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

Fiscal Year 1980

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U.S. Department of Labor
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Introduction

Under the Federal Mine Safety and Health Act of 1977, the Mine Safety and Health Administration (MSHA) is responsible for protecting the health and safety of about 550,000 employees at more than 20,000 mines and associated operations across the United States. The agency issues regulations that are needed to guard against safety and health hazards at various types of mining operations, makes inspections of all operations under its jurisdiction, and assesses civil monetary penalties for safety and health violations as the Act requires. In addition, MSHA assists operators in complying with regulations, strengthening their safety programs and improving miner training. The agency cooperates with industry, labor, equipment manufacturers, state mine agencies, educational institutions and other members of the mining community to assure the protection of workers in this vital but hazardous industry.

The 1977 Act, effective March 9, 1978, extended the Federal Coal Mine Health and Safety Act of 1969 to cover metal and nonmetal (non-coal) mining, and otherwise amended several of its provisions.

In FY 1980, ending Sept. 30, 1980, most new programs required by the 1977 Act were established and functioning. MSHA concentrated on issuing the few remaining new regulations the Act required, revising existing regulations and programs to improve their effectiveness, and promoting increased cooperation between government, industry and labor.

MSHA inspectors made approximately 100,000 inspections during FY 1980. These included four complete annual inspections at underground mines and two at surface mines as required by the Act. Other inspections and investigations were conducted to check on correction of violations cited during the regular inspections, to focus on specific aspects of safety and health, to make spot checks for methane in mines with excessive amounts of this explosive gas, to assist operators with compliance problems, and to determine the causes of fatalities and other serious accidents. MSHA also investigated complaints of safety- and health-related discrimination, possible knowing and willful violations, and requests from operators for variances from mandatory safety standards.

The Resident Inspection Program, which provides for a full-time MSHA inspector at selected coal mines, was expanded to include a new category of especially hazardous operations. The Program in Accident Reduction, providing increased inspection and consultation for selected metal and nonmetal mines, continued to produce good results; lost-day accidents at participating mines declined by 32 percent.

To promote cooperation with industry and reduce risks to miners in the particularly hazardous "start-up" period at new operations, MSHA in fiscal 1980 instituted Compliance Assistance Visits for metal and nonmetal mines, during which an inspector points out potential violations, but MSHA does not assess penalties. This service is available on request for new mines that have not started producing; seasonal, closed or abandoned mines before reopening; and new installations or equipment in an operating mine. Inspectors conducted more than 2,000 of these visits in FY 1980.

A total of 244 miners lost their lives in work-related accidents in FY 1980. The fatal-injury rates in coal and non-coal mining each remained at the same level as in fiscal 1979, in both cases the lowest levels in U.S. history. The rate of all reported coal mine injuries increased slightly, while the all-injury rate for metal and nonmetal mining declined by 10 percent.

FY 1980 was free of major mine disasters. However, an increase in roof fall fatalities in underground coal mines during the last half of calendar 1979 caused concern and prompted MSHA to redouble its roof control efforts in cooperation with industry. The agency also promoted the use of improved technology to prevent roof fall accidents and made special evaluations of roof control

training at underground coal mines. The number of roof fall deaths declined in the latter part of fiscal 1980.

MSHA in FY 1980 issued the final report on its investigation of the June 18, 1979, explosion disaster at the Belle Isle salt mine, in which five miners died. Partly as a result of this investigation, the agency stepped up its emphasis on identifying non-coal mines that have hazardous amounts of methane and must be required to meet special safety standards to prevent explosions.

Two new regulations specifically required in the 1977 Act were issued in final form in fiscal 1980. One rule, which took effect July 31, provides procedures for integrating independent contractors working at mines into MSHA's enforcement program. The 1977 Act made such contractors responsible for their own violations of standards and regulations. The other final rule, effective in FY 1981, requires all underground mines to have rescue teams available in case of emergency and establishes requirements for these teams.

Another rule required in the 1977 Act and proposed during the fiscal year would implement the Act's provisions for establishing criteria for determining when a pattern of violations exists. Additional required regulations governing surface construction on mine sites, circulated in draft to the mining community the year before, were being prepared for proposal.

Also issued and proposed in FY 1980 were a series of revised regulations related to the control of respirable coal mine dust, the cause of disabling and even fatal coal workers' pneumoconiosis. A final rule changed MSHA's definition of respirable dust to accord with the Act's wording, and substantially revised requirements for underground coal mine operators to take regular samples of respirable dust in the mine air at selected underground locations. Additional changes were proposed that cover sampling at surface locations and miners' participation in the sampling program. These regulations are intended to simplify the sampling requirements while ensuring results that accurately show whether coal miners are exposed to excessive respirable dust. Also proposed were regulations on the statutory right of miners with evidence of pneumoconiosis to work in a low-dust area of the mine.

A substantial number of existing standards and regulations were under review in FY 1980. Besides proposing changes in civil penalty assessment regulations, MSHA requested comments from the mining community as part of a comprehensive review of three major groups of safety and health standards: those specifically applicable to underground metal and nonmetal mines, to open pit metal and nonmetal mines, and to sand and gravel and crushed stone operations. Many responses were received, and the agency was setting priorities for revising these standards at the fiscal year's end. A number of coal mine regulations, especially those on surface mining, were also being reviewed to assess the need for revisions.

