decrease was related to the drop in number of inspections and similar factors as cited above.

Figure 13 shows the closure orders issued during the fiscal year. About 44 percent of the closure orders were for situations of imminent danger. As in 1976 and 1977, over 29 percent of such closure orders cited unsafe means of loading, hauling, and dumping. Also as in past years, inadequate ground control accounted for approximately 20 percent of imminent danger closure orders.

About 52 percent of the closure orders were issued for noncompliance with notices and citations. The most frequent types involved inadequate guarding of machinery and unsafe means of loading, hauling and dumping.

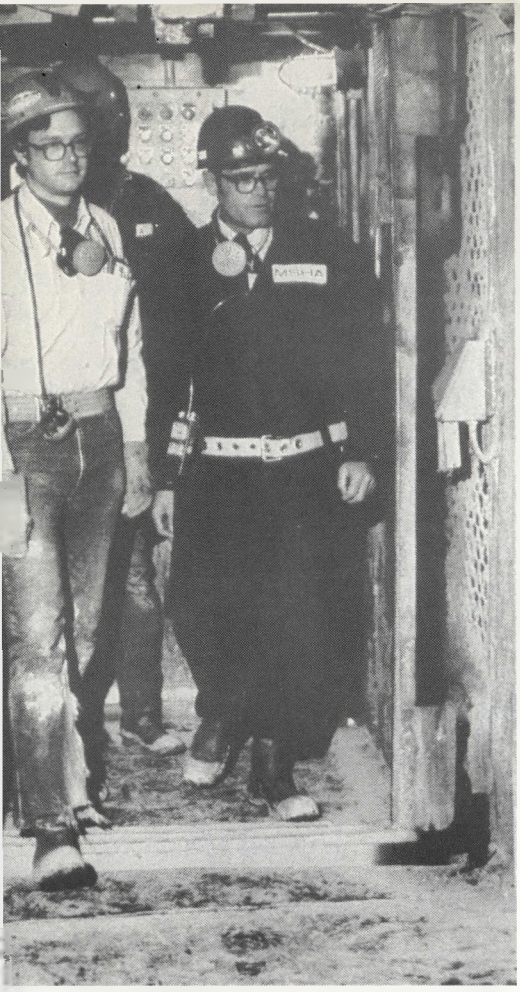
In 105 cases, whether the closure order was issued for imminent danger or for noncompliance was not specified.

About 96 percent of the closure orders issued in fiscal 1978 were for imminent danger to miners' safety or for failure to correct violations of safety regulations. The other four percent (110 orders) were issued for failure to correct violations of health regulations or for imminent danger to miners' health.

Metal and nonmetal mine fatalities

There were 134* fatal work-related accidents at metal and nonmetal mines in the United States in Fiscal Year 1978—the same number as in calendar year 1977. Underground mines experienced a 19-percent decrease in the number of fatalities,

* Preliminary figure. Note that 29 fatalities occurred in the last three months of 1977 and thus were counted in both tabulations.



Company safety officials accompany an MSHA inspector on an inspection tour of an underground metal mine. Under the 1977 Mine Safety and Health Act, the number of complete mandatory annual inspections of metal and nonmetal mining operations was considerably increased.

An important part of the MSHA inspection force's job is its safety education role. Here, an inspector discusses safe haulage practices with a motorman at a western underground metal mine. Haulage accidents usually are among the leading causes of fatalities and injuries in metal and nonmetal mining.

while fatalities at mills remained constant and the number of fatalities at surface mines increased by 14 percent (figure 14). The preliminary fatal injury incidence rate for Fiscal Year 1978 is 0.053 per 200,000 employee hours of exposure, slightly up from the figure of 0.052 for calendar year 1977.

In underground mines there were 34 fatalities, and falls of ground resumed their historical place as the major cause of work-related deaths (figure 15). Haulage accidents ranked first in 1977. For the third consecutive year, these two causes accounted for half the fatal accidents at underground mines; 10 deaths at underground mines resulted from falls of ground and 7 from haulage accidents.

At surface mines and mills, where there were 68 and 32 fatalities, respectively, haulage and machinery accidents continued to be the leading causes of death. Nearly half of all fatalities in pits, quarries and mills resulted from these two causes. See table 25 for further historical data on causes of metal and nonmetal mining fatalities.

Analysis of the fatalities that occurred in Fiscal Year 1978 shows that new employees and workers inexperienced in their jobs continued to suffer the most fatal accidents (see table 26). About 30 percent of victims of fatal accidents had one year or less experience in the job they were doing when they were killed, and about 60 percent had less than five years experience. This shows the need not only for early training in safe working procedures, but also for continued training, retraining and close supervision. Table 27 shows FY 1978 metal and nonmetal mining fatalities by State, table 28 by the victims' occupations.

Metal and nonmetal mine injuries

The preliminary total injury incidence rate for the metal and nonmetal mining industry in Fiscal Year 1978 is 7.15 per 200,000 employee-hours of exposure. The total number of reported injuries was 18,002 in 504 million reported employee-hours.

The incidence rate of 7.15 for FY 1978 represents a 25 percent increase from the calendar year 1977 incidence rate of 5.81 per 200,000 employee-hours (see table 29). The increase may be due to improved reporting of injuries by mine operators as a result of the new reporting system which became effective January 1, 1978, and which contained clearer definitions of reportable injuries. Table 30 shows the number of injuries and injury-incidence rates for FY 1978 by type of mining operation and by State.

Special Enforcement Activities

Program in Accident Reduction

For mines with potentially serious safety problems, it requires more than the usual general inspections to check compliance with standards to significantly reduce accidents and injuries. It requires special promotion of good safety programs with job safety analysis, accident prevention training, and

safety awareness by both management and labor. This is the basis of the Program in Accident Reduction (PAR) implemented in FY 1976 and directed to about 40 to 60 operations each year which account for perhaps 20 percent of more of the disabling or lost-time injuries occurring in the industry.

At the beginning of each year, the operations and safety policy, procedures, and practices of a program mine are evaluated and appropriate recommendations to eliminate accidents and injuries are made to mine management and labor. During the year, assistance in the implementation of the recommendations is provided if required and progress is monitored and evaluated on a monthly basis. Experience in the past few years has shown that significant reductions of accidents and injuries have been achieved in the program mines.

The Program in Accident Reduction was expanded to 55 operations in 1978. Mines in the program achieved overall a 17-percent reduction in disabling injuries during calendar year 1978 as compared to calendar year 1977—the equivalent of a reduction of 350 disabling injuries.

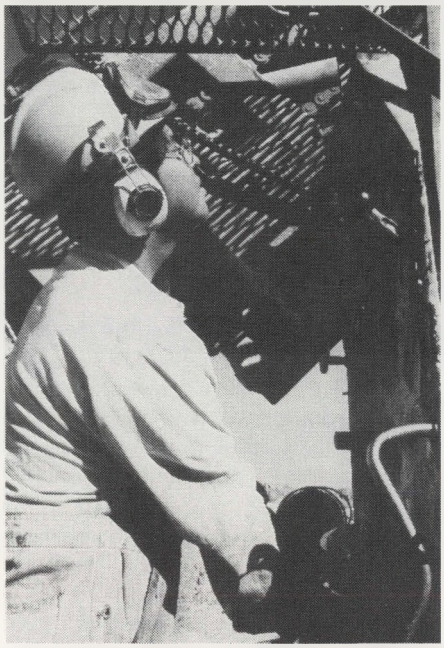
Special Investigations

In fiscal 1978, MSHA metal and nonmetal mine inspectors continued investigating all fatal accidents and many serious nonfatal accidents to determine their causes and circumstances as a basis for preventing future accidents of a similar nature. As in the past, information and reports of these investigations were made available to industry, labor organizations, state agencies, and others as a tool for education in accident prevention. Information about fatalities in metal and nonmetal mining was also disseminated by means of one-page "Fatalgrams."

Metal and nonmetal mine inspectors began making investigations of complaints of discrimination against metal and nonmetal miners, their representatives, or applicants for employment for exercising their safety and health-related rights. Metal and nonmetal miners received protection from such discrimination for the first time under the 1977 Act.

Silica

Miners' overexposure to silica dust is determined by a formula relating dust exposure and the percent of free quartz in that dust. The higher the percentage of free quartz, the lower the permissible dust concentration.

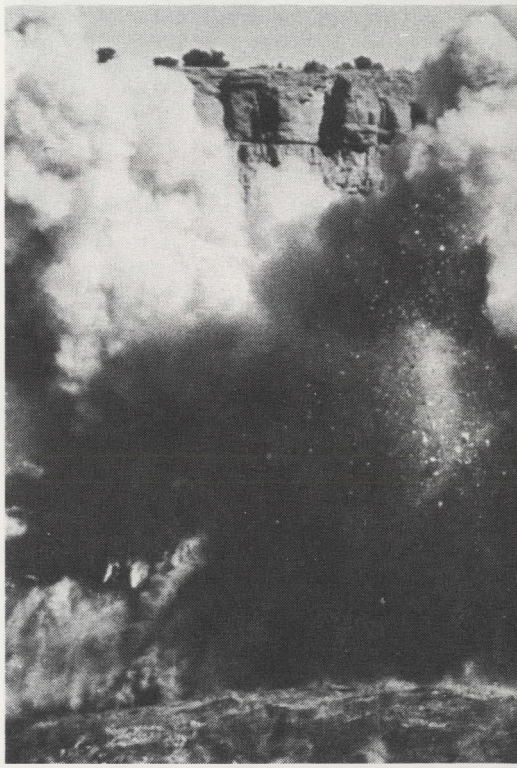


Hearing protection equipment, worn here by a drill operator at a New Mexico surface mine, has prevented hearing losses by many miners over the years.

Of all respirable dust samples taken in FY 1978, 21 percent contained more than 10 percent of free quartz and 8 percent contained more than 20 percent. Of all total dust samples, only about 8 percent contained more than 10 percent of free quartz and only about 3 percent contained more than 20 percent. About 16 percent of all respirable dust samples and 28 percent of all total dust samples indicated overexposure.*

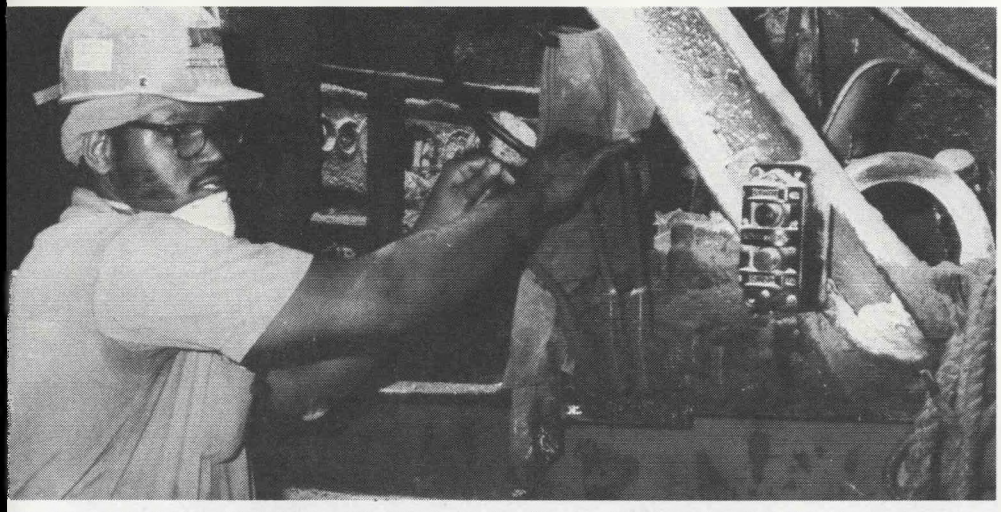
* Not all samples indicating overexposure to dust or noise resulted in notices or citations; in some cases, notices and citations already in force were continued or modified.

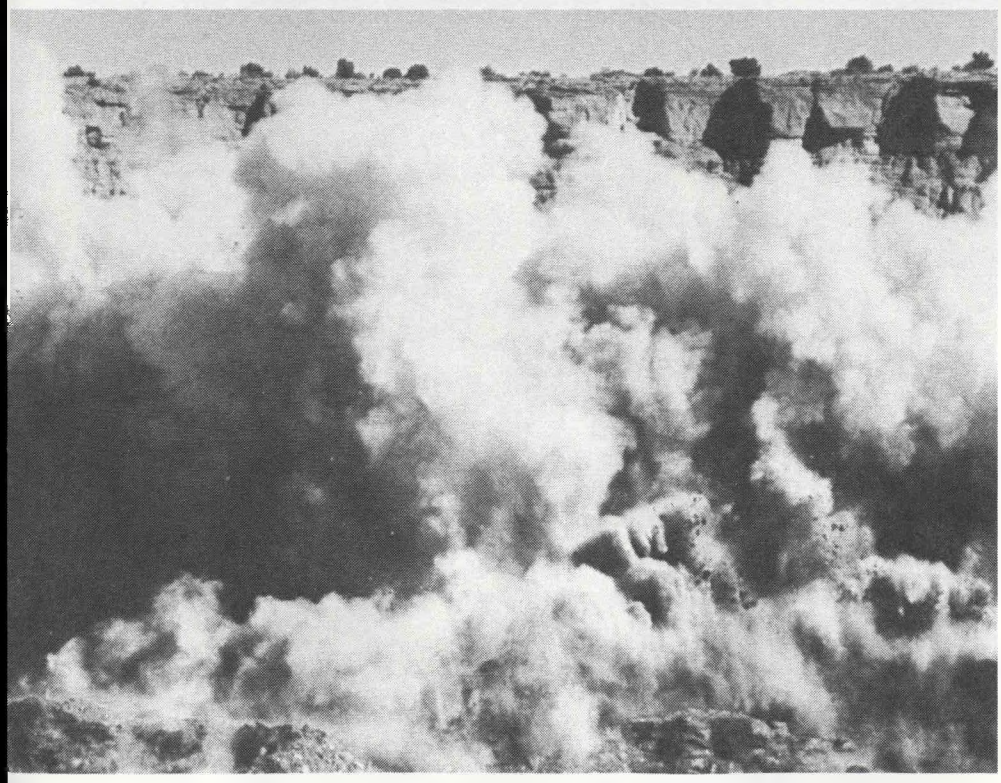
Noise level readings taken with a dosimeter over an eight-hour period at an underground metal mine are averaged on a readout machine by MSHA inspectors.



More than 60 percent of employees in areas where dust sampling indicated overexposure were using respirators. However, even where employees were using personal protective equipment, operators were still cited for inadequate engineering controls. Table 31 shows Metal/Nonmetal's sampling during FY 1978 for silica and other substances and agents.

A miner at a Louisiana salt mine adjusts the leg support system of a large, diesel-powered jumbo drill.





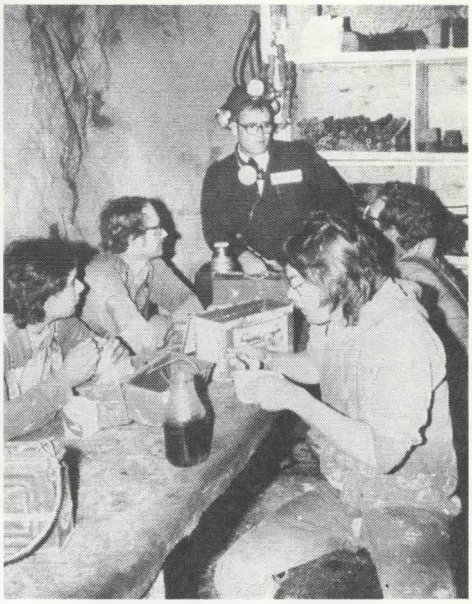
The detonation of explosives at a surface mine sends rock fragments flying. Because "flyrock" has caused deaths and injuries and has destroyed property, careful attention must be paid to clearing people from areas some distance from the blasting site and observing good warning procedures.

Noise

Of all noise dosimeter samples taken, about 38 percent indicated overexposure. Two-thirds of the employees in these areas wore ear protection, but as with dust, employers were still cited for inadequate engineering controls.

Radiation

In fiscal 1978, average radon daughter levels in uranium mines continued to decline, from 0.71 Working



Miners discuss safety and health practices and conditions with an inspector during a lunch break at an underground mine.

Levels in 1975 to 0.58 WL in 1976, 0.51 WL in 1977 and 0.41 WL in fiscal 1978. Average concentrations in nonuranium mines rose slightly to 0.18 WL in Fiscal Year 1978 after having declined the previous two years, from 0.31 WL in 1975, to 0.22 WL in 1976, and 0.12 WL in 1977.

Table 32 shows radon daughter concentrations detected in sampling during the fiscal year.

In past years a table of miners' exposure to radon daughters was included. Since this information is compiled on a calendar year basis, 1978

data were not available for this report. They will appear in the annual report for fiscal 1979.

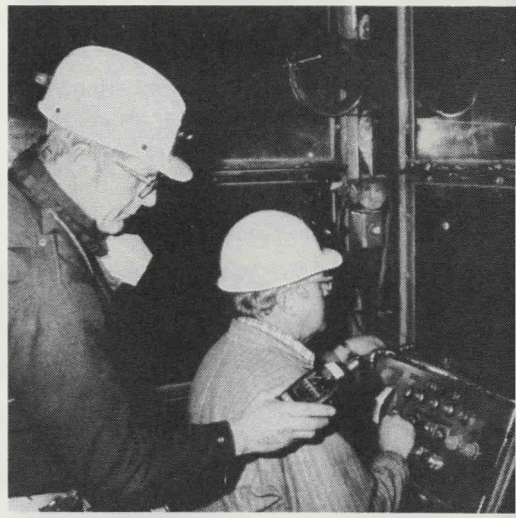
Other Sampling Activities

Table 33 lists the number of samples taken in Fiscal Year 1978 which were found to contain less frequently encountered, but extremely hazardous, mine air contaminants. This includes the number of times individual metals and metallic oxides were detected in a total of 503 welding fume samples and 179 dust samples.

Diesel-silica Study

In an attempt to determine health hazards to underground miners from exposure to silica dust and diesel exhaust products, environmental and medical data collected on 21 mines and 4,930 miners during a two-year joint study with the National Institute for Occupational Safety and Health (NIOSH) were analyzed during Fiscal Year 1978. The environmental survey conducted by MSHA found generally lower levels of silica than were found in the 1958-60 silicosis study conducted by the U.S. Public Health Service and the Bureau of Mines. No significant difference in nitrogen dioxide levels was found between mines with heavy and light diesel use, and whether the chief source of detectable nitrogen dioxide was diesel equipment or explosives could not be ascertained. Exposure to other diesel exhaust products could not be evaluated with the instrumentation used.

The medical survey conducted by NIOSH found that although exposure to nitrogen dioxide and aldehydes caused symtomatic responses including cough, phlegm, shortness of breath and decreased lung function, there was no evidence that exposure to diesel exhaust products caused any pulmonary diseases.



Noise level readings are taken inside a crusher control room at a large metal mill. Built with soundproofing materials, this compartment shields the crusher operator from the deafening process just a few feet away.

A company engineer records radiation samples taken at a western underground uranium mine.

Mortality Analysis of Metal Miners

In conjunction with the diesel-silica study, NIOSH conducted a mortality analysis among 12,487 underground metal miners who had been included in the 1958–60 silicosis study. Excessive death rates from pulmonary diseases were found among copper, lead-zinc and silver miners. Miners exposed to mercury and chromium were found to have excess cancer rates as well.

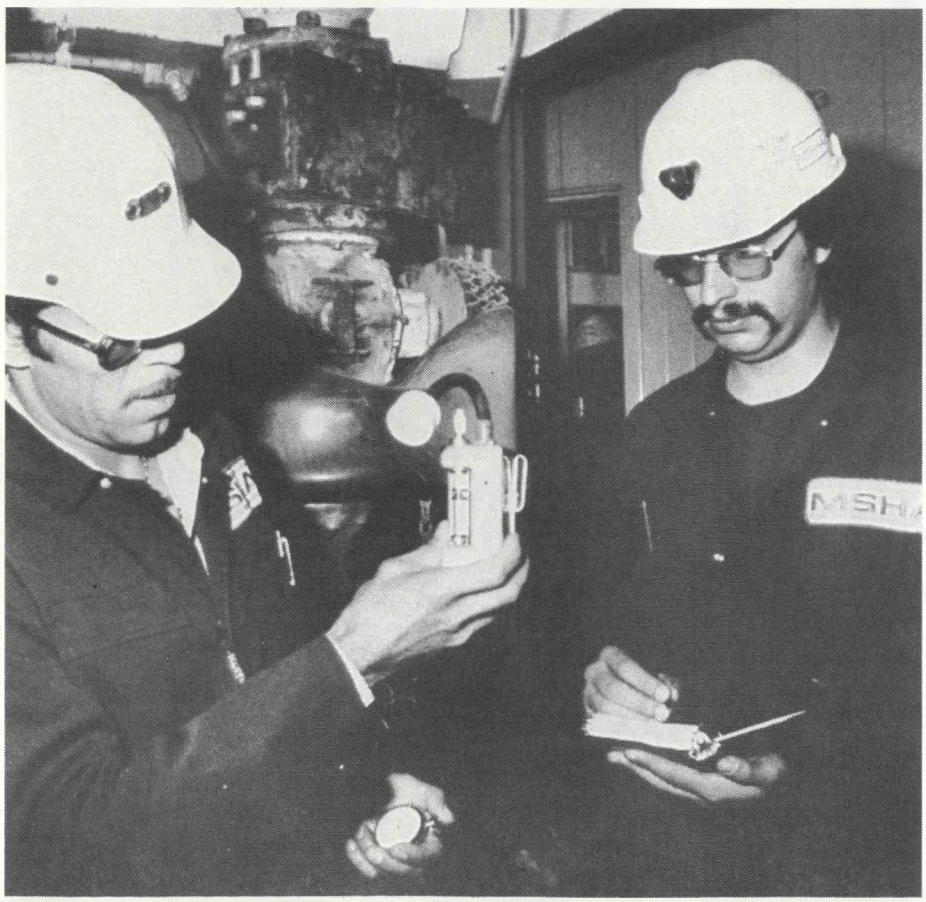
Study of Cement Workers

A morbidity study of cement workers jointly planned by MSHA and NIOSH in 1977 was begun in Fiscal Year 1978. A pilot study was conducted among 120 workers at five plants to determine the statistically appropriate numbers of workers to sample for dust exposure. The full-scale study is to be conducted among approximately 2,500 workers at 20 plants, with NIOSH conducting both the environmental and medical surveys.

Talc Study

The long-range joint MSHA-NIOSH study of the exposure effects of talc and associated mineral deposits continued during Fiscal Year 1978 with the characterization of approximately 100 samples from 24 mines and mills.

Average talc content was 63 percent but ranged from 1 percent to 99 percent. Twenty-three other minerals were also identified. More than two-thirds of the samples contained substantial amounts of tremolite and actinolite. Most of these samples were at least partly fibrous. Only one sample contained chrysotile. Tremolite, actinolite and chrysotile are specifically covered by MSHA's asbestos standards.



Radiation samples are taken at an acid-leach-type uranium mill.

Fiber Screening Program

During Fiscal Year 1978, MSHA metal and nonmetal inspectors and technicians continued the fiber screening program begun in 1976. This program was aimed at more than 6,000 mining and milling operations in geographic regions—especially the West and Northeast—where geologic formations make the presence of asbestos fibers possible.

A proposed reduction in the exposure level for asbestos fibers in metal and nonmetal mines and mills from 5 per milliliter of air to 2 per milliliter was promulgated in late 1978. Of the operations screened during Fiscal Year 1978, 18 percent yielded dust samples containing mineral fiber concentrations greater than 5 fibers per milliliter. These samples are being analyzed for the presence of asbestos. Dust samples from another 22 percent of the screened operations contained concentrations greater than two per milliliter. MSHA policy is that subsequent inspections at operations with asbestos fiber concentrations greater than the exposure limit are to include evaluation of full-shift employee exposure.

Other Health Investigations

Also during Fiscal Year 1978, MSHA health specialists investigated a number of especially troublesome metal and nonmetal enforcement problems. These include dust control and housekeeping practices at silica sand and silica flour mills, noise generated by percussive rock drills, and the burning of polychlorinated biphenyls (PCBs) in cement kilns.

TABLE 18.—Continuously active metal and nonmetal mining operations by district, State and type, FY 1978

State	Under-ground	Open Pit	Crushed Stone	Sand & Gravel	Mills*	Total
SOUTHEASTERN DISTRICT						
Alabama	2	44	54	80	10	190
Florida	0	49	105	52	28	234
Georgia	8	58	102	48	38	254
Kentucky	25	18	81	30	12	166
Mississippi	0	29	10	92	12	143
North Car.	1	80	107	259	41	488
South Car.	0	39	32	58	13	142
Tennessee	22	37	122	54	37	272
Panama Can.	—	—	—	—	—	—
Puerto Rico	0	0	50	42	1	92
Virgin Isl.	0	0	3	0	1	4
Total	58	354	666	715	193	1,986
NORTHEASTERN DISTRICT						
Connecticut	0	4	21	93	6	124
Deleware	0	1	0	9	1	11
Dist. of Col.	—	—	—	—	—	—
Maine	1	7	7	94	5	114
Maryland	2	7	36	48	10	103
Mass.	0	4	37	181	9	231
New Hamp.	0	1	6	41	2	50
New Jersey	2	4	11	13	4	34
New York	14	26	84	245	13	382
Pennsylvania	16	47	216	91	37	407
Rhode Island	0	0	6	26	3	35
Vermont	5	2	27	10	5	49
Virginia	6	25	112	62	4	209
West Virginia	7	3	43	4	2	59
Total	53	131	606	917	101	1,808
SOUTH CENTRAL DISTRICT						
Arkansas	2	25	61	142	21	251
Iowa	13	21	263	217	12	526
Kansas	14	23	154	121	10	322
Louisiana	6	11	13	112	20	162
Missouri	43	70	279	129	51	572
Nebraska	3	5	19	259	4	290
New Mexico	55	54	13	83	27	232
Oklahoma	2	29	76	165	3	275
Texas	6	78	121	246	57	508
Total	144	316	999	1,474	205	3,138
NORTH CENTRAL DISTRICT						
Illinois	13	19	162	177	21	392
Indiana	5	12	101	178	9	305
Michigan	5	21	16	8	11	61
Minnesota	0	29	33	78	12	152
Ohio	6	51	134	238	46	475
Wisconsin	2	3	84	78	5	172
Total	31	135	530	757	104	1,557
ROCKY MOUNTAIN DISTRICT						
Colorado	136	44	27	162	29	398
Montana	10	12	8	17	11	58
North Dakota	0	4	0	26	2	32
South Dakota	1	10	18	35	10	74
Utah	85	37	16	87	28	253
Wyoming	16	42	15	50	17	140
Total	248	149	84	377	97	955
WESTERN DISTRICT						
Alaska	1	13	31	33	2	80
Arizona	15	45	22	119	30	231
California	28	83	97	303	47	558
Hawaii	0	8	17	3	6	34
Idaho	14	13	7	25	5	64
Nevada	12	49	6	41	33	141
Oregon	6	10	161	100	3	280
Washington	3	9	97	163	6	278
Total	79	230	438	787	132	1,666
Grand total	613	1,315	3,323	5,027	832	11,110

*Mills that are inspected as separate entities rather than as part of a mining operation.

TABLE 19.—Average number of workers and employee-hours reported at metal and nonmetal mining operations, by type of operation, Fiscal Year 1978*

Operations	Average number of workers	Employee-hours
Underground	32,870	61,287,825
Open pit	35,708	69,576,297
Crushed stone	33,352	62,874,742
Sand and gravel	35,773	58,344,291
Mills	96,080	187,673,386
Subtotal	233,783	439,756,541
Office	34,427	64,047,342
Grand total	268,210	503,803,883

*Data are preliminary

FIGURE 11.—District, Subdistrict, and Field Offices, metal and nonmetal mine safety and health, FY1978.

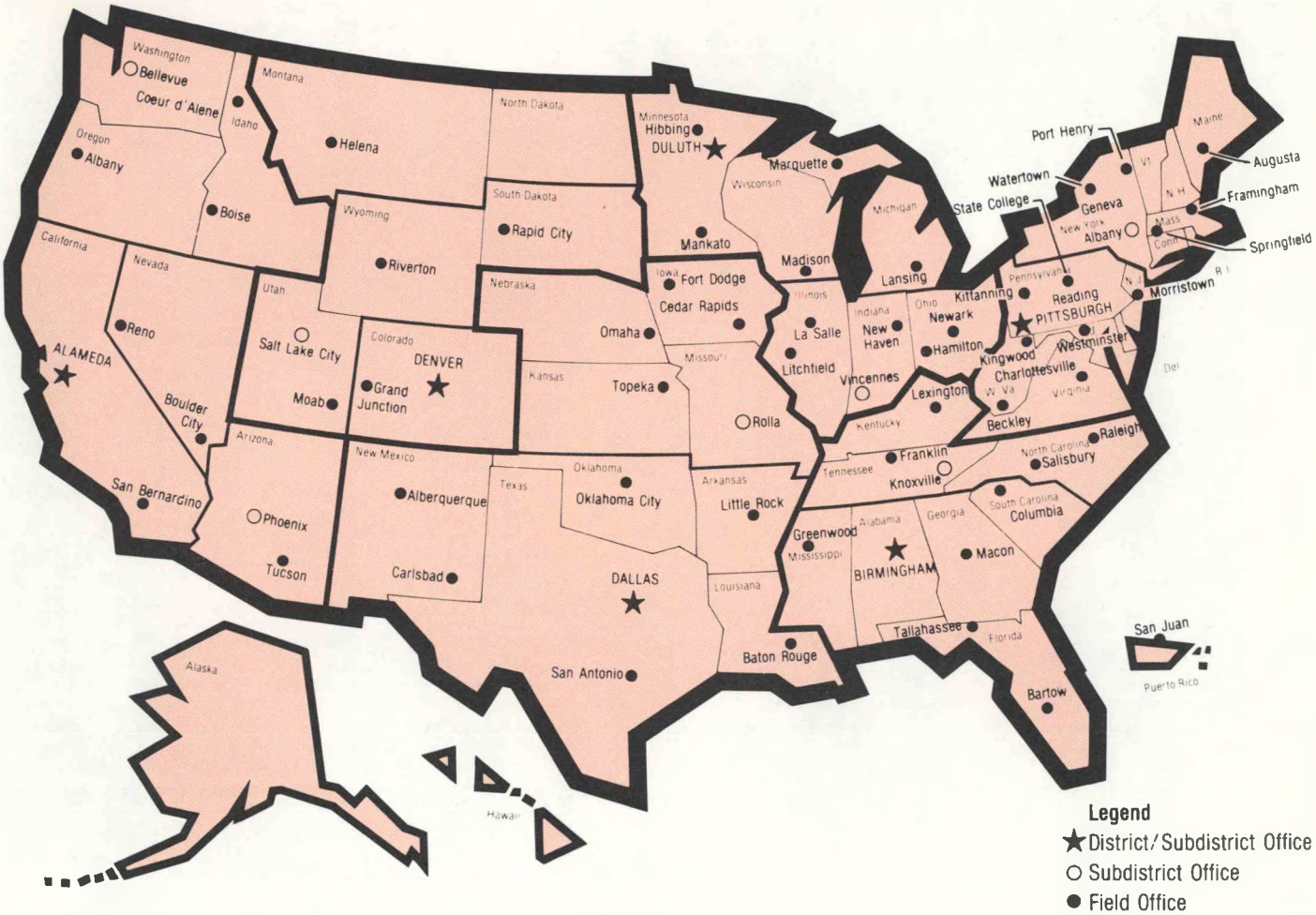


TABLE 20.—Federal inspections of metal and nonmetal mining operations, CY 1973-1977 and FY 1978

Type of operation and inspection	Number of inspections					
	CY 1973	CY 1974	CY 1975	CY 1976	CY 1977	FY 1978
Underground						
Regular	1,570	1,632	2,227	2,208	2,284	1,578
Spot	1,358	1,214	1,456	1,417	1,173	940
Total	2,928	2,846	3,683	3,625	3,457	2,518
Open pit						
Regular	1,165	1,398	1,904	2,245	2,329	1,223
Spot	1,103	1,055	1,535	1,608	1,324	963
Total	2,268	2,453	3,439	3,853	3,653	2,186
Crushed stone						
Regular	2,309	2,967	4,865	5,273	6,428	3,659
Spot	2,593	3,345	4,863	5,343	5,211	3,626
Total	4,902	6,312	9,728	10,616	11,639	7,285
Sand & gravel						
Regular	3,088	4,594	6,390	8,199	9,916	4,949
Spot	2,963	4,164	5,600	5,794	6,225	3,907
Total	6,051	8,758	11,990	13,993	16,141	8,856
Mills						
Regular	413	690	1,114	1,479	1,860	832
Spot	—	782	1,048	1,222	1,093	1,041
Total	413	1,472	2,162	2,701	2,953	1,873
Total						
Regular	8,545	11,281	16,500	19,404	22,817	12,450
Spot	8,017	10,560	14,502	15,384	15,026	10,287
Grand total	16,562	21,841	31,002	34,788	37,843	22,737

TABLE 21.—Notices, citations and orders issued at metal and nonmetal mines, by type of mining operation, Fiscal Year 1978

Type of operation	Notices and citations		Orders	
	Issued	Abated*	Issued	Abated†
Underground	9,174	10,305	533	508
Open pit	4,992	6,661	130	142
Crushed stone	22,359	27,399	997	1,078
Sand and gravel	14,507	21,251	913	784
Mills	6,195	8,235	326	288
Total	57,227	73,851	2,899	2,800

*Includes notices issued prior to Fiscal Year 1978 that were later abated in Fiscal Year 1978.

†Includes orders issued prior to Fiscal Year 1978 that were abated during Fiscal Year 1978.

TABLE 22.—Metal and nonmetal mine inspection activity by State, FY 1978

State	Inspections		Notices*		Orders	
	Regular	Spot	Issued	Abated	Issued	Abated
Alabama	152	246	1,085	1,263	30	30
Alaska	65	7	89	113	3	2
Arizona	339	241	932	771	8	9
Arkansas	363	189	796	1,092	27	30
California	583	430	2,002	2,825	77	63
Colorado	270	125	1,191	993	64	43
Connecticut	263	133	928	1,194	71	70
Delaware	3	11	23	67	5	0
Florida	218	388	1,730	2,261	81	102
Georgia	237	294	2,556	2,802	172	185
Hawaii	49	11	98	130	0	0
Idaho	145	153	822	928	32	27
Illinois	304	560	3,299	4,052	76	69
Indiana	236	290	1,147	1,725	13	13
Iowa	363	85	881	1,184	28	32
Kansas	289	131	803	850	33	39
Kentucky	203	234	1,084	1,740	34	33
Louisiana	297	146	1,492	1,759	138	152
Maine	109	140	533	1,104	93	63
Maryland	75	102	388	461	6	7
Massachusetts	216	236	1,204	1,863	176	120
Michigan	234	280	1,541	2,177	100	84
Minnesota	270	332	1,353	2,408	24	26
Mississippi	163	193	762	841	7	8
Missouri	792	174	1,755	2,308	88	99
Montana	88	144	893	1,461	31	41
Nebraska	256	44	348	565	22	25
Nevada	259	143	556	871	30	32
New Hampshire	51	34	178	301	25	22
New Jersey	93	84	1,368	1,935	104	74
New Mexico	261	54	548	528	9	9
New York	479	412	4,566	5,719	306	276
North Carolina	107	125	627	587	9	7
North Dakota	56	36	84	161	1	2
Ohio	56	36	84	161	1	2
Oklahoma	479	248	1,214	1,436	112	138
Oregon	234	215	739	927	31	28
Pennsylvania	482	630	2,204	3,050	44	49
Rhode Island	29	25	295	272	44	31
South Carolina	158	201	1,039	1,284	36	44
South Dakota	137	126	809	881	23	18
Tennessee	486	595	2,418	2,874	83	77
Texas	791	398	3,149	4,230	140	156
Utah	201	105	317	217	14	14
Vermont	155	109	681	848	39	40
Virgin Islands	4	9	134	120	49	26
Puerto Rico	45	166	859	1,004	200	231
Virginia	120	56	483	410	9	8
Washington	322	268	960	1,289	78	66
West Virginia	84	123	282	325	0	0
Wisconsin	204	273	815	1,193	18	23
Wyoming	185	202	1,172	1,295	23	24
National total	12,450	10,287	57,227	73,851	2,899	2,800

*Consists of notices issued prior to March 9, 1978, and citations issued since that date.

TABLE 23.—Notices of violation/citations issued at metal and nonmetal mining operations, CY 1973-1977 and FY 1978

Type of mine	CY 1973	CY 1974	CY 1975	CY 1976	CY 1977	FY 1978
Underground	10,393	10,589	12,419	15,184	15,102	9,174
Open pit	8,493	6,982	8,513	9,710	11,001	4,992
Crushed stone	23,728	24,367	31,946	41,804	44,025	22,359
Sand and gravel	20,344	23,344	27,262	34,133	39,147	14,507
Mills	—	6,158	7,653	12,583	12,232	6,195
Total	62,749	71,440	87,793	113,414	121,507	57,227

FIGURE 12.—Most frequently cited violations in metal and nonmetal mines, FY 1978.

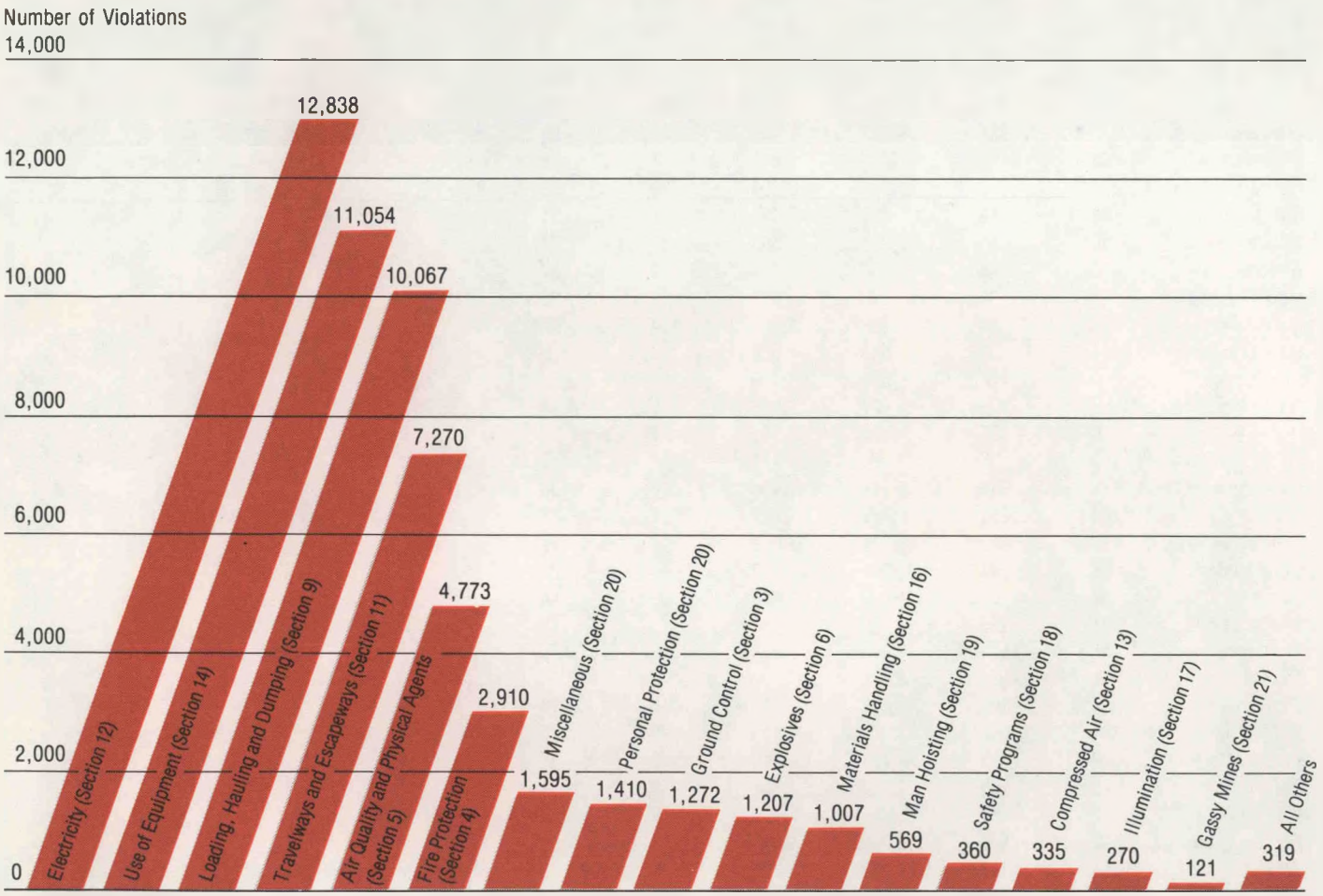
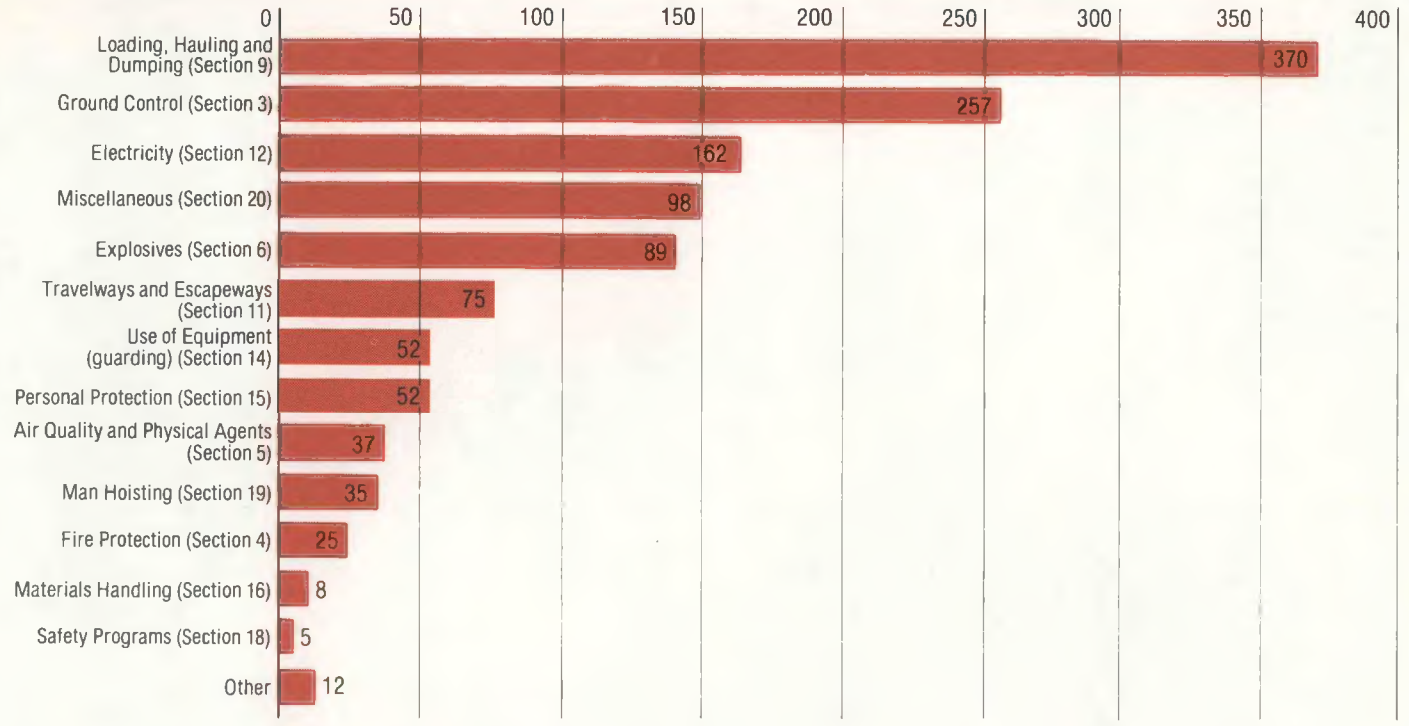
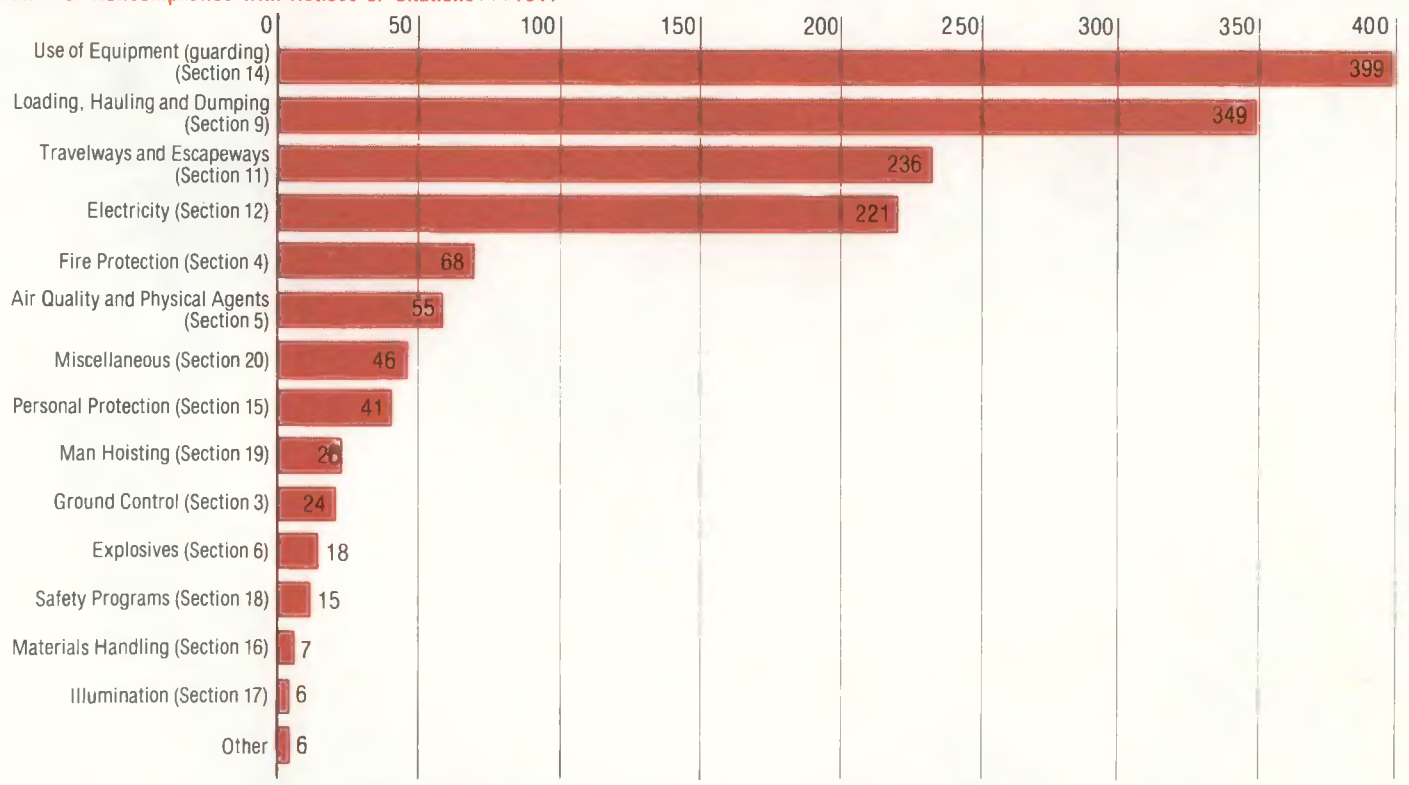


FIGURE 13.—Closure orders issued at metal and nonmetal mines in Fiscal Year 1978.





In 105 cases, whether the closure order was for imminent danger or for noncompliance was not specified.

TABLE 24.—Notices, citations and orders issued for metal and nonmetal mine health violations, Fiscal Year 1978

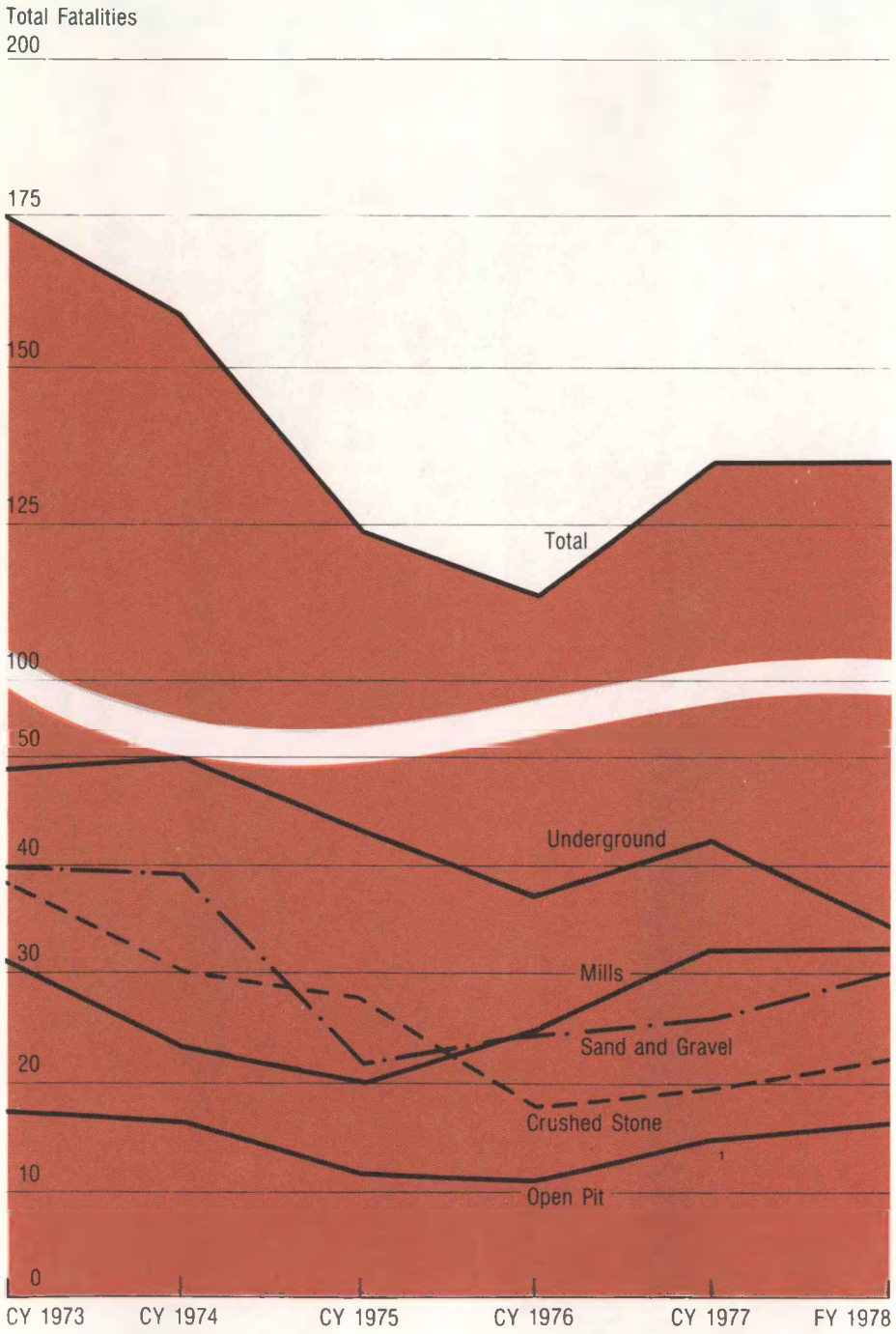
Standard	Notices	Citations	Total	Orders
Noise standards: Exposure limits, abatement measures, and personal protection	974	1,647	2,621	36
Control of harmful airborne contaminants shall be by means of ventilation or protection with respirators*	398	947	1,345	26
Exposure to harmful airborne contaminants shall not exceed Threshold Limit Values*	291	199	490	34
Holes shall be collared and drilled wet, or other efficient dust control measures shall be used	83	52	135	8
Welding operations shall be shielded and well ventilated	56	37	93	2
Radiation standards: Concentration and exposure limits	8	33	41	2
Ventilation standards: Equipment and procedures	11	16	27	1
Dust, gas, mist, and fume surveys shall be conducted by mine operators	14	7	21	1
All health standards	1,835	2,938	4,773	110

* Primarily dust

TABLE 25.—Metal and nonmetal mining fatalities by type of mining operation, cause, CY 1973-1977 and FY 1978

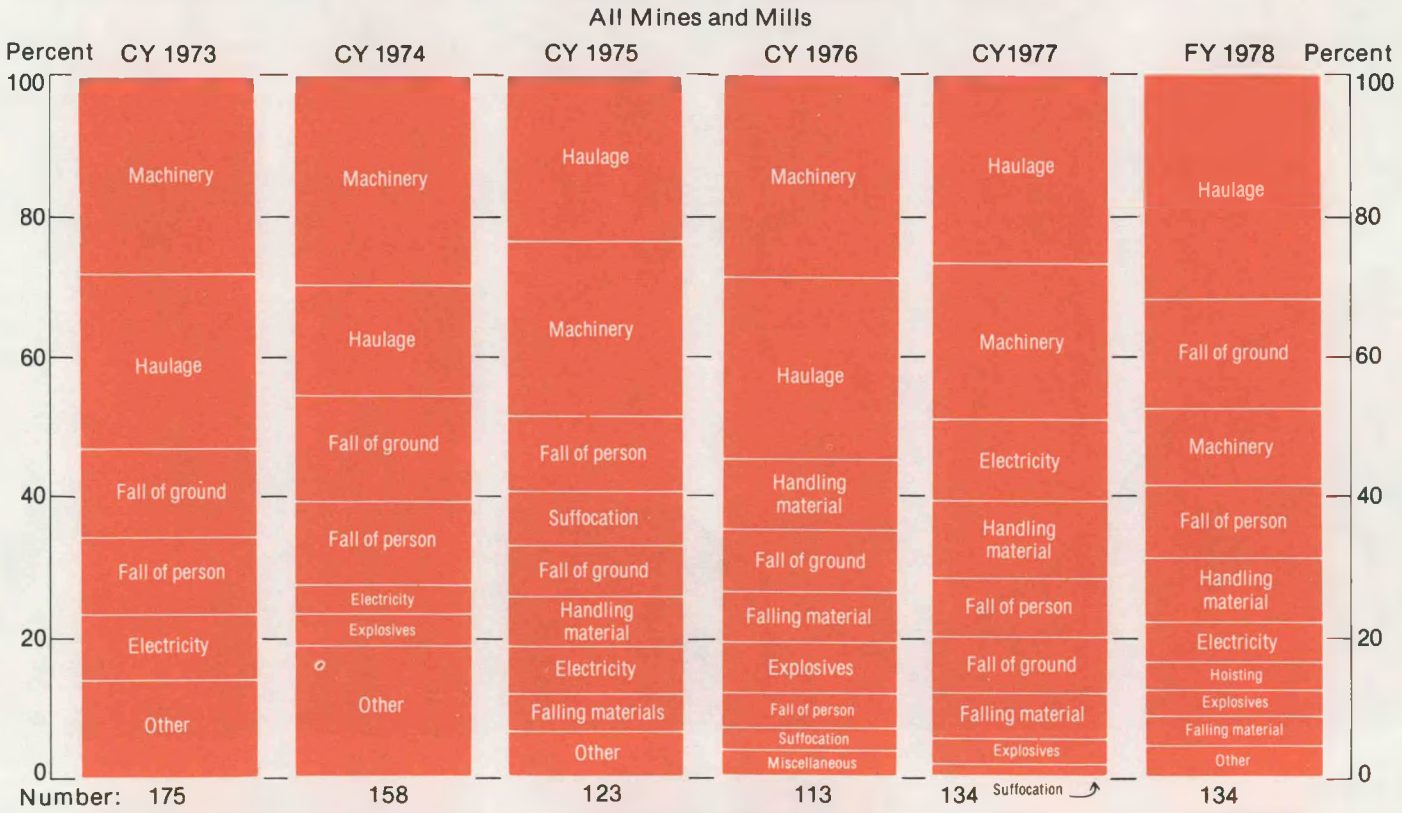
Cause	CY 1973	CY 1974	CY 1975	CY 1976	CY 1977	FY 1978
Underground Mines:						
Fall of roof, face or back	14	16	6	8	9	10
Pressure bump or burst	-	2	1	-	-	-
Slips or falls of persons	5	8	5	3	3	5
Haulage	10	4	8	8	12	7
Sliding or falling materials	-	2	4	5	2	-
Machinery	6	8	6	2	4	2
Explosion of gas	-	-	4	-	-	-
Explosives	3	2	1	7	4	3
Electricity	3	1	1	1	3	1
Handling materials	3	3	1	2	5	3
Suffocation	3	-	5	1	-	-
Mine fires	2	-	-	-	-	-
Inrush of materials or water	-	2	-	-	-	-
Helicopter crash	-	1	1	-	-	-
Hoisting	-	-	-	-	-	2
Miscellaneous	-	1	-	-	-	1
Total	49	50	43	37	42	34
Surface Mines:						
Machinery	35	29	22	22	14	5
Haulage	25	20	20	20	20	29
Slips or falls of persons	8	8	7	2	5	4
Handling materials	6	6	2	3	5	3
Fall of ground	8	7	3	2	2	12
Electricity	8	5	5	-	7	5
Sliding or falling materials	3	5	1	2	5	1
Explosives	1	4	-	1	1	2
Exploding vessels under pressure	-	-	-	-	-	1
Hoisting	-	-	-	-	-	4
Ignition or explosion of gas or dust	-	-	-	-	-	1
Miscellaneous	1	1	-	-	-	-
Total	95	85	60	52	59	67
Mills:						
Machinery	8	10	3	8	11	7
Haulage	8	2	2	3	4	6
Handling materials	2	3	5	6	5	6
Sliding or falling materials	1	2	1	1	2	4
Slips or falls of persons	7	3	1	2	3	4
Electricity	5	1	2	2	6	2
Suffocation	-	-	5	1	1	-
Exploding vessel under pressure	-	-	-	-	-	1
Ignition or explosion of gas or dust	-	-	-	-	-	1
Miscellaneous	-	2	1	1	-	1
Total	31	23	20	24	32	32
Office:						
Machinery	-	-	-	-	1	1
Grand Total:	175	158	123	113	134	134

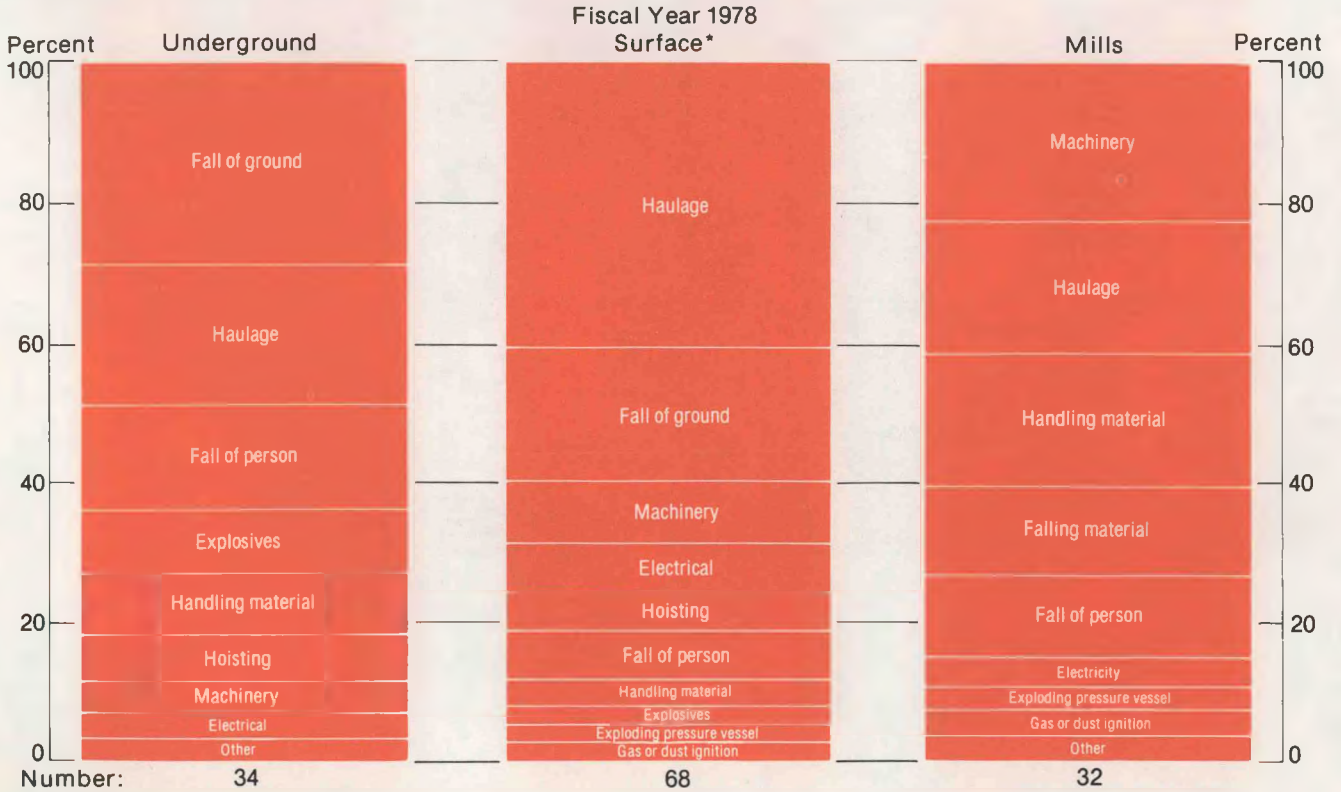
FIGURE 14.—Metal and nonmetal mining fatalities, CY 1973-1977 and FY 1978.



[1]Includes one office worker employed at open pit mine

FIGURE 15.—Metal and nonmetal mining fatalities, percent of total by major causes, CY 1973-1977 and FY 1978.





*Includes 1 officeworker at a surface mine

TABLE 26.—Metal and nonmetal mining fatalities by experience of victims, FY 78*

Part A: By total mining experience

Years	Number	Years	Number
0-1	16	21-22	-
1-2	6	22-23	1
2-3	11	23-24	-
3-4	5	24-25	4
4-5	6	25-26	-
5-6	4	26-27	-
6-7	1	27-28	1
7-8	3	28-29	-
8-9	3	29-30	-
9-10	3	30-31	2
10-11	2	31-32	1
11-12	-	32-33	1
12-13	-	33-34	-
13-14	4	34-35	-
14-15	2	35-36	-
15-16	1	36-37	2
16-17	1	37-38	-
17-18	-	40-45	1
18-19	2	50-55	-
19-20	3	Unknown	46
20-21	2		

Part B: By experience on regular job

Years	Number	Years	Number
0-1	41	17-18	-
1-2	16	18-19	1
2-3	8	19-20	1
3-4	8	20-21	-
4-5	6	21-22	-
5-6	3	22-23	-
6-7	2	23-24	-
7-8	4	24-25	3
8-9	2	25-26	-
9-10	4	26-27	1
10-11	-	27-28	-
11-12	2	28-29	-
12-13	-	29-30	1
13-14	3	30-35	2
14-15	1	35-40	1
15-16	1	40-45	1
16-17	1	Unknown	21

Part C: By total experience in mine where fatality occurred

Years	Number	Years	Number
0-1	42	19-20	3
1-2	13	20-21	1
2-3	7	21-22	-
3-4	6	22-23	1
4-5	4	23-24	-
5-6	4	24-25	-
6-7	1	25-26	-
7-8	3	26-27	-
8-9	4	27-28	-
9-10	3	28-29	-
10-11	1	29-30	-
11-12	-	30-31	2
12-13	-	31-32	1
13-14	4	32-33	-
14-15	1	33-34	-
15-16	2	34-35	-
16-17	3	35-36	-
17-18	-	40-45	-
18-19	2	Unknown	27

* Data are preliminary.

TABLE 27.—Metal and nonmetal mining fatalities by State, CY 1973-1977 and FY 1978*

State	CY 1973	CY 1974	CY 1975	CY 1976	CY 1977	FY 1978
Alabama	4	7	1	4	2	4
Alaska	—	1	1	3	1	—
Arizona	13	14	9	7	6	5
Arkansas	3	3	—	2	—	2
California	9	6	8	2	5	3
Colorado	8	9	6	5	6	9
Connecticut	—	—	1	—	—	—
Delaware	—	—	—	—	—	—
Florida	5	2	3	2	8	1
Georgia	6	3	1	1	1	5
Hawaii	1	—	—	—	—	—
Idaho	—	6	7	3	4	4
Illinois	8	7	5	3	3	4
Indiana	4	2	1	2	1	4
Iowa	1	1	2	1	—	3
Kansas	3	2	—	—	1	—
Kentucky	4	2	5	4	2	2
Louisiana	3	2	3	1	1	3
Maine	2	—	1	—	—	—
Maryland	1	1	1	1	1	1
Massachusetts	3	1	1	—	—	—
Michigan	6	4	1	3	6	4
Minnesota	5	1	2	3	2	1
Mississippi	1	1	—	—	2	—
Missouri	11	9	5	2	4	5
Montana	6	2	5	3	2	4
Nebraska	8	3	—	4	—	—
Nevada	1	1	2	2	8	2
New Hampshire	—	—	—	—	—	—
New Jersey	2	1	—	—	1	1
New Mexico	8	5	2	7	11	8
New York	5	6	6	6	2	3
North Carolina	2	3	2	2	2	3
North Dakota	—	1	2	1	1	—
Ohio	5	2	5	3	3	2
Oklahoma	3	2	—	1	1	1
Oregon	2	3	—	4	6	4
Pennsylvania	3	4	2	3	5	3
Puerto Rico	—	—	—	—	1	2
Rhode Island	—	—	—	—	—	—
South Carolina	3	—	—	1	1	1
South Dakota	2	—	1	4	4	4
Tennessee	1	6	5	3	5	7
Texas	7	9	11	1	7	10
Utah	2	5	6	3	8	3
Vermont	—	3	—	2	—	—
Virgin Islands	—	1	—	—	—	1
Virginia	3	3	1	3	1	3
Washington	2	2	2	—	2	2
West Virginia	1	1	1	—	1	1
Wisconsin	4	5	2	4	—	3
Wyoming	4	6	4	7	6	6
Total	175	158	123	113	134	134

* Data are preliminary.

TABLE 28.—Metal and nonmetal mining fatalities by victim's occupation, Fiscal Year 1978*

Occupation	Number
Laborer/Utility man/Pumper (surface)	16
Truck driver (surface)	14
Miner N.E.C. (underground)	12
Highlift operator/Front-end loader operator (surface)	10
Mechanic repairman (surface)	9
Cleaning/Media/Boney/Crusher plant operator (surface)	7
Mine foreman/Mine manager/Owner	7
Unknown N.E.C.	7
Power shovel operator/Pitman (surface)	6
Maintenance foreman	5
Drill helper (surface)	3
Stope miner (underground)	3
Superintendent	3
Miner N.E.C./Quarry worker	2
Drift miner (underground)	2
Laborer/Advance faceman/Move up man/Pumpman (undergd)	1
Mucking machine operator (underground)	1
Drill operator (underground)	1
Section foreman/Shift boss (underground)	1
Utility man (underground)	1
Raise miner (underground)	1
Electrician (underground)	1
Mechanic repairman (underground)	1
Power shovel operator (underground)	1
Truck driver (underground)	1
Front-end loader operator (underground)	1
Belt/Conveyor man (surface)	1
Mechanic helper (surface)	1
Cleanup man (surface)	1
Oiler/Greaser (surface)	1
Welder (surface)	1
Surface miner	1
Drill operator (surface)	1
Brakeman/Trip rider (surface)	1
Bulldozer/Tractor/Heavy equipment operator (surface)	1
Barge attendant/Boat/Dredge	1
Carpenter (surface)	1
Watchman/Guard	1
Yard engineer operator/Fireman (surface)	1
Electrical, Ventilation, Mining engineers	1
Outside foreman	1
Mill foreman	1
Crane/Dragline/Backhoe operator (surface)	1
Total	134

*Data are preliminary. N.E.C. = Not elsewhere classified.

TABLE 29.—All-injury incidence rates for the metal and nonmetal mining industry per 200,000 employee-hours worked, CY 1973-1977 and FY 1978*,†

Type of mines	1973	1974	1975	1976	1977	Fiscal year 1978
Underground	14.46	13.58	11.67	10.51	14.05	15.84
Open pit	7.06	6.93	6.05	4.57	4.30	6.08
Crushed stone	9.17	8.63	8.30	7.38	7.37	7.54
Sand and gravel	6.16	5.85	4.94	4.29	4.34	5.35
Mills	4.73	7.26	6.77	5.94	6.63	8.15
All operations	7.53	7.26	6.77	5.94	6.63	8.15
Office	0.29	0.20	0.19	0.22	0.23	0.29
Grand total	6.79	6.54	6.01	5.24	5.81	7.15

* Number of injuries per 200,000 employee-hours worked. Prior to fiscal 1978, the all-injury frequency rates for calendar years had been based on 1,000,000 employee-hours of exposure. The 1973-1977 rates shown above have been adjusted to the 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of these changes, see the box on injury reporting changes on page 3.

† Data are preliminary for Fiscal Year 1978.

TABLE 30.—All injuries and injury-incidence rates per 200,000 employee-hours worked* by type of mining operation and State, Fiscal Year 1978† (including fatalities)‡

State	Underground mines	Surface mines	Mills	Total	Office	Grand total	Underground mines	Surface mines	Mills	Total	Office	Grand total
Alabama	1	72 (2)	108 (2)	181 (4)	—	181 (4)	3.78	4.89	4.23	4.46	—.	3.93
Alaska	—	10	—	10	—	10	—.	3.85	—.	3.72	—.	3.95
Arizona	545 (2)	462 (2)	398 (1)	1,405 (5)		1,410 (5)	16.28	7.19	8.83	9.97	0.24	8.73
Arkansas	2	97 (2)	320	419 (2)	—	419 (2)	5.77	6.24	9.98	8.74	—.	8.73
California	72	335 (3)	629	1,036 (3)	8	1,044 (3)	17.39	7.11	11.12	9.61	0.51	8.46
Colorado	949 (6)	192 (1)	236 (2)	1,377 (9)	4	1,381 (9)	23.22	14.54	13.26	19.16	0.31	16.29
Connecticut	—	24	3	27	—	27	—.	2.71	2.37	2.67	—.	2.40
Delaware	—	—	2	2	—	2	—.	—.	8.36	4.35	—.	3.81
Florida	—	241 (1)	142	383 (1)	4	387 (1)	—.	4.87	3.30	4.14	0.25	3.56
Georgia	4	239 (4)	310 (1)	553 (5)	4	557 (5)	5.21	8.68	6.26	7.11	0.31	6.14
Hawaii	—	13	23	36	—	36	—.	6.73	11.31	9.08	—.	7.55
Idaho	396 (2)	52 (1)	30 (1)	478 (4)	2	480 (4)	20.63	5.81	6.49	14.59	0.47	12.96
Illinois	38	163 (2)	235 (2)	436 (4)	1	437 (4)	12.71	7.21	9.57	8.70	0.10	7.29
Indiana	3	147 (2)	55 (2)	205 (4)	2	207 (4)	3.37	8.06	3.52	5.90	0.35	5.12
Iowa	28 (1)	102 (2)	106	236 (3)	—	236 (3)	15.12	5.60	6.67	6.56	—.	5.69
Kansas	14	59	67	140	2	142	7.56	4.75	4.76	4.94	0.33	4.42
Kentucky	65	98	114	277 (2)	—	277 (2)	11.47	7.30	12.75	9.88	—.	8.60
Louisiana	64	43	196 (3)	303 (3)	1	304 (3)	11.02	2.89	6.94	6.19	0.14	5.41
Maine	1	29	3	33	—	33	12.23	5.28	1.93	4.63	—.	4.12
Maryland	—	64	42 (1)	106 (1)	—	106 (1)	—.	5.15	4.95	5.03	—.	4.35
Massachusetts	—	35	23	58	—	58	—.	3.18	5.53	3.82	—.	3.22
Michigan	181 (1)	243 (2)	280 (1)	704 (4)	4	708 (4)	12.72	6.60	6.51	7.48	0.35	6.72
Minnesota	—	441 (1)	454	895 (1)	6	901 (1)	—.	6.47	9.94	7.84	0.35	6.87
Mississippi	—	35	29	64	1	65	—.	3.76	5.73	4.45	0.65	4.08
Missouri	187 (1)	160 (1)	289 (2)	636 (4)	4 (1)	640 (5)	10.01	7.07	7.55	7.99	0.32	6.94
Montana	40 (1)	43 (2)	29 (1)	112 (4)	—	112 (4)	15.60	2.37	4.13	4.04	—.	3.75
Nebraska	—	54	13	67	—	67	—.	6.27	4.01	5.39	—.	4.90
Nevada	57	61	116 (2)	234 (2)	1	235 (2)	18.73	4.54	7.57	7.35	0.18	6.27
New Hampshire	—	16	12	28	—	28	—.	5.04	9.81	6.36	—.	5.48
New Jersey	19	77 (1)	12	108 (1)	—	108 (1)	12.54	6.40	2.79	6.05	—.	5.06
New Mexico	818 (5)	133 (3)	193	1,144 (8)	4	1,148 (8)	14.27	5.95	6.83	10.60	0.32	9.53
New York	105	158 (3)	172	435 (3)	6	441 (3)	12.45	6.52	6.82	7.51	0.66	6.58
North Carolina	5	182 (3)	135	322 (3)	1	323 (3)	27.19	7.00	8.24	7.56	0.19	6.74
North Dakota	—	5	4	9	—	9	—.	2.25	11.31	3.49	—.	3.23
Ohio	62	133 (2)	185	380 (2)	2	382 (2)	12.83	4.28	5.91	5.65	0.18	4.86
Oklahoma	12 (1)	120	31	163 (1)	2	165 (1)	34.84	8.56	3.85	7.27	0.82	6.64
Oregon	1 (1)	65 (3)	64	130 (4)	1	131 (4)	5.89	8.05	14.70	10.32	0.63	9.23
Pennsylvania	90	286 (2)	334 (1)	710 (3)	3	713 (3)	17.34	8.87	7.47	8.64	0.26	7.61
Puerto Rico	—	20 (1)	69 (1)	89 (2)	—	89 (2)	—.	3.95	10.93	7.82	—.	6.44
Rhode Island	—	—	—	—	—	—	—	—	—	—	—	—
South Carolina	—	97 (1)	82	179 (1)	1	180 (1)	—.	9.17	6.98	8.02	0.39	7.24
South Dakota	343 (3)	68 (1)	60	471 (4)	1	472 (4)	24.75	11.77	11.21	18.85	0.36	17.01
Tennessee	150 (3)	175 (2)	189 (2)	514 (7)	5	519 (7)	11.05	6.44	7.94	7.96	0.57	7.07
Texas	1	352 (6)	550 (4)	903 (10)	4	907 (10)	2.55	6.34	8.51	7.49	0.27	6.70
Utah	302 (3)	157	155	614 (3)	2	616 (3)	23.31	4.89	5.14	8.16	0.23	7.35
Vermont	18	55	66	139	1	140	17.55	10.43	15.45	13.15	0.72	11.70
Virgin Islands	—	—	24 (1)	24 (1)	—	24 (1)	—.	—.	6.99	6.58	—.	5.32
Virginia	38	141 (2)	72 (1)	251 (3)	3	254 (3)	11.69	6.83	3.88	5.91	0.47	5.20
Washington	12	47 (2)	41	100 (2)	1	101 (2)	25.22	4.29	8.28	6.11	0.46	5.45
West Virginia	20	48	36 (1)	104 (1)	1	105 (1)	14.04	8.32	4.92	7.17	0.58	6.47
Wisconsin	5	64 (3)	43	112 (3)	—	112 (3)	11.93	4.47	7.12	5.39	—.	4.70
Wyoming	206	134 (2)	228	568 (6)	5	573 (6)	8.91	5.24	7.45	7.16	0.43	6.29
Total	4,854 (34)	6,047 (67)	7,009 (32)	17,910 (133)	92 (1)	18,002 (134)	15.84	6.34	7.47	8.15	0.29	7.15

* Prior to January 1, 1978, work injuries were classified according to ANSI (American National Standards Institute) and injury frequency rates were computed per 1,000,000 employee-hours of exposure. Effective January 1, 1978, injuries are classified according to severity as Fatal, Nonfatal with Days Lost (NFDL) and No Days Lost (NDL), and the injury incidence rate is computed per 200,000 employee-hours worked. See box on injury reporting changes, page 3.

† All data are preliminary.

‡ Figures in parentheses are fatalities and are included in the totals.

TABLE 31.—Metal and nonmetal industrial hygiene sampling activities, FY 1978

Type of sample	Number of Samples	Number of Inspections[1]	Number of Mines[1]
Full-shift samples:			
Respirable quartz dust	7,225	1,206	1,058
Total silica and nuisance dust	2,674	420	364
Noise dosimeter	15,011	2,614	2,032
Others	833	105	92
All full-shift samples	**25,743**	**2,995**	**2,267**
Area samples:			
General air quality	NA	537	290
Toxic and asphyxiant gases	NA	614	338
Radiation	1,505	250	189
All area samples:	**NA**	**915**	**472**

NA - Not applicable.

[1]Inspection and mine totals are not the sums of the individual entries because more than one contaminant is usually sampled for during an inspection.

TABLE 32.—Radon Daughter concentrations detected at metal and nonmetal mines, Fiscal Year 1978

Type of mine	Total number of samples	Average concentrations	Maximum concentrations	Percent of samples in designated range				
				0-.3 WL	.3-.6 WL	.6-1 WL	1-2 WL	2 WL
Uranium mines	1,004	0.41 WL	10.47 WL	60.1	19.8	13.1	4.2	2.8
Non-uranium mines	501	0.18 WL	4.60 WL	77.0	17.2	3.8	1.4	0.6

TABLE 33.—Miscellaneous mine air contaminants detected at metal and nonmetal mining operations, Fiscal Year 1978

Contaminant	Number of samples
Forms of silica other than quartz	42
Asbestos fibers	37
Nonasbestiform talc	37
Other nonmetallic minerals (graphite, penlite)	18
Mercury vapor	15
Mist (sulfuric acid, oil)	2
Metals and metallic oxides:	
Lead	167
Manganese	115
Iron oxides	100
Titanium oxides	95
Aluminum oxides	80
Vanadium fume	78
Cobalt	71
Zinc oxide fume	69
Copper fume	67
Arsenic and its compounds	63
Chromium	62
Nickel	59
Magnesium oxides	45
Cadmium	43
Molybdenum	42
Beryllium	24
Total, metals and metallic oxides	682
Total	833

section 3

Office of Assessments

The enactment of the Federal Mine Safety and Health Act of 1977 brought about many significant changes in MSHA's civil penalty assessment program during 1978. One of the most important changes stemming from the 1977 Act requires metal/nonmetal mine operators to be subject to civil monetary penalties for violating mandatory standards or other provisions of the 1977 Act. Previously, only coal mine operators were subject to civil penalties for violations.

In order to process the additional assessments under the 1977 Act, MSHA has added new assessment conference offices in Phoenix, Ariz.; Birmingham, Ala.; Madison Wis,; Denver, Colo.; and Dallas, Texas. Thirty-three conference officers were hired and trained to staff those offices in addition to four metal-nonmetal assessors added to the central assessment office in Wilkes-Barre, Pa.

Penalties for violations are now set by the 1977 Act at a maximum of $10,000 for each violation, and operators who fail to correct a violation for which a citation has been issued within the prescribed period may be assessed an additional penalty. This may be for any amount up to $1,000 a day for every day beyond the prescribed abatement period. Conviction for willfully violating a standard or knowingly failing to comply with an order carries a penalty of up to $25,000 and/or up to a year in jail. Corporate officers, operators, directors or agents who knowingly authorize, order or carry out violations are subject individually to these penalties.

Section 105 of the new Act requires that the operator and the representative of the miners at the mine be notified by mail of the proposed civil penalty within a reasonable time after the citation or order is issued.

In computing the penalty, the Office of Assessments must take into consideration these six criteria established by the 1977 Act:

1. History of previous violations;
2. Size of the operator's business;
3. Whether an operator was negligent;
4. Effect of a penalty upon an operator's ability to continue in business;
5. Gravity of the violation; and
6. Demonstrated good faith by an operator in attempting to achieve rapid compliance after notification of a violation.

Under the new assessment regulations (30 CFR, Part 100), promulgated to meet the requirements of the new Act, the formula system which had previously been used for computing the penalties for coal mine operators was retained. Using the formula system, each category is assigned a range of points which, after being totaled, are converted into a dollar amount by a penalty conversion table. The penalty conversion table was modified in the new regulations to increase substantially the penalties to be assessed.

An integral part of the civil penalty process under the Federal Coal Mine Health and Safety Act of 1969 was the opportunity for a conference after the initial assessment was issued. At the conference, an operator could meet with assessment office personnel and present additional facts or advance legal arguments prior to the finalizing of the amount of penalty. In most instances, the conferences resolved the issues and the penalty was paid. Eighty-five percent of the penalties collected in calendar year 1977 were collected after the conference process. Prior to developing the conference process, few penalties were paid. Under the new Act, the conference procedure has been retained but with much tighter time frames than before.

Under the new assessment regulations, after an inspector issues a citation for a violation and after the violation is abated, a copy of the citation is forwarded to the central assessment office in Wilkes-Barre, Pa. The citation, together with a statement prepared by the inspector detailing facts relating to the negligence of the operator, the gravity of the violation, and the good faith efforts of the mine operator to achieve rapid compliance is reviewed by an independent specialist in accordance with Section 100.3 of the assessment regulations. The size and history points are computed using automated records. The operator's ability to continue in business is presumed to be unaffected by the assessment unless the operator submits information for consideration. The results of this initial review are mailed to the operator and the representative of the miners at the mine.

The operator and the representative of the miners have 10 days to notify the assessment office that a conference is requested or that additional evidence will be submitted for consideration. The assessment office may, at its discretion, refuse to conduct a

conference. A conference, if held, must be held within 33 days of receipt of the initial review documents. If additional evidence is received, it is considered. Based upon the conference and/or the evidence submitted, the initial findings are affirmed or modified. A proposed assessment, in accordance with Section 105(a) of the Act, is then issued.

The proposed assessment can be paid, contested before the Federal Mine Safety and Health Review Commission, or it can be ignored. If paid within 30 days, the case is closed. If contested within 30 days, the proposed assessment is referred to the commission for formal adjudication. If the proposed penalty is ignored, it is deemed a final order of the commission 30 days after issuance.

Under the 1977 Act, once a proposed penalty becomes a final order, it is not subject to review by any court or agency and it accrues interest at the rate of 8 percent per year.

If an operator requests formal adjudication before the commission, the Office of Assessments immediately notifies the Commission and refers the case to the Office of the Solicitor for processing.

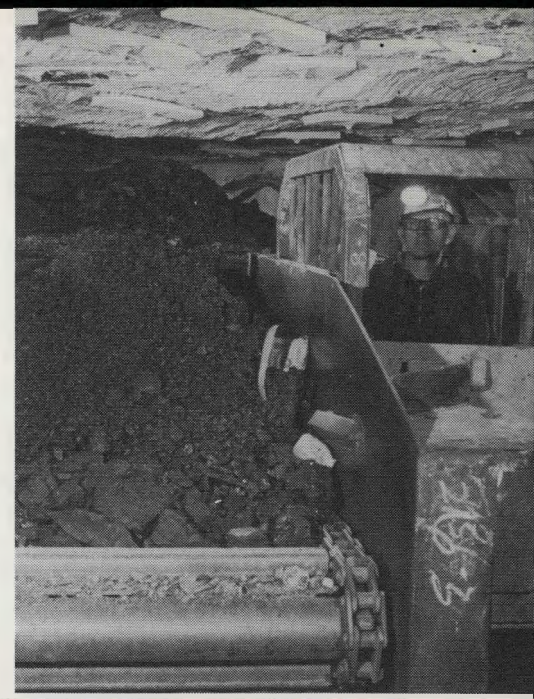
Cases referred to the commission receive an administrative hearing in accordance with the Administrative Procedure Act. An administrative law judge working for the commission hears the facts and issues a decision. That decision may be appealed to the commissioners by any party, the operator, the representative of the miners, or the Mine Safety and Health Administration. If it is not appealed and it is not paid, it becomes the final order of the commission and subject to collection in the Federal courts.

A decision by the commissioners may be appealed to the United States Court of Appeals by any party, including MSHA.

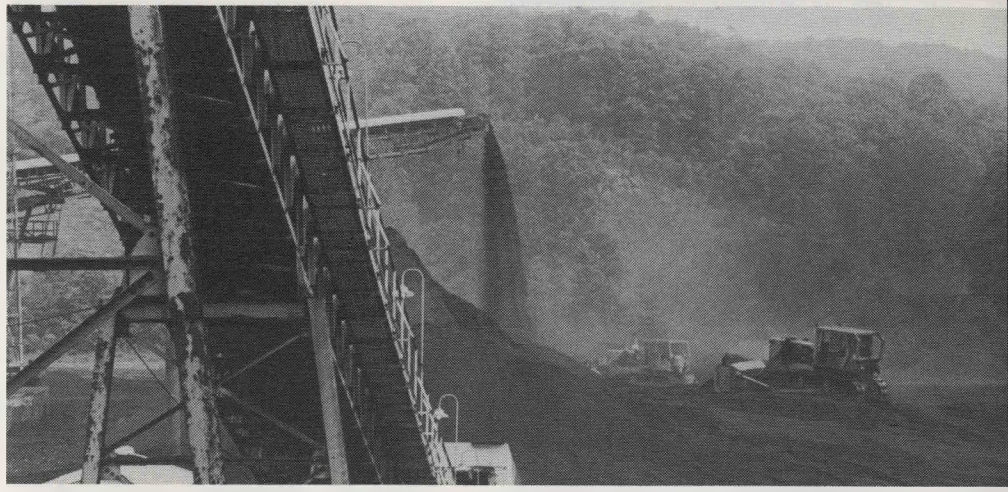
If a case is appealed to the Federal court, the court is limited to a review of the record. No new evidence is considered. This is in contrast to the 1969 Coal Act where the operator was entitled to a **de novo** jury trial in the Federal court before MSHA could collect a penalty.

During 1978, extensive modifications were made to the Office of Assessments' management information system to accommodate the addition of the metal/nonmetal mines and other requirements of the regulations.

In 1978, the Office of Assessments began implementing the special assessment function. Section 100.4 of the assessment regulations provides that the Office of Assessments may elect to waive in whole or in part the assessment formula contained in subsection 100.3 if it determines that conditions surrounding the violation warrant such a waiver. Although an effective penalty can usually be derived from the formula, some types of violations may be of such a nature or seriousness that it is not possible to arrive at an appropriate penalty by using the assessment formula. Accordingly, it may be appropriate in certain types of cases, such as fatalities and serious injuries, unwarrantable failures to comply with mandatory health and



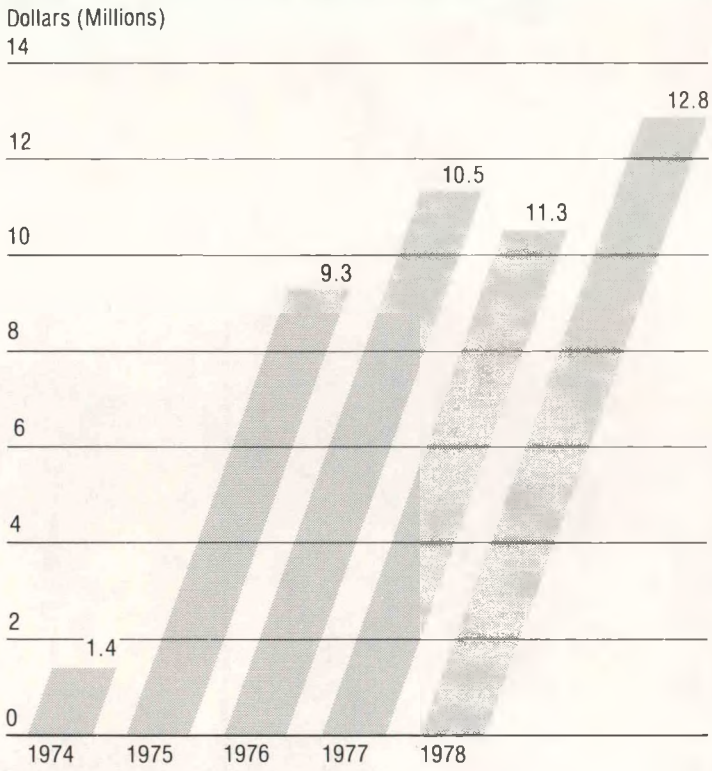
A canopy protects the operator against the dangers of roof falls as his shuttle car moves towards a dumping point with a load of coal.



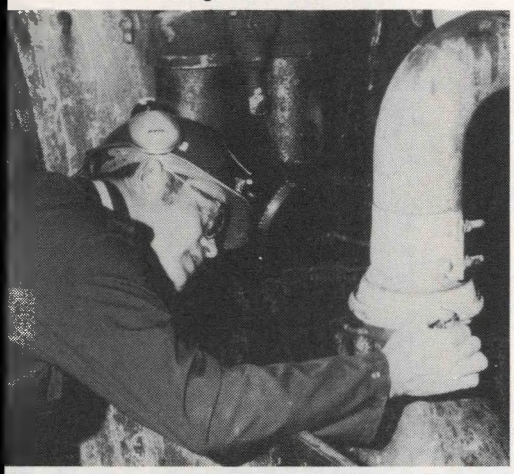
Bulldozers on a stockpile push coal to a draw-off tunnel where it is loaded onto the raised conveyor belt at the left.

The cowl extending over the cab on this haulage truck protects the driver from any loose rock which may bounce out of the truck bed during loading operations.

FIGURE 16.—Assessment collections, FY 1974-1978.



Catalytic converter-type scrubbing devices such as the one shown here help to reduce diesel exhaust emissions from the rubber-tired equipment used in metal and nonmetal underground mines.



A miner changes the auger on a coal drill.

TABLE 34.—Assessment collections, FY 1978

	Number of cases	Amount collected
Direct payment	5,551	1,223,391
MSHA Conferences	14,109	10,289,779
Solicitor Settlements	1,793	742,117
OHA/Commission Decision	170	154,979
Justice	961	410,007
Total	22,584	12,830,273

safety standards and other appropriate cases, to waive the formula and make a special assessment. Such special assessments take into account the six criteria enumerated in 100.3(a) and all findings are in narrative form.

During 1978, the Office of Assessments assessed 128,052 violations for total penalties of $22,812,888. Conferences were held on 15,717 cases during Fiscal Year 1978 and total collections were made in the amount of $12,830,273. Conference procedures accounted for 80 percent of collections during 1978. Direct payments (payments made after an Initial Review was issued) resulted in collections of $1,233,391 (table 34).

As of Sept. 30, 1978, there was a working inventory of 9,048 violations in the Wilkes-Barre office that were assessed and in the process of being assembled and mailed to the mine operators. This working inventory and the related processing time were the lowest in the history of the assessment program.

The Sept. 30, 1978, case inventory showed a working inventory of 6,406 cases in the nine conference offices. During 1978, 3,019 cases were referred to the Office of the Solicitor for a hearing.

section 4

Office of Standards, Regulations and Variances

In March 1978, MSHA created an Office of Standards, Regulations and Variances which is responsible for coordinating all phases of the rulemaking process. This office promotes increased efficiency in the rulemaking process prescribed by the 1977 Act and assures that all standards are issued in accordance with MSHA, DOL and other Federal regulatory policy.

Section 101 of the 1977 Act requires the development, promulgation, and revision, where appropriate, of improved mandatory health or safety standards for the protection of life and the prevention of injuries in the Nation's mines. In addition, it facilitates the rulemaking process by setting strict time limitations for completion of various stages of the rulemaking process. The 1977 Act specifically mandated the issuance of certain standards and regulations and placed increased emphasis on health hazards found in mines. MSHA will proceed with the development of standards pertaining to health hazards pursuant to Section 101(a)(6) and (7) of the 1977 Act upon receipt of NIOSH criteria documents relating to toxic substances and harmful physical agents found in mines. MSHA is working closely with NIOSH in this area.

The 1977 Act is designed to ensure that the public be allowed adequate opportunity to participate, at an early stage, in the rulemaking process. Also, Executive Order 12044, concerning regulatory reform, imposes additional requirements designed to ensure full public participation during rulemaking. Toward this end, the 1977 Act provides for the use of advisory committees, where necessary, and encourages, in the legislative history, the use of pre-proposal consultations with affected parties, where appropriate. In accordance with Executive Order 12044 and the Department of Labor's guidelines for implementing the Executive Order, MSHA allows all interested parties 60 days, to the extent practicable, to comment on proposed rules. Additionally, public hearings are conducted, if requested, on objections filed regarding a proposed standard. However, because of the expedited rulemaking process, the hearings are informal.

In accordance with Executive Order 12044 and the 1977 Act, MSHA is focusing its attention upon a complete review of existing standards and regulations to determine their overall and individual adequacy and effectiveness in terms of the goal of reducing injuries and illnesses in the Nation's mines. In the last quarter of fiscal 1978, MSHA identified the first set of standards and regulations which it would review.

In fiscal 1978, MSHA's priorities for developing standards and regulations were first, to issue those standards and regulations which were necessary to ensure effective and expeditious implementation of the Act; second, to issue those standards and regulations which were specifically mandated by the Act; and finally, to finalize standards and regulations for which rulemaking had begun prior to the effective date of the Act. With regard to petitions for variances, the goal was to process these as quickly as possible to ensure miner safety and to prevent backlogs. In fiscal 1978, 150 petitions for variances from mandatory standards were received and processed. Standards and regulations issued by MSHA in either proposed or final form are contained in the appendix.

section 5

Office of the Solicitor, Division of Mine Safety and Health

The Division of Mine Safety and Health of the Solicitor's Office acts as counsel to the Mine Safety and Health Administration, assisting in trial and appellate litigation, in the development of standards and regulations, and in a wide range of other legal matters.

The 1977 Act established an independent Federal Mine Safety and Health Review Commission and gave MSHA and other litigants the right to appeal Review Commission decisions to the U.S. Court of Appeals. The division's trial attorneys litigate cases involving important policy or legal issues and coordinate the work of regional solicitors at administrative hearings in other cases before both administrative law judges of the Commission and Federal District Courts. The division's appellate attorneys are responsible for all cases before the commission brought under the Act and most cases brought in Federal appeals courts.

During Fiscal Year 1978, the division participated in 2,976 new administrative proceedings. Of these, 657 involved review of the validity of citations and orders; 2,256 involved contested penalty assessments; 42 involved petitions for modification of the application of health and safety standards; and 21 involved charges of discrimination against miners for exercising their rights under the 1977 Act.

In addition, the division brought 67 injunctive actions in Federal District Courts to prevent mine operators from denying access to their mines or otherwise impeding inspectors in the performance of their duties and for operating in the face of withdrawal orders issued by MSHA inspectors. In five instances, the division brought contempt actions against operators who refused to obey injunctions issued by Federal District courts.

In Fiscal Year 1978, the division assisted in the promulgation of many new mine safety and health regulations necessitated by the 1977 Act (see Appendix). The Act provides for extensive public participation in rulemaking through hearings and comment periods before proposed rules are made final. The division provides legal representation for MSHA in rulemaking hearings and helps to evaluate public comments on these proposed standards and regulations. The division also reviews proposed standards for legal sufficiency.

Finally, the division assisted MSHA during fiscal 1978 in a wide range of general legal matters. The division's attorneys prepared legal opinions on interpretation and application of the 1977 Act, on implementing standards and regulations, and on the interactions between MSHA and other Federal agencies and statutes. The division advised MSHA on Freedom of Information Act requests and matters arising under the Privacy Act; prepared and reviewed contracts, grants, draft agreements with other agencies, and responses to Congressional inquiries; dealt with internal personnel matters; and provided day-to-day legal advice to MSHA on the development and implementation of programs under the 1977 Act.

section 6

Federal Mine Safety and Health Review Commission

The Federal Mine Safety and Health Act of 1977 made significant changes in the process of reviewing judicial decisions pertaining to mining safety and health, creating a five-member Federal Mine Safety and Health Review Commission with far broader powers than the former Board of Mine Operations Appeals in the Department of the Interior which it replaced.

By the end of the 1978 fiscal year, the independent, Presidentially - appointed commission was at work on pending appeals cases while developing permanent procedural rules for carrying out its new responsibilities under the Act.

Development of new procedures, along with strict timetables set in the new Act for the judicial review process, was widely expected to eliminate many of the burdensome delays imposed under the old system and to make the process more responsive for all concerned parties.

Under the new provisions, any person who is adversely affected or aggrieved by the decision of an administrative law judge in a mining safety and health case, may file a "petition for discretionary review" on one or more of several stated grounds by the commission within 30 days following the decision.

The Act set strict time limits on actions by concerned parties and on the commission in its role in reviewing and issuing decisions regarding appeals of citations and orders issued to operators, civil penalties assessments, and complaints brought by miners, their representatives, or job applicants under various provisions of the Act, as well as other appeals and review avenues provided by the new law.

The 1977 Act also provided procedures for review of final orders of the commission by Federal appeals courts.

The new law transferred administrative law judges formerly assigned to the Department of the Interior's Office of Hearings and Appeals to the commission.

President Carter selected former California Rep. Jerome Waldie as first commission chairman. Others named to the commission were: Al E. Lawson, Marian Nease, Frank F. Jestrab, and Richard V. Backley. The members of the commission represent a varied background in governmental affairs, the occupational safety and health field, and the labor movement.

section 7

Technical Support

The Technical Support directorate directly supports MSHA's enforcement activity under provisions of the Federal Mine Safety and Health Act of 1977 with engineering and technological assistance, collects and analyzes data on accidents and injuries, approves mining equipment and instruments, conducts numerous laboratory investigations, makes on-site mine hazard evaluations, and assists in investigations involving mine safety and health problems. An important part of the directorate's role is to provide technical information needed to develop standards to protect the miner. The directorate also participates in exchanges of technological information on safety and health problems of underground and surface mine and milling operations.

Safety technology and health technology activities are coordinated with each other and with inspection and enforcement activities in the directorate's field technical centers. In the area of safety technology, regulatory-coordinated investigations deal with such problems as mine roof control, industrial safety and electrical, explosives and mine waste embankment hazards. Health technology activities include investigations involving ventilation, industrial health, mine radiation and other problems. Under health technology, Technical Support personnel also provide a wide range of analytical services regarding hazardous levels of dust, gases, organic contaminants and toxic substances.

Technical operations in the field are carried out through the Pittsburgh, Pa., Technical Support Center for all coal mines and metal and nonmetal mines in the eastern United States and by the Denver, Colo., Technical Support Center for all metal and nonmetal and coal mines in the western United States. National mining accident, injury, illness and production data are collected and analyzed at the Health and Safety Analysis Center in Denver. Technical activities related to the approval and certification of mining equipment are carried out by the Approval and Certification Center in Triadelphia, W.Va., which was opened Jan. 30, 1978.

SAFETY TECHNOLOGY

Ground Control

Technical activities in ground control are aimed at improving mine safety by providing engineering support service to MSHA's inspection force and the mining industry. This includes the evaluation and investigation of all types of roof support systems; forecasting ground stability through application of geologic techniques; evaluating methods that can be applied to minimize the exposure of miners to unsupported roof areas; and evaluation of devices that will protect machine operators should a roof fall occur.

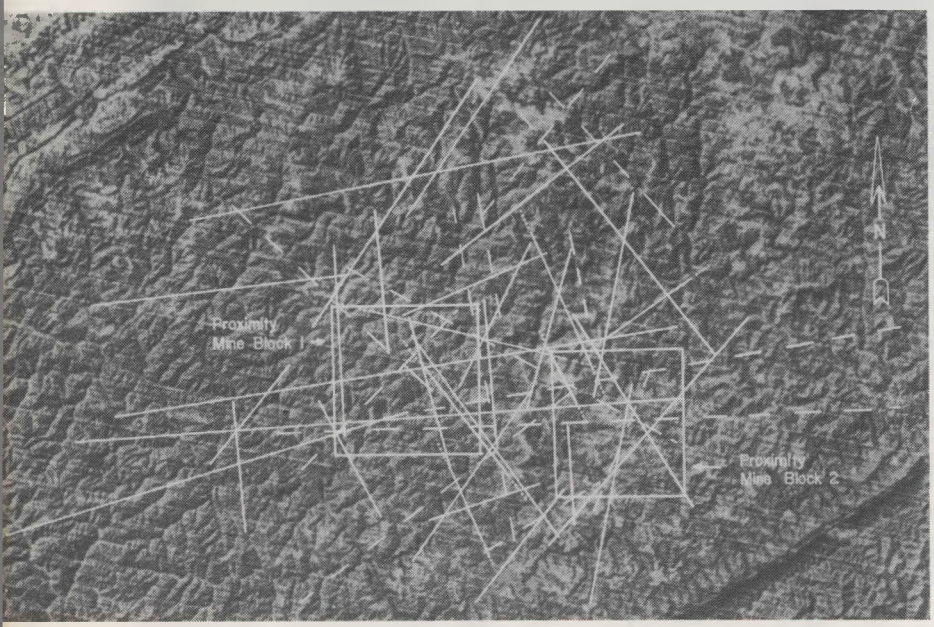
The greatest single hazard miners are exposed to in underground coal mines is fall of mine roof. Falls of mine roof in the immediate face area have historically been responsible for a high proportion of coal mine fatalities and injuries. During Fiscal Year 1978, MSHA made 180 mine investigations to improve ground control and roof support in the Nation's coal mining operations.

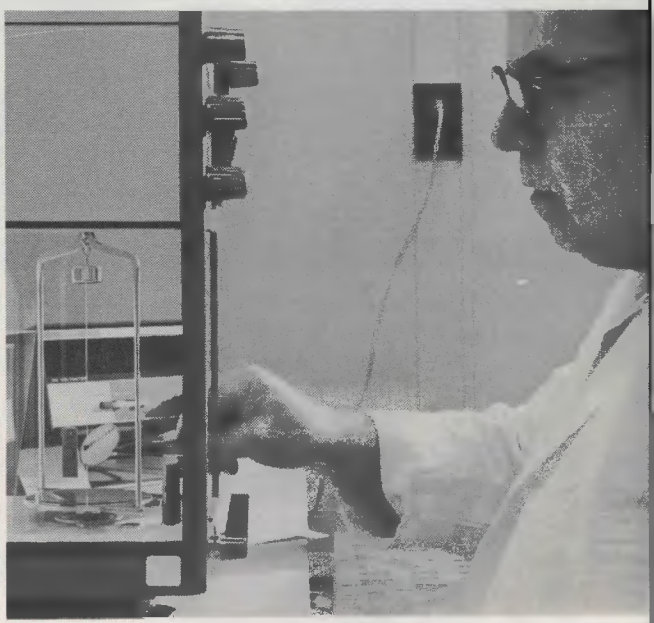
MSHA is expanding its efforts in investigating, evaluating, and conducting engineering analysis of automated temporary roof support systems (ATRS) proposed for use in place of canopies on mobile mining machines. To date, about 20 percent of all roof bolters in the field are equipped with automated temporary roof support systems. During the year, 42 mine investigations were conducted and 27 mines were granted approval to use ATRS systems instead of canopies.

Since cab and canopy regulations, 30 CFR 75.1710, went into effect in 1973, 114 miners reportedly have been saved from serious and possibly fatal injuries when the mining machines they were operating were covered by a fall of mine roof. During Fiscal Year 1978, technical assistance was provided to coal mine enforcement and the mining industry on cabs and canopies. A data base was established from which mine operators can acquire information to help them to comply with cab and canopy regulations.

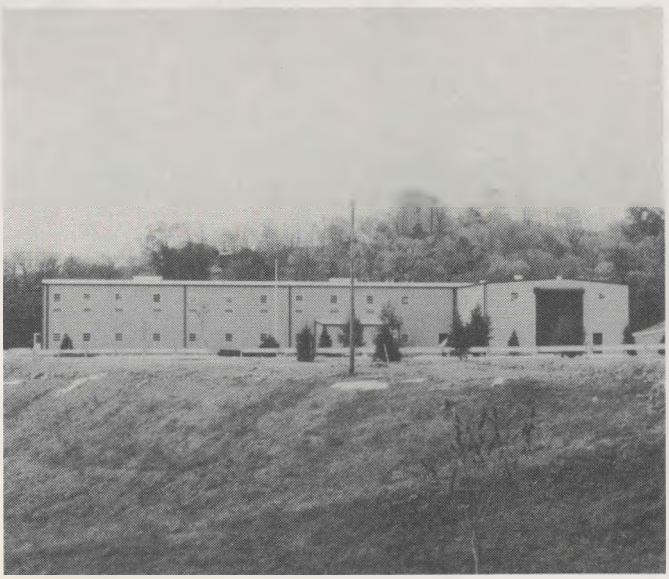
About 98 percent of all mine roofs in the coal industry are supported with roof bolts. To determine whether new and existing roof bolting systems meet existing standards and specifications, and to establish installation criteria, MSHA conducted 129 analyses and investigations of a wide variety of roof support systems and accessories. MSHA activities substantially contributed to increased reliability of roof support systems, and the transfer of improved roof bolting technology to

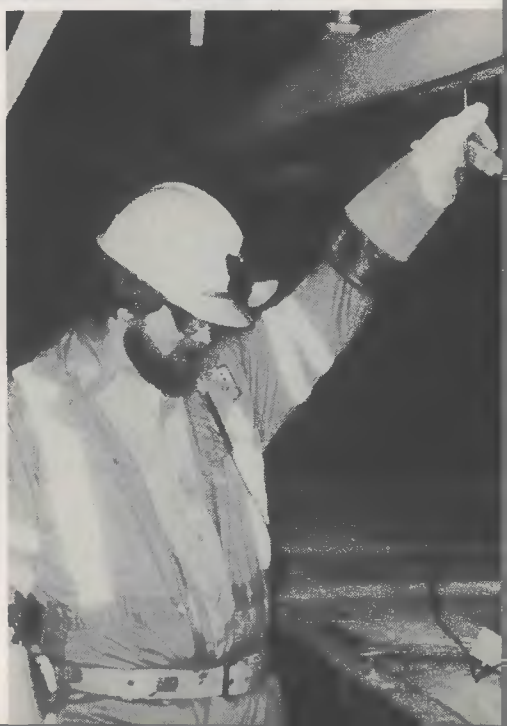
In the photo below, MSHA personnel check modifications to tailings embankments made to improve their stability. At right, a wire hoist rope is tested electronically for safety.





Satellite map, directly above, shows linear geologic features indicating potential mine roof instability. These photos have proven useful in planning new mines and expanding existing mine operations. Above right, a coal dust sample submitted by a mine operator is weighed. Over the years, hazardous dust concentrations in underground mines have been greatly reduced. MSHA's approval and certification facility in West Virginia is shown at immediate right. And at far right, an MSHA specialist makes an electrical survey.





wider use by the mining industry. Technical studies also are under way to develop strength criteria for tunnel liners that can serve as protective devices during renovation of roof fall areas.

Remote Sensing and Ground Control

One of the most difficult safety problems encountered by mine operators is the determination of ground conditions before laying out a mine. During the 1978 fiscal year, MSHA advanced the use of satellite imagery and remote sensing techniques to predict potential complex ground control problem areas.

MSHA has been studying and demonstrating remote sensing with the use of satellite and aircraft imagery to pinpoint geological features in the earth's crust that contribute to roof instability. Results indicate that the method locates potential roof control problem areas in advance of mining with a high degree of reliability. For example, experience gained by one mine operator, through technical data provided by MSHA, resulted in changes in the mine longwall layout and established roof support procedures for mining through areas with potential roof control problems.

Companies with ground instability problems are starting to contact MSHA to inquire about the use of remote sensing. MSHA does not act in a formal consulting capacity, but works with and advises companies by providing demonstrations and instructions on remote sensing.

Mine Waste

Technical Support specialists provide technical aid and consulting services, both within MSHA and to the mining industry, on complex safety and health problems related to the handling and disposal of mined waste, including refuse piles and water impoundments, and flooding.

During Fiscal Year 1978, a total of 255 plans and technical data submissions from mine operators were reviewed. Current practices and procedures for mine waste disposal were surveyed and comparisons were made of actual construction to specifications in approval plans. The evaluations helped MSHA to determine to what degree recognizable hazardous conditions in waste dam impoundments are being reduced.

A computer program that analyzes slope stability was completed and published. The program provides mine enforcement and design engineers with a useful tool for dealing with slope stability problems and enables MSHA field engineers to more accurately review engineering plans on impoundments submitted to field offices.

Investigations were made of 43 metal and nonmetal mine waste disposal sites to collect background information for use in developing proposed regulations. Following one such investigation, a recommendation was made to close a disposal site. Investigation results are being incorporated into draft metal and nonmetal regulations for mine waste piles and tailings impoundments.

Industrial Safety

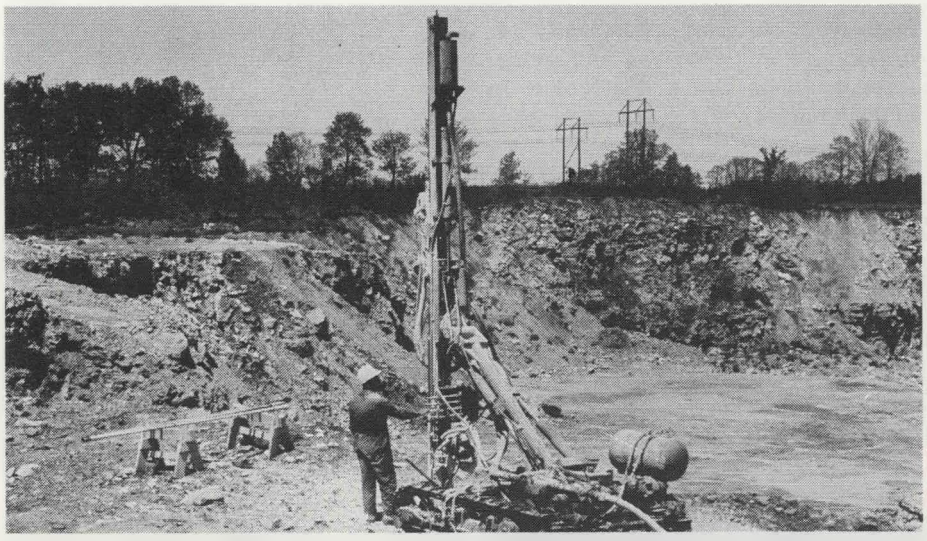
Industrial safety activities provide technical assistance to mine inspection personnel covering critical areas relating to fires, methane ignitions, gas and dust explosions, and explosives technology. The activities provide services for the evaluation of potential hazards of material combustibility and underground mine flooding, guidance in extinguishing burning waste dumps, as well as general investigations of accidents and safety and health practices.

One investigation concerned two cases of fire and gas ignition which occurred during installation of resin-anchored roof bolts in coal mines. Technical investigations found that, in both cases, bolting machine operators had exerted excessive thrust on the bolt, causing generation of enough frictional heat between the bolt head and roof plate to ignite the resin in one instance and the methane in the other.

In mine fire control, an ignition suppression system was developed as mandated by section 317(q) of the Act. Gallery ignition studies were completed to provide data on the rate of explosion flame development for given methane concentrations. Over 244 different types of tests were made to check out the sensitivity and response of ultraviolet fire detectors. Test results have established the feasibility of ignition sensing using ultraviolet detectors. Tests are underway to incorporate these detectors in a quenching system.

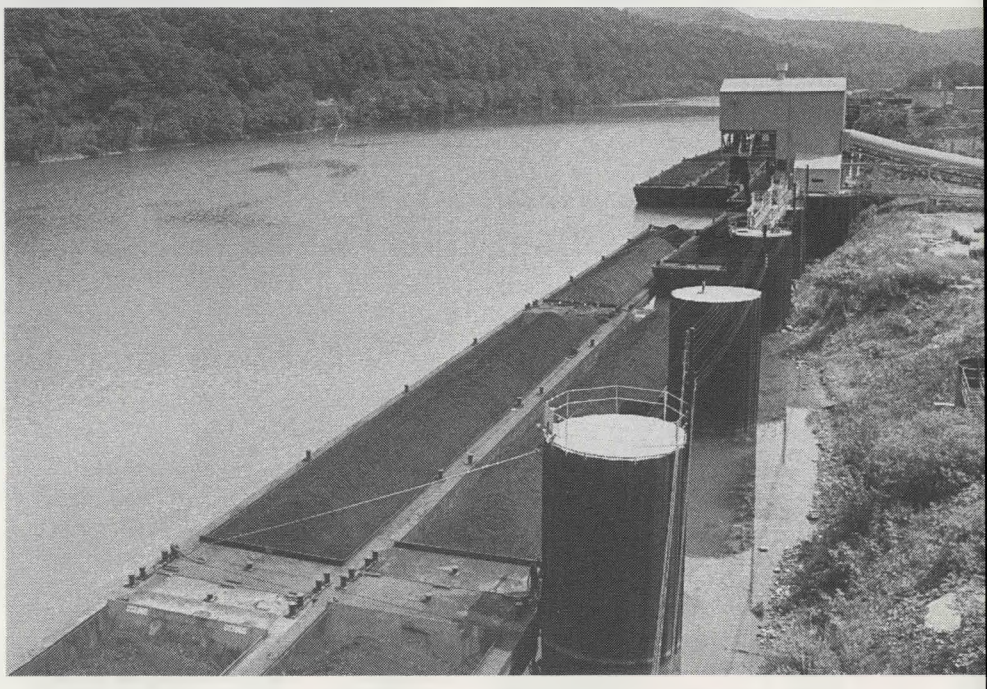
Hoist safety and hoist rope retirement procedures received increased emphasis during the year. MSHA is in the process of applying nondestructive testing methods, using electronic instruments to examine the adequacy of wire ropes to ensure safety. A technology transfer of commercially-available instruments to detect internal flaws in hoist ropes is currently being made. At the same time, Technical Support specialists are using a new destructive testing machine in a new laboratory in Denver in the testing and analysis of wire rope safety characteristics. These efforts will minimize hoist and haulage rope failures in mining operations.

In the area of explosives technology, Technical Support investigated the use of unconfined explosives in the removal of longwall chocks; demonstrated the advantages of multishot large-scale blasting of overcasts; assisted in the development of an approved large-capacity blasting machine; and defined MSHA's position on various explosives-initiating sys-



Left, tracked drills such as this one are commonly used at small surface operations to drill holes for explosive shots. The tank on the right of the machine feeds pressurized water to the drill bit to suppress dust which might interfere with the operator's breathing.

Below, coal is loaded, top right, into barges at this riverside facility. Cells filled with concrete or stone provide tie-off points to anchor the barges.



tems in surface blasting operations. Technical procedures were established for loading explosives under caving ground conditions in quarrying operations. Nonelectric blasting systems were designed to minimize hazards from stray electrical currents and lightning in electrical storms.

Mine Electricity

Technical Support provides scientific and engineering assistance in the recognition, analysis, and control of mine electrical hazards, electrical fires, overload circuit protection, grounding of electrical equipment, mine illumination, and communication.

Twenty-four electrical investigations were conducted on mine electrical systems during the fiscal year. These resulted in engineering solutions to specific problems in the areas of electrical fires, proper grounding of electrical equipment, power distributer overload circuit protection, and lighting protection, among others.

Technical services were provided to the mining industry and lighting system manufacturers in meeting the requirements of the mandatory illumination regulations. A total of 2,100 illumination systems were evaluated for compliance and use in coal mining operations.

MSHA has completed the design and testing of a ground-check circuit and ground-fault test instrument combination for use by MSHA enforcement personnel. A total of 88 ground check circuits were evaluated.

APPROVAL AND CERTIFICATION

The approval and certification activities contribute to mine safety and health by investigating products, including materials, instruments, and explosives intended for use in underground mines. On Jan. 30, 1978, a new MSHA approval and certification facility was put into operation at Triadelphia, W. Va. The laboratory will enable MSHA to develop improved methods of testing critical mining equipment and components.

During the year, 4,434 approval, certification, and acceptance-related actions were completed. The productivity on the processing of applications was increased by putting into effect cancellation programs, a Stamped Notification Acceptance Program (SNAP), a Stamped Revision Acceptance Program (SRA), and a new check-handling procedure. The inception of these programs helped to accelerate the turnaround time without sacrificing the quality of approvals.

MSHA emphasizes quality assurance for approving products used in mines. New programs were begun to investigate failures of approved products and field complaints, and for post-approval audits of equipment previously certified under various mine safety and health regulations.

Technical Support plays a key role in transferring to mining use new technologies in personal protective equipment, including self-rescuer and breathing apparatus. In conjunction with the National Institute for Occupational Safety and Health, a total of 51 respirators were approved under the requirements of Title 30, Code of Federal Regulations, Part 11. These approvals include self-contained breathing apparatus, respirators, gas masks, and chemical cartridge respirators. Technical Support helped coal mine enforcement to draft new regulations for self-rescuers in coal mines, resolved field problems with mine rescue breathing apparatus, and served as liaison to the Bureau of Mines for transferring newly-developed technology to mine use.

A total of 355 approval actions were completed on mining equipment, including diesel equipment, roof drill dust collector systems, cable or splice kits, panic bar designs, and fire resistant hydraulic fluid approvals. The Mining Equipment Safety Laboratory conducted braking tests to obtain data needed to develop regulations on braking and test procedures for approval.

During the 1978 fiscal year, major efforts were made to increase the output of electrical equipment approval with improved quality. A total of 3,888 approval actions were completed during the year.

A total of 140 acceptance actions were completed on materials and explosives used in mines. The fire and toxic hazards of products such as conveyor belting, certain hose products, packing glands, insulation material, and other products were investigated under regulatory requirements. A new program has been instituted that will help to maintain a 30-day turnaround time for approval actions.

Many products used or proposed for use in mines are not regulated under the mine safety and health regulations, and may present a toxicity hazard to miners. To meet the needs of the industry in this area and to comply with the intent of the 1977 Act regarding toxicity hazards, interim criteria were developed based upon prudent engineering and scientific practices. There is a need for further development in this area, and additional information is being developed on interim criteria and acceptance procedures.

An MSHA inspector watches for proper backing and braking procedures as this haulage truck is loaded with quarried stone.

HEALTH TECHNOLOGY

Respirable Dust Control

The dust control activities provide engineering and technical assistance to MSHA, other Federal and State agencies, and the mining industry in meeting the mandated health requirements, provide transfer to use by industry of new technology to control respirable dust, and recommend improvements in mine health standards for coal and metal and nonmetal mining operations.

In Fiscal Year 1978, a total of 436,371 dust samples and associated data from the underground and surface coal mine operator's sampling program were processed; 27,146 samples collected during coal mine health inspections were encoded and transmitted to MSHA's central automatic data processing center for storage; 35,967 respirable coal mine dust samples collected during MSHA's health inspections were processed for alpha quartz analysis; and 2,957 mine air samples were analyzed for methane, nitrogen, and oxides of carbon. A total of 14,661 metal and nonmetal mine samples were analyzed for free silica by x-ray diffraction.

A high-priority program was started to develop and demonstrate the feasibility of a machine-mounted respirable dust monitor. Commercially-available dust sampling instruments, employing the principles of beta-ray attenuation and light scattering to measure dust mass, are being redesigned for machine mounting and testing. Completion of this development work is expected to have a significant impact on enforcement procedures for controlling respirable coal dust in the Nation's mines.

MSHA is developing a new single-sample analytical technique for quartz analysis. This new method has the potential of increasing MSHA's capability to make respirable quartz deter-

minations in mines by about 300 percent. A program was initiated for controlling dust in longwall mining operations having difficulty in complying with the mandatory dust standards. Mines involved in this program were visited, and technical recommendations were provided.

Mine Ventilation

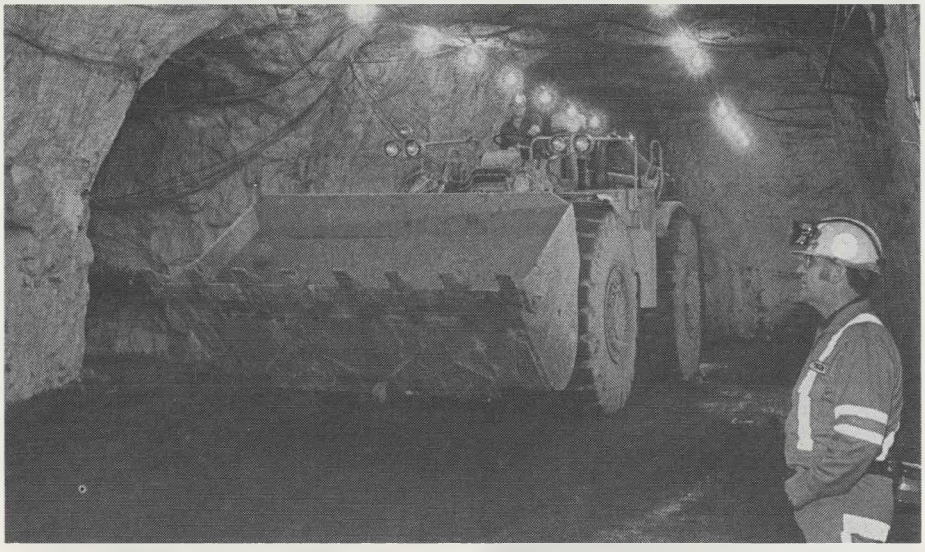
The ventilation activities provide engineering and technical support services in mine ventilation design, methane and air contaminant control, and improvement of mine ventilation systems.

ing place methane checks required in the regulations in a way that would reduce potential hazards to miners who make such checks.

Mine Hygiene and Toxicity

Because of added emphasis in the Federal Mine Safety and Health Act of 1977 regarding miners' protection from exposure to all toxic materials found in mine environments, Technical Support has placed special emphasis on the control of toxic materials in mine environments.

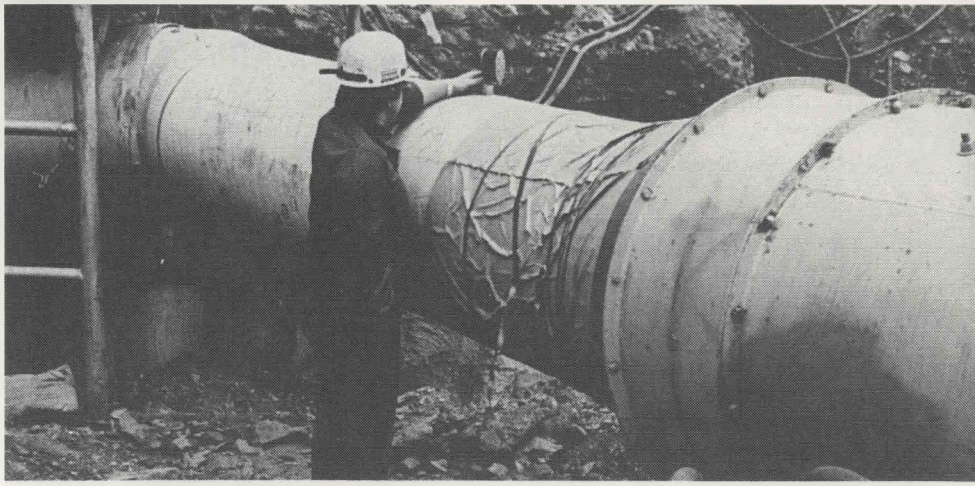
A scanning transmission electron microscope which was put into opera-



Above, a miner changes a bit on a continuous mining machine in a low coal seam. Roof bolts are visible above the miner's head. Left, an MSHA inspector checks for loose rock as a front-end loader moves through a well-illuminated drift in an underground lead mine.

MSHA has developed and tested a prototype early-warning fire detection system for underground coal mines. MSHA also tested low-level carbon monoxide monitors for the early detection of belt heatings in underground coal mines, and determined the conditions under which a carbon monoxide detection system would afford protection equivalent to that of the point-type heat sensors. These guidelines have helped MSHA's enforcement personnel in approving carbon monoxide detection systems for mine use.

MSHA is currently developing and demonstrating methods of providing adequate face ventilation at line or tubing face distances of over 10 feet. MSHA is also developing and demonstrating a method of making the work-



Technical Support provides services to the mining industry in ventilation design, methane and air contaminant control, and in the improvement of mine ventilation systems. In this picture, an air quality test is made in a mine's exhaust ventilation tubing.

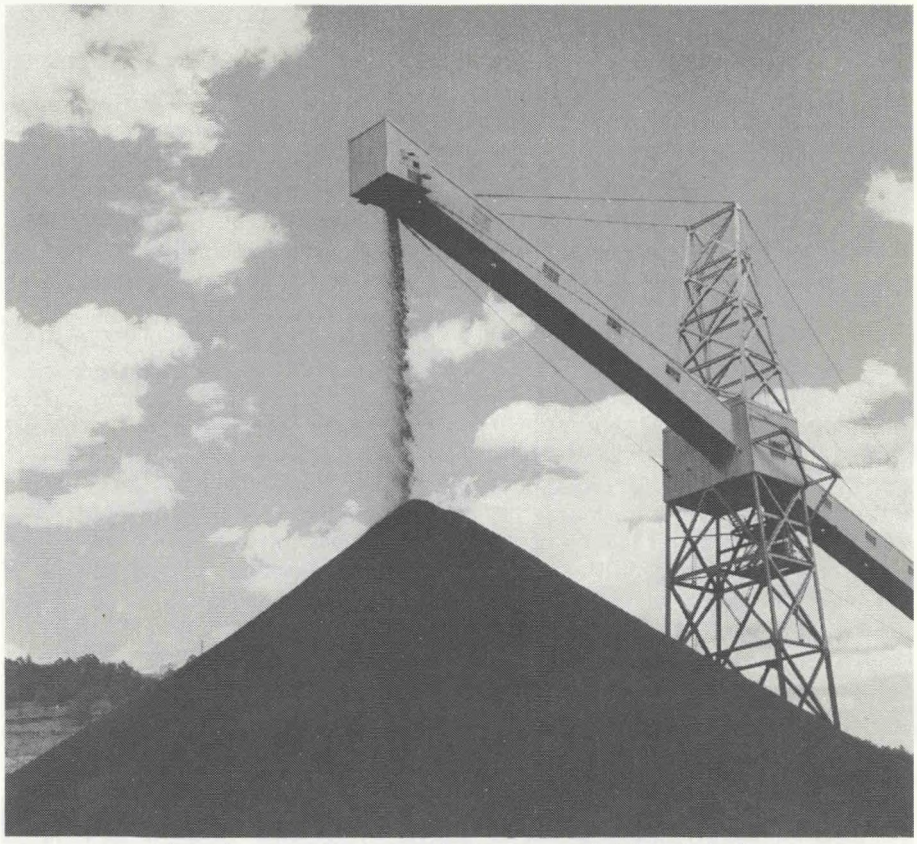
tion during the fiscal year provides MSHA with the capability to identify mineral fibers. The technique is the most reliable method of identifying asbestos and other mineral fibers, and provides information on the size and shape of particles, as well as the chemical composition. A total of 58 fiber identification analyses were performed during the year.

MSHA developed a portable colorimeter technique to evaluate the performance of nitrogen dioxide dosimeters. This method was used in a lead mine to determine nitrogen dioxide emissions from diesel equipment in mines. A carbon monoxide personal dosimeter which was evaluated has the potential to provide MSHA with a capability for a full-shift measurement in place of a time-weighted average currently obtained with existing techniques.

Tests have confirmed that concentrations as low as one ppm of silicone in mine air produce a loss in the sensitivity of sensing elements used to measure methane concentrations. MSHA has developed a method of measuring silicone concentrations in mine air flow, and is using the method to compare loss in sensitivity of the methane sensor to the silicone concentrations in coal mining operations.

MSHA developed a dust pump timing mechanism for fiber sampling, and built 10 prototypes for field tests. Field evaluations show that the new method can effectively reduce the time required for fiber counting. Work is in process to transfer the technology to industry for mining use.

A total of 8,283 quantitative determinations of toxic materials were performed during the year. Carbon dioxide, carbon monoxide, methane, oxygen, and nitrogen analyses were performed on 2,661 mine atmosphere samples using gas chromatographic techniques. 362 industrial hygiene samples were analyzed for nitrogen dioxide, sulfuric acid mist, formaldehyde, oil mist, and benzene solutions. A total of 1,095 fiber count analyses were performed on airborne dust samples collected in metal and nonmetal mines.



A track-mounted conveyor belt moves coal to the stockpile.

Mine Noise Control

Technical Support provides scientific, engineering, and technical assistance to MSHA in the recognition, evaluation, and control of mine noise, and applies state-of-the-art or improved technology to minimize miner exposure to noise in underground or surface mining environments.

A number of demonstration noise control packages were installed on various strip mine and quarry vehicles, including haulage trucks, bulldozers, and front-end loaders. In all cases, reductions of at least 10 dBA were achieved by using state-of-the-art noise reduction technology.

Detailed full-shift noise surveys were conducted at numerous preparation plants. Recommendations to reduce noise levels were made to the companies and were put into effect with good results. Installation of permanent enclosures reduced noise levels by 10 to 12 dBA. Semi-permanent enclosures (high-density curtains) provided a noise reduction of 8 to 9 dBA. Treating screens with wear-resistant rubber produced noise reductions ranging from 3 to 6 dBA.

SAFETY AND HEALTH DATA ANALYSIS

MSHA uses the analyses of data collected nationally on mine accidents, injuries, and illnesses as a tool to identify problem areas in mine safety and health, and to guide MSHA programs. The Health and Safety Analysis Center in Denver, Colo., collects, computerizes and analyzes the data on mine accidents, injuries and coal mine production. The findings are circulated periodically to MSHA personnel and are published.

MSHA modified accident, injury, and illness reporting procedures and adopted the injury and illness definitions used by the Occupational Safety and Health Administration (OSHA). A slide and sound training session was prepared to train MSHA personnel,

mine operators, and others on the salient points of the new reporting procedures. On Jan. 1, 1978, a new coding structure was designed and implemented to reflect the new reporting requirements. MSHA has systematically audited all types of mining operations to determine compliance with the new requirements and developed designs for random sampling of reporting compliance in order to assess the quality of reporting and estimated over-reporting or under-reporting of data on injuries and employment.

A statistical tool called "control charts" was used for the first time to detect changes in coal mine and metal and nonmetal mine historical injury patterns or trends at mines. The charts alert MSHA enforcement offices whenever certain individual mines of the mines in a MSHA subdistrict have a significantly greater-than-expected number of injuries. Moreover, hazard alerts are issued to operators and MSHA enforcement offices to dramatize sources of frequent serious and fatal injuries.

A Coal Interactive Graphics System (CIGS) also was designed and put into effect. This system consolidates coal mine data from the respirable dust records system, the assessments system and the coal employment-injury system from 1973 to the present.

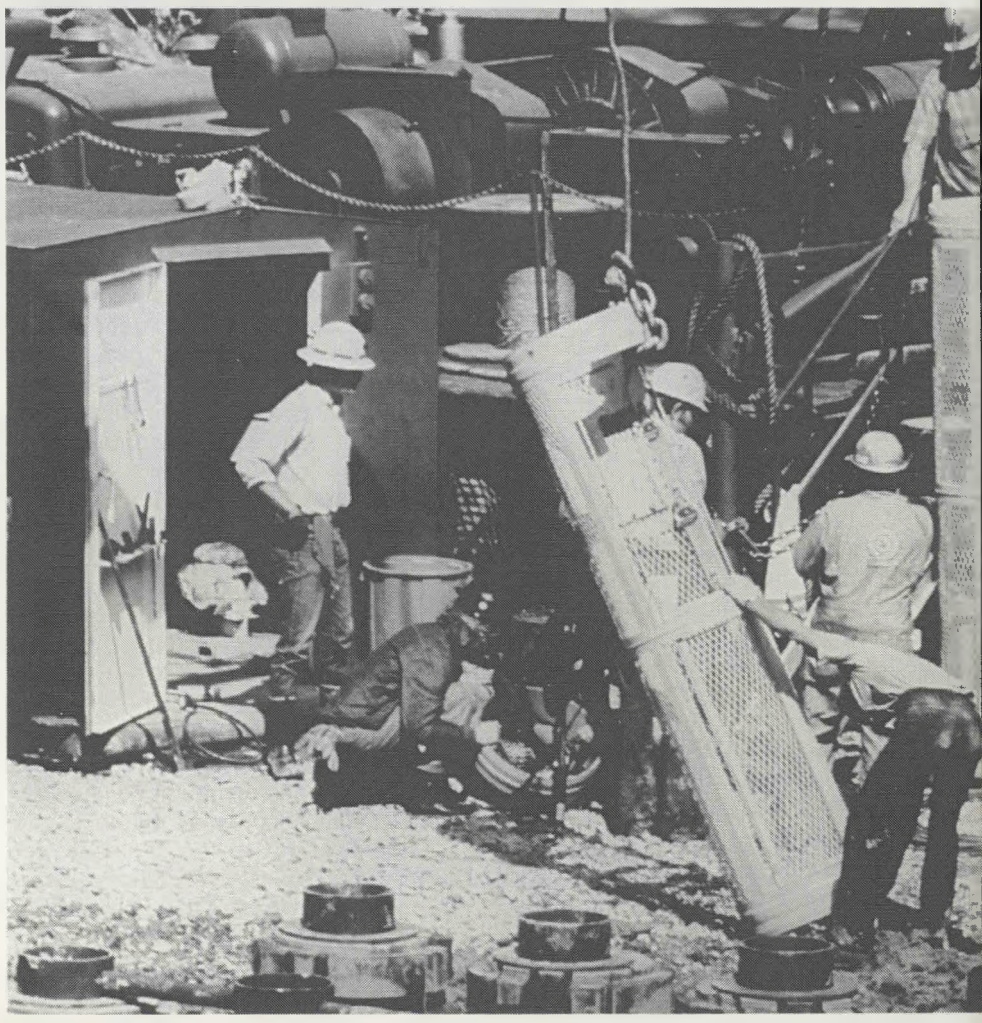
MINE EMERGENCY OPERATIONS

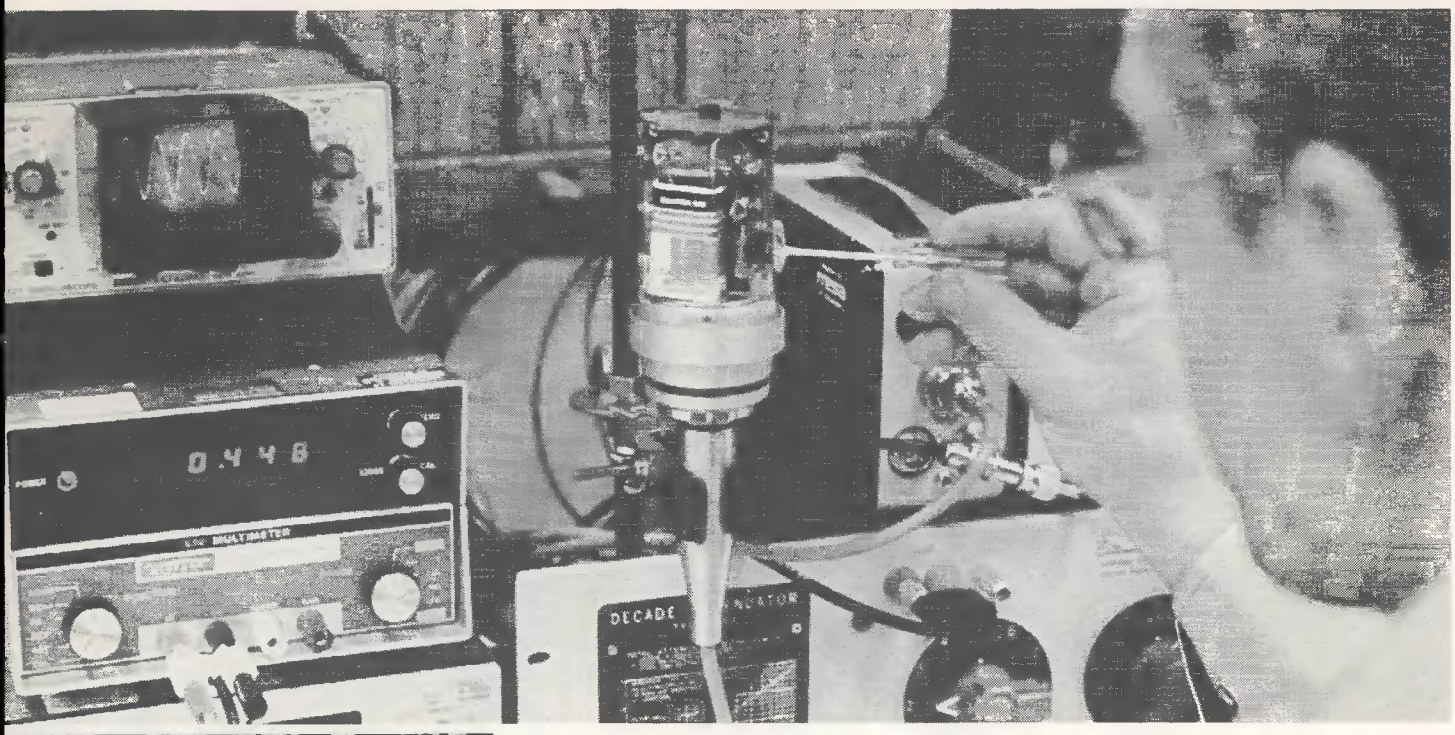
MSHA maintains mine emergency operations equipment and the capability to mobilize and deploy the equipment to a mine area for locating and rescuing trapped underground miners. MSHA monitors new rescue technology developments and updates its rescue capabilities. Improvements in equipment capability made during the fiscal year include the addition of a power-driven sampling cable for analysis of mine gases, an improved audio-visual communications terminal, and a high-speed data link to communicate photographs and maps to and from the emergency sites. These additions enhance MSHA's capability to effectively respond to mine emergency situations. There were eight mine emergency alerts during Fiscal Year 1978.

Simulated alerts, including dispersal of equipment, were held at Waltonville, Ill., in July 1978; Sullivan, Mo., in August 1978; and Copper Hill, Tenn., in September 1978. Seismic field tests were made for testing in-mine seismic location systems to augment surface seismic techniques.

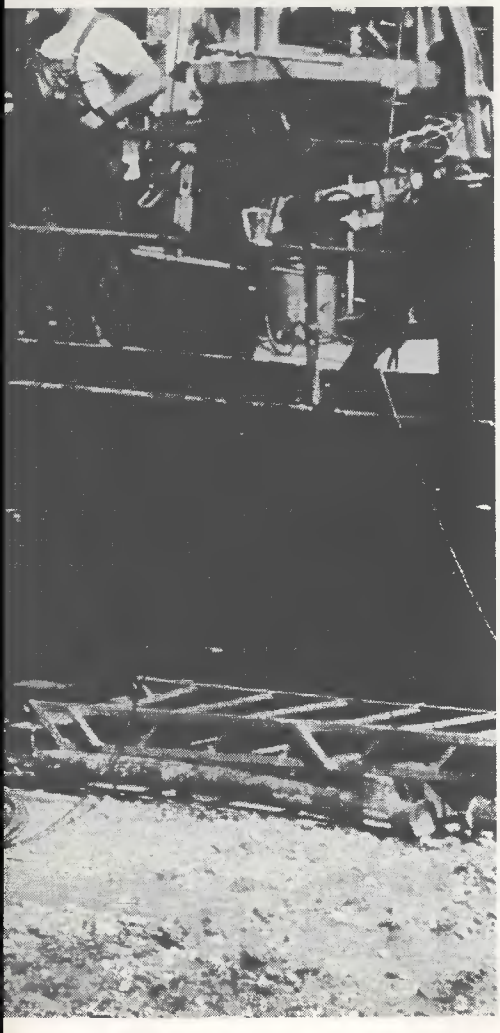
MSHA LIAISON WITH RESEARCH AND DEVELOPMENT PROGRAMS

MSHA's Technical Support directorate provides a link between research and development activities carried out by other agencies and the transfer of the technology developed to use in mining. All mine safety and health research is conducted by the Bureau of Mines, Department of the Interior, and the National Institute for Occupational Safety and Health (NIOSH) in the Department of Health, Education, and Welfare. Through memoranda of understanding with the Bureau of Mines and NIOSH, the Mine Safety and Health Administration contributes to overall direction of the programs by generating proposals for research projects, monitoring research programs which have a yearly funding of about $60 million, and aiding in the transfer of new technology to use by industry. Technical Support also monitors coal mining research and development programs carried out by the Department of Energy, and, through a memorandum of understanding, will cooperate with the DOE in development of coal production technology which will increase U.S. coal productivity with improved health and safety.





Above, in the acoustic calibration laboratory of MSHA's Pittsburgh Technical Support Center, an inspector's field calibrator is adjusted to ensure its accuracy.



Left, mine rescue capsules like the one pictured here are maintained by Technical Support's Mine Emergency Operations Group. MSHA maintains state-of-the-art rescue equipment capable of being deployed to a mine disaster area in any part of the country.

section 8

Education and Training

During Fiscal Year 1978 MSHA provided education and training programs to the mining community through 10 training centers and 24 field offices. MSHA instructors at these facilities tailored training programs for mines with particularly hazardous conditions or for mines having a high rate of injuries. They also conducted mine safety and health courses at the request of mine operators, unions, State and other organizations.

MSHA's main emphasis during 1978 was to aid the mining industry in identifying training needs, developing training courses, and evaluating training programs. MSHA not only monitored training for compliance with statutory requirements, but also analyzed results of training activities to determine where added training would be necessary.

In the past, the emphasis has been on actual platform teaching by education and training personnel. Less emphasis is now placed on this activity, and most of the teaching that MSHA does is in the areas of supervisory, mine rescue and cooperative instructor training. To help extend training to the greatest number of persons, MSHA stresses training and certification of industry cooperative instructors. In order for the mining industry to comply with the training requiremenrts, 7,100 cooperative industry instructors conducted various courses for more than 310,000 attendees during FY 1978.

More than 23,000 classes in mine health and safety subjects were taught by MSHA, State, or coopetative industry instructors during FY 1978 in 18 different subject areas. Table 35 shows major areas of training and miner attendance by subject for FY 1978.

NEW EDUCATION AND TRAINING REGULATIONS

Under the Federal Mine Safety and Health Act of 1977, mine operators are required to train employees and to submit training plans for approval by MSHA. New underground miners who have had no underground experience must receive a minimum of 40 hours of health and safety training, and inexperienced surface miners must have a minimum of 24 hours of training. All miners must be provided with a minimum of 8 hours of annual refresher training, and any miner being assigned to a new task shall be trained in safety and health aspects of that task. Evaluation of the approved plans is the responsibility of the training centers.

In order to assist the operators in implementing the 1977 Act, the Training Centers scheduled over two hundred informational meetings on the new training regulations. Workshops were also scheduled to assist operators in developing their training plans, and personnel from State agencies and educational institutes were trained in how to assist the industry in complying with the new training regulations. Modules for training and retraining of miners were also developed and made available to the industry.

AUDIO VISUAL SERVICES

Motion pictures and visual aids are an integral part of MSHA's total education and training effort. Through specially trained crews, MSHA's Audio Visual Services division provides the mining community with safety and health training films and video tapes. This office also produces training materials and instructors' guides in a variety of multi-media formats. They design and display MSHA exhibits and provide resource persons and services for varied audio-visual needs.

In FY 1978, films produced by MSHA were shown approximately 26,000 times to 637,000 persons.

During this year, five films were produced: "Rock Bolting Safety," "Mine Emergency Operations," "Safety in Surface Coal Mining," "Twenty Five Feet From the Face," and "Hazards Around Bins and Hoppers."

There were three videotape-recorded training programs produced in addition to occupational health program tapes for metal and nonmetal activities. Also, preliminary work was done for a metal and nonmetal mine inspector training program.

The training materials group of this section are continuing development of the instructional program entitled, "Mine Safety Program Rating Procedure." Training programs, which include the instructors' guides and visual aids on "Permissible Methanometer M-502," "Gravemetric Mass Respirable Dust Sampling-Metal and Nonmetallic Mining Industry," "Mining Accident Prevention" and "Metal and Nonmetal Noise Measurement Training Course," have been completed.

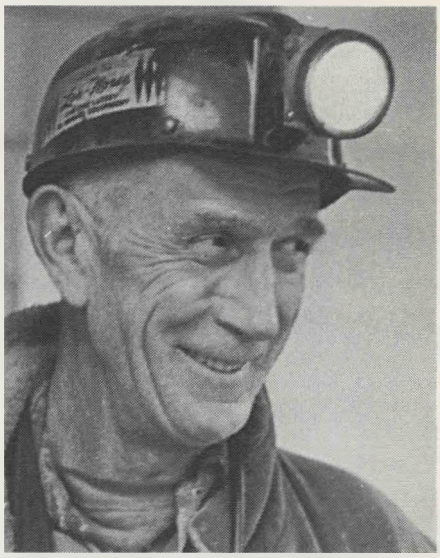
Also, the photographic group expanded their photo lab capabilities during the year. They provided photographic visuals and exhibits for MSHA programs as well as revised and updated existing ones to reflect changes resulting from the 1977 Act. These exhibits were set up and manned at the following meetings and conventions: Denver Safety Council, Western Safety Council, West Virginia Safety Council, American Mining Congress, Salute to Coal, and the King Coal Show in Casper, Wyo. Others were the Minerals Open House and the United Mine Workers Convention.

HOLMES SAFETY ASSOCIATION

The Holmes Safety Association was established in 1926 by the board of directors of the Joseph A. Holmes Safety Association, in cooperation with the Bureau of Mines. The Association's objectives are to prevent fatalities and injuries and to improve health and safety in all phases of the mineral industries. During the fiscal year, plans were initiated to bring the Joseph A. Holmes Association under the sponsorship of MSHA.

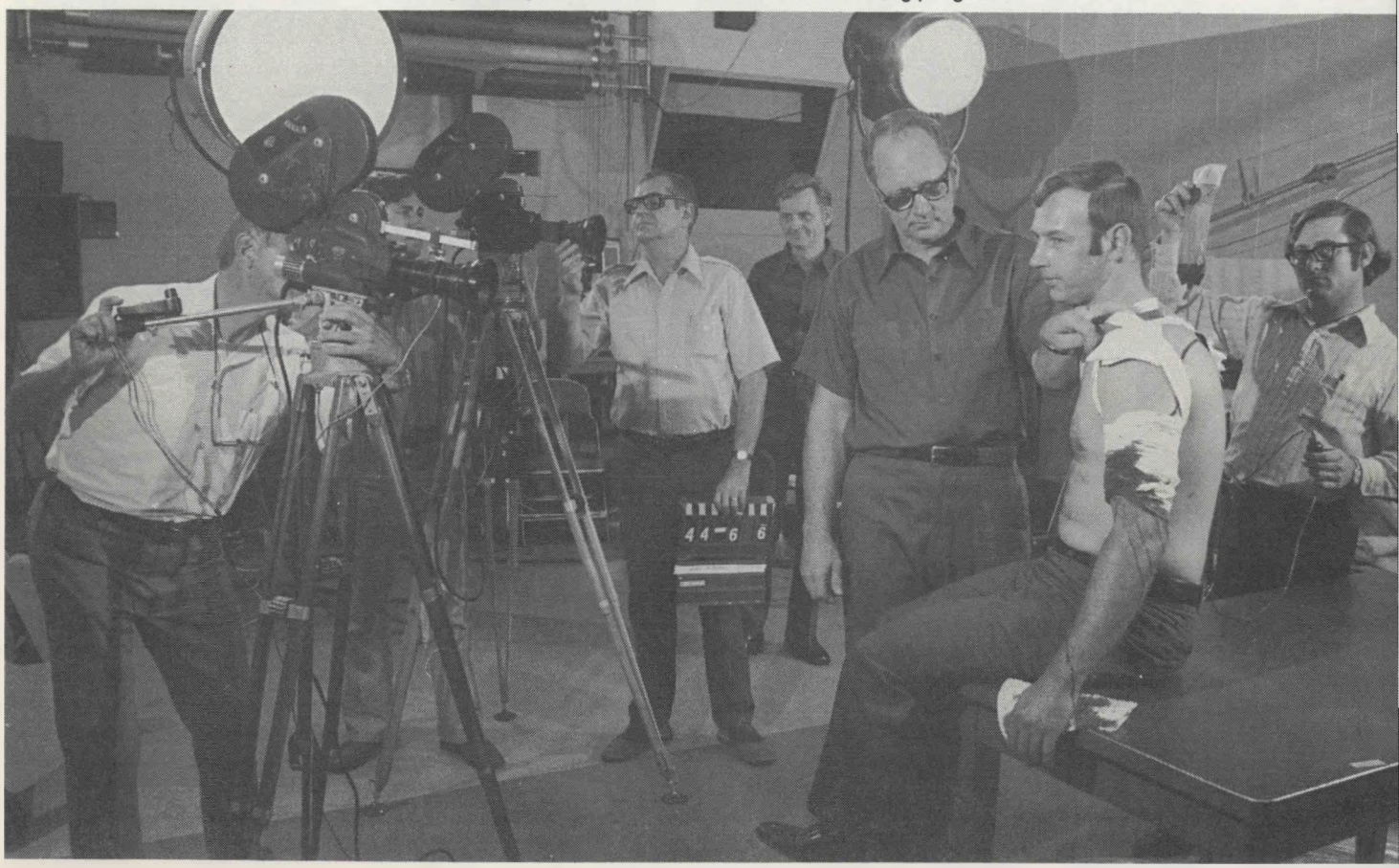
The National Council of the Holmes Safety Association now represents four State and 40 district councils, 1,389 safety chapters with approximately 190,670 members within 41 mineral industry States, plus the provinces of British Columbia, Ontario, and the Northwest Territory of Canada.

During FY 1978, association chapter mines reported over 68,160 safety meetings with 889,719 members attending. State and district councils held 111 meetings, with 7,243 members present. Safety topics are developed and distributed monthly by the HSA. They are used in mine and mill



chapters for weekly safety training sessions with employees. Approximately 200,000 copies of monthly safety topic material were distributed during FY 1978.

Films and other audio-visual presentations on safety hazards, first aid, emergency rescue procedures and other subjects are an important part of MSHA's education and training program.



SEMINAR PROGRAM

In FY 1978, MSHA held 16 mine safety and health seminars providing training to union safety committeemen, other union officials, mine management, non-union personnel and State personnel. Seven of these seminars were given for coal mining personnel and nine for metal and nonmetal mining personnel comprising a total attendance of 815 persons. These programs covered such problem areas as roof support, ventilation, haulage and others. Accident data were analyzed and training needs identified and incorporated into the program at each seminar.

STATE GRANTS PROGRAM

The Mine Safety and Health Administration awards financial grants to mining States to assist in developing and enforcing effective mine safety and health laws; improve State workers' compensation and occupational disease laws and programs related to mine employment; and promote Federal-State coordination and cooperation in improving the health and safety conditions in the mines. The Federal Coal Mine Health and Safety Act of 1969 authorized the State Grants program for coal mines, and the 1977 Act extended it to include metal and nonmetal mines. Table 36 shows State Grant funding to the various States since the program was initiated in FY 1971.

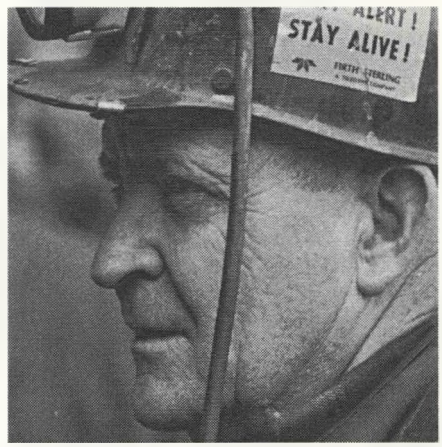


TABLE 35.—Attendance at mine safety and health courses

Subject	Metal	Nonmetal	Sand and Gravel	Crushed Stone	Coal	Total
Accident Prevention	24,941	10,154	594	3,333	225,944	264,966
First Aid	11,142	7,058	2,357	2,646	59,335	82,538
Rescue Training	1,023	446	3	47	2,179	3,698
Mine Emergency	18,940	6,804	159	1,992	2,672	30,567
Noise and Dust	2	8	0	4	2,530	2,544
Instructor Training	445	343	125	172	1,428	2,513
Total	56,493	24,813	3,238	8,194	294,088	386,826

TABLE 36.—State Grant funding, FY 1971-1978

State	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77	FY 78*	Total*
Alabama		67,180	75,000	90,000	42,000	265,835	177,079	334,480	1,051,574
Arkansas						43,538	65,090	90,000	198,628
Colorado		104,760				36,696	137,791	26,235	305,482
Idaho							23,493		23,493
Illinois		30,510	125,000	70,000	117,500	282,078	52,400	125,000	802,488
Indiana					35,166	45,280		73,225	153,671
Kentucky	115,183	79,915	420,000	295,038	210,000	528,000	1,221,641	1,410,455	4,280,232
Montana			129,969	60,443	76,000				266,412
Ohio		58,557	10,000	40,000					108,557
Oklahoma				75,000	34,170	133,283	128,000	213,580	584,033
Pennsylvania				107,676	105,000	133,000	212,548	303,750	861,974
Tennessee						20,000	100,081	156,420	276,501
Utah				60,000	15,000	145,000	245,797	220,300	686,097
Virginia		97,838	100,000	150,000	243,000	200,514	519,449	427,633	1,738,434
West Virginia	271,902	66,000	285,272	143,843	143,843	150,000	234,860	383,661	1,703,182
Wyoming							159,553	34,647	194,200
Total	387,085	504,760	1,145,241	1,092,000	1,045,480	1,983,224	3,277,782	3,799,386	13,234,958

* Preliminary Data

appendix

SIGNIFICANT MINE SAFETY AND HEALTH REGULATIONS FISCAL YEAR 1978

October 17, 1977-Notification, Investigation, Reports and Records of Accidents, Injuries, Illnesses, Employment, and Production in Mines – 42 F.R. 55568 – 55577 – Proposed Rules–30 CFR Part 50. (The final rules were published on Dec. 30, 1977.)

November 16, 1977-Use of Filter-Type and Self-Contained Self-Rescuers in Underground Coal Mines–42 F.R. 59300–59302–Proposed Rules – 30 CFR Part 75, Sections 75.1714 through 75.1714–2. These proposed rules provide for oxygen-generating self-rescue equipment.

December 30, 1977-Notification, Investigation, Reports and Records of Accidents, Injuries, Illnessess, Employment, and Production in Mines–42 F.R. 65534–65540–Rules and Regulations–30 CFR Part 50. These regulations consolidate two systems for investigating and reporting mine accidents, injuries and illnesses for coal and metal/nonmetal mining.

March 3, 1978-Representative of Miners – 43 F.R. 9108 – 9109 – Proposed Rules–30 CFR Parts 40, 81. (The final rules were published on July 7, 1978.)

March 3, 1978-Notification of Legal Identity–43 F.R. 9109–9112–Proposed Rules–30 CFR Parts 41, 82. (The final rules were published on July 7, 1978.)

March 3, 1978-Procedures for Processing Hazardous Conditions Complaints–43 F.R. 9113–9114–Proposed Rules–30 CFR Part 43. (The final rules were published on July 7, 1978.)

March 3, 1978-Rules of Practice for Petitions for Modification of Mandatory Safety Standards–43 F.R. 9114–9119–-Proposed Rules–30 CFR Part 44. (The final rules were published on July 7, 1978.)

March 3, 1978-Civil Penalties for Violation of the Federal Mine Safety and Health Act–43 F.R. 9120–9124–Proposed Rules–30 CFR Part 100. (The final rules were published on May 30, 1978.)

April 25, 1978-Interpretative Bulletin-Section 103(f) of the Federal Mine Safety and Health Act of 1977–43 F.R. 17546–17549. The bulletin discusses "walkaround rights" of miners and their representatives in connection with their participation in inspections made by MSHA inspectors.

May 30, 1978-Civil Penalties for Violations of the Federal Mine Safety and Health Act–43 F.R. 23514–23519–Rules and Regulations–30 CFR Part 100. The rule includes guidelines to be used by MSHA in determining the amount of a proposed penalty and the procedures to be followed in issuing and contesting a proposed penalty.

July 7, 1978-Representative of Miners–43 F.R. 29508–29510–Rules and Regulations–30 CFR Parts 40, 81. The rule governs the identification of representatives of miners and sets forth filing requirements for such representatives. 30 CFR Part 81 is revoked.

July 7, 1978-Notification of Legal Identity–43 F.R. 29510–29513–Rules and Regulations–30 CFR Parts 41, 82. This rule requires each operator of a mine to file specified information with the Secretary respecting the operator's legal indentity and sets forth the procedures for filing such notification of legal identity. 30 CFR Part 82 is revoked.

July 7, 1978-Procedures for Processing Hazardous Conditions Complaints–43 F.R. 29513–29516–Rules and Regulations–30 CFR Part 43. The rule sets out procedures for handling safety and health complaints.

July 7, 1978-Rules of Practice for Petitions for Modification of Safety Standards–43 F.R. 29516–29524–Rules and Regulations–30 CFR Part 44.

July 18, 1978-Health and Safety Training and Retraining of Miners–43 F.R. 30990–30999–Proposed Rules–30 CFR Part 48. (Final rules for training and retraining of underground and surface miners were published in October 1978.)

July 31, 1978-Mine Rescue Teams-Advance Notice of Proposed Rules–30 CFR Part 49. The draft proposed rules would require the operator of each underground mine to have available at least two mine rescue teams and establish the requirements for such teams and mine rescue stations. (The rules were proposed in January 1979.)

September 12, 1978-Coal Mine Noise Dosimeters-43 F.R. 40760-40764-Rules and Regulations-30 CFR Part 70, Mandatory Health Standards-Underground Coal Mines; 30 CFR Part 71, Mandatory Health Standards-Surface Coal Mines. These rules permit the use of personal dosimeters for measurements of noise exposure.

September 12, 1978-Metal and Nonmetal Mines-Advisory Standards-43 F.R. 40766–40799–Proposed Rules – 30 CFR Parts 55, 56 and 57. The proposed rules would make mandatory and enforceable certain advisory standards promulgated under the repealed Federal Metal and Nonmetallic Mine Safety Act of 1966. (The final rules were published in August 1979.)

FIGURE A-1.—Department of Labor, Mine Safety and Health Administration, Headquarters Organization

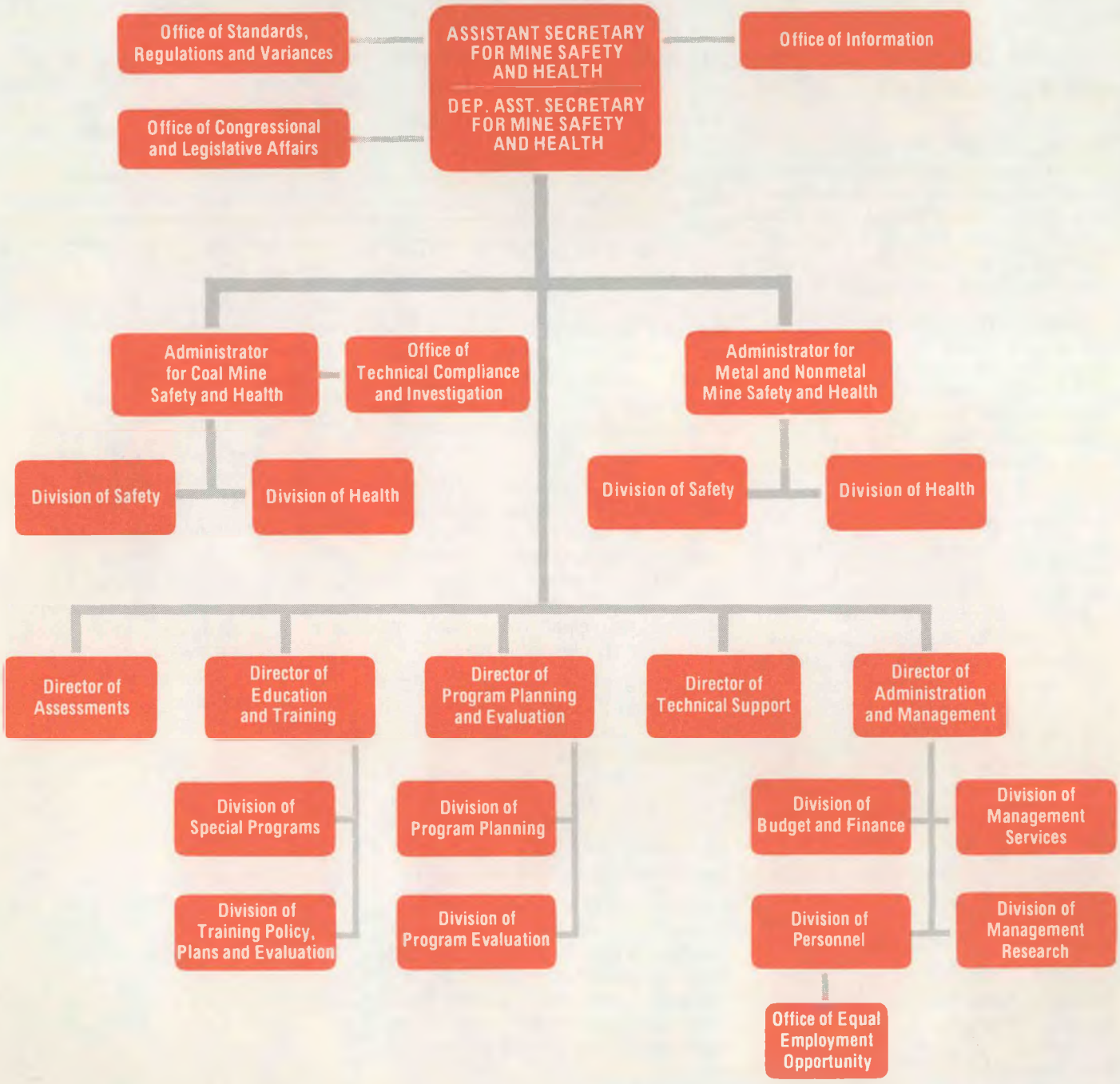


FIGURE A-2, Department of Labor, Mine Safety and Health Administration, Field Organization

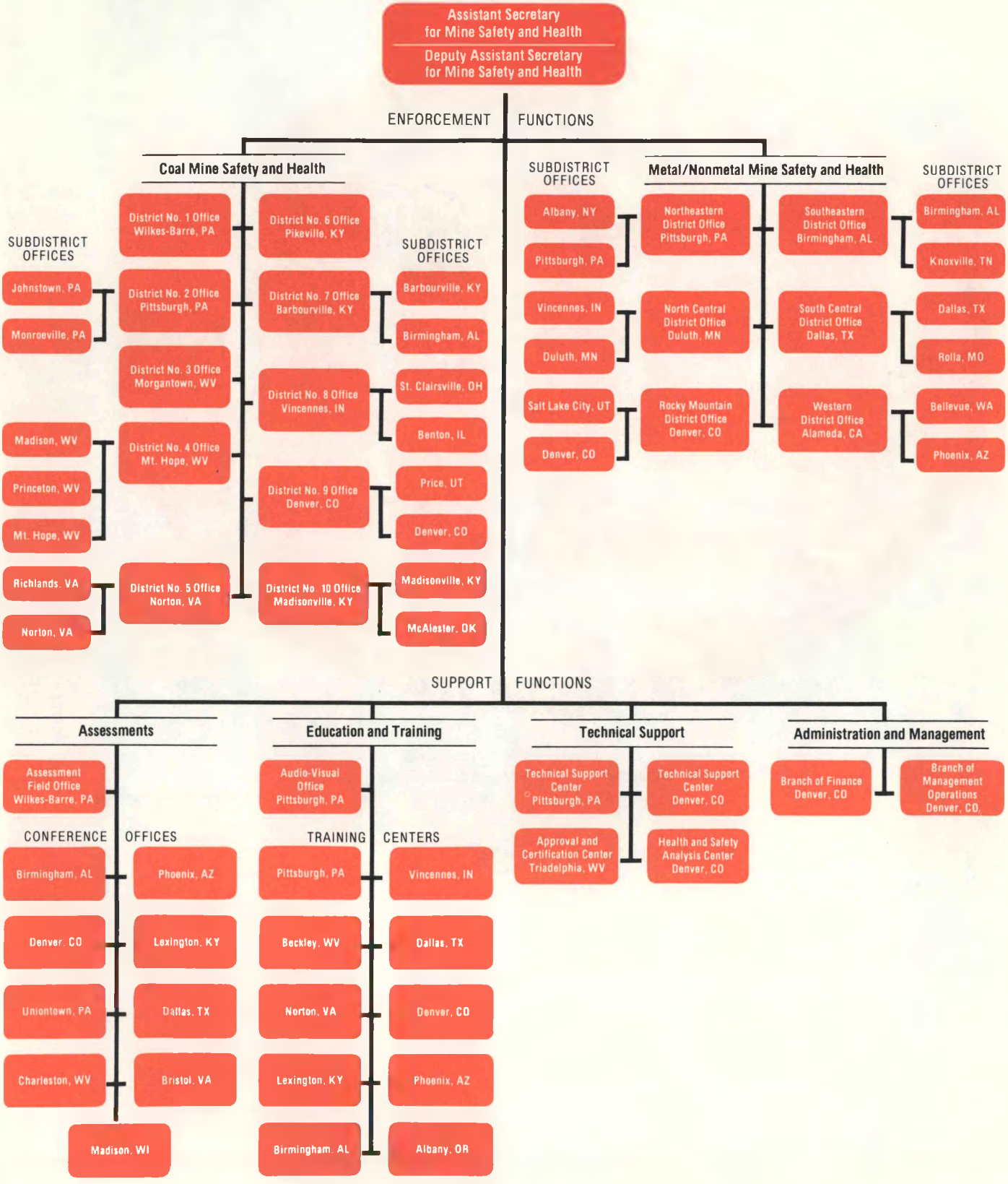
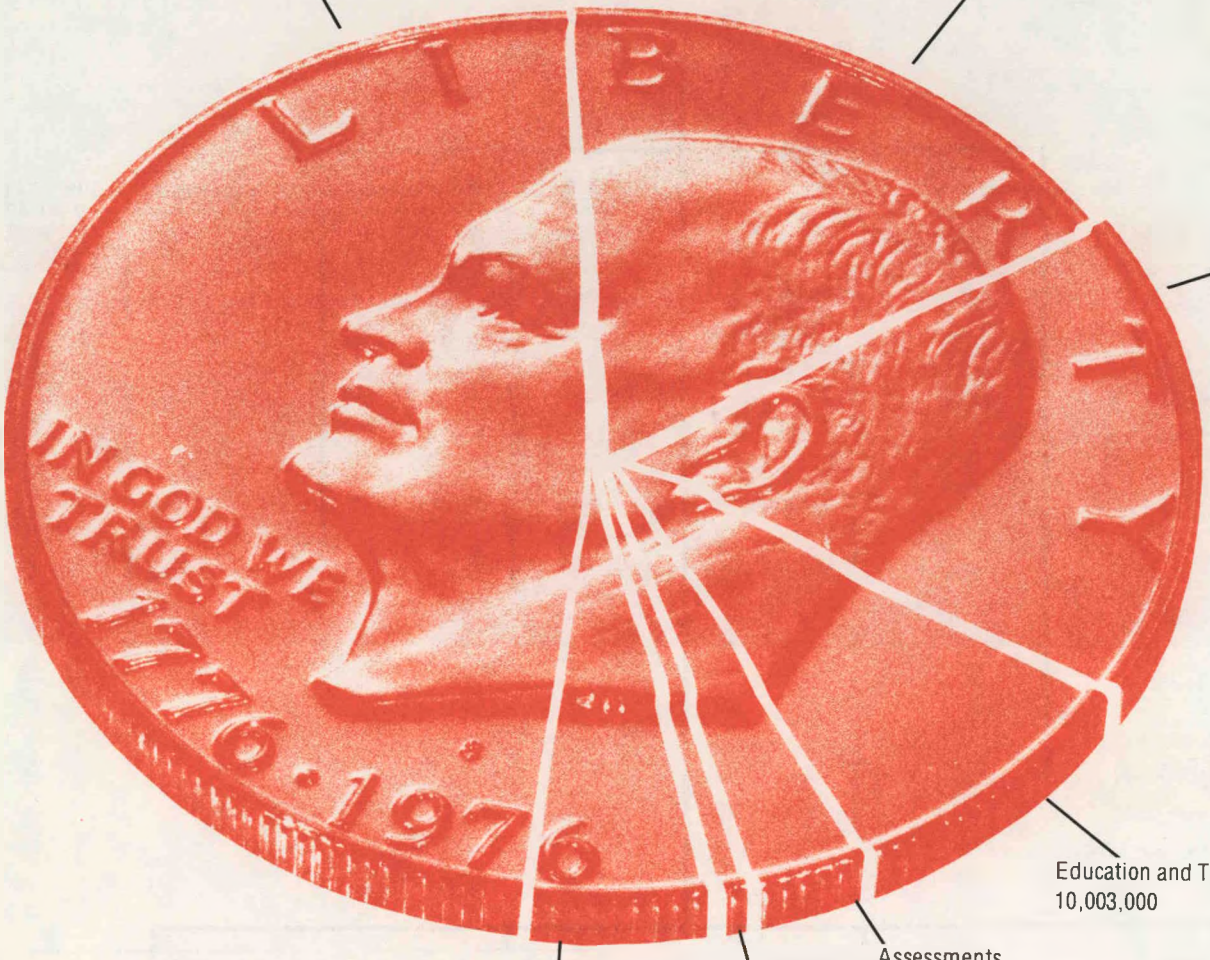


FIGURE A-3.—Budget, Fiscal Year 1978.



Total: 111,301,000

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980 O— 326-970/6492