In accordance with the Act's increased emphasis on protecting miners' health, several improved health standards for metal and nonmetal mining were under development during the fiscal year with the assistance of the Health and Human Services Department's National Institute for Occupational Safety and Health (NIOSH). In addition, MSHA received a petition for an emergency temporary standard on radiation. The 1977 Act provides for emergency standards, bypassing normal rulemaking procedures, when necessary to protect miners from grave danger. The agency undertook to review the current radiation standard to determine the need for an emergency standard reducing the permitted exposure.

In fiscal 1980, MSHA assessed civil monetary penalties—mandatory under the Act—on some 165,000 violations of safety and health standards. Processing time for these assessments was the shortest ever. Assessment personnel held conferences on more than 120,000 violations with operators who wished to discuss MSHA's initial proposed assessment; in most cases, the conference resolved the issues and the penalties were paid. Also during FY 1980, MSHA conducted a review of the assessment regulations as promised when they were issued in 1978. After review of written comments on a draft and informal meetings with members of the mining community, MSHA early in FY 1981 formally proposed changes in the regulations to improve the assessment program's effectiveness.

MSHA's Directorate of Technical Support, Directorate of Education and Training, and National Mine Health and Safety Academy continued to provide services for MSHA's enforcement activities and the mining community.

Technical Support provided laboratory and other technical services for enforcement programs, assisted enforcement personnel and operators on problems in complying with mandatory standards and in emergency situations, worked to promote use of improved safety and health technology in the industry, tested and approved mining equipment, and compiled mining accident and injury statistics. The directorate

took steps to improve a number of its programs in FY 1980. It also acted as MSHA's liaison with the Bureau of Mines, which conducts mine safety and health research under the 1977 Act. The Bureau's research activities under the Act during FY 1980 are presented in volume 2 of this report.

Education and Training continued to approve mine operators' plans for training their employees under comprehensive training regulations mandated in the 1977 Act. The directorate also assisted operators in developing plans, evaluated existing training programs, and maintained programs for certifying miners to perform critical tasks. In FY 1980, special surveys of roof control training were conducted at underground coal mines, and the directorate developed the necessary programs to train and qualify coal miners under the new respirable dust sampling regulations. Education and Training's state grants program, in the second year it has covered metal and nonmetal mining as well as coal mining, continued expanding and funded the mandatory miner training in many states.

MSHA's appropriations for FY 1980 exempted operations mining certain metal and nonmetal minerals from enforcement of the training regulations. However, the agency continued to assist many operations in these categories with their training efforts at the operator's request.

Nearly 14,000 students from MSHA, other government agencies, industry and labor attended the 90 resident courses offered in FY 1980 at the National Mine Health and Safety Academy. The Academy also offered correspondence courses and provided training materials.

The independent Federal Mine Safety and Health Review Commission, established in the 1977 Act to adjudicate legal cases arising under the Act, handled an increasing caseload in FY 1980. Its administrative law judges and presidentially appointed commissioners continued to issue significant decisions interpreting the Act's provisions. Notably, the commissioners decided cases involving a section that provides for a representative of the miners to accompany the MSHA inspector at no loss in pay. The commissioners decided that the mine operator is not required to pay the miner's representative when accompanying an inspector on inspections other than regular, mandatory inspections. However, the operator is required to pay two or more miners' representatives if they separately accompany different MSHA inspectors who are simultaneously conducting a regular inspection in different parts of the mine.

Additional significant cases were decided in various courts of appeals. In an exception from past precedents, a Federal district court judge declared unconstitutional the Act's provision for warrantless inspections on mine property. The Labor Department's Office of the Solicitor recommended appeal to the Supreme Court, which reversed the district court decision in June of 1981.

MSHA continued to cooperate with numerous other Federal agencies to prevent duplication of effort, provide specialized technical assistance, and promote miners' safety and health. During FY 1980 MSHA and the Treasury Department's Bureau of Alcohol, Tobacco and Firearms signed a new memorandum of understanding to supersede a 1971 agreement on explosives safety between their predecessor agencies. Under the new agreement and other guidelines issued during the year, MSHA inspectors inspect explosives storage facilities at mines for compliance with ATF regulations during routine safety and health inspections. The agencies also agreed to cooperate in developing new, uniform regulations for safe and secure storage of explosives and to exchange pertinent information.

Other new memoranda of understanding with the Labor Department's Employment Standards Administration and the National Labor Relations Board, concerned overlapping jurisdiction in discrimination complaints. MSHA also made an agreement with the Energy Department's Fossil Energy Division to ensure that safety and health protections are built into new mining technologies at an early stage of development.

Note on the Data in This Report

This annual report for fiscal year 1980 is the third to appear on a fiscal, rather than calendar, year basis. It covers the period from Oct. 1, 1979, through Sept. 30, 1980. Historical data presented in this report generally cover calendar years 1975 through 1977 and fiscal years 1978 through 1980. It should be kept in mind when using these data that there is a three-month overlap between calendar 1977 and fiscal 1978.

The current system used to record mining injuries was adopted Jan. 1, 1978, to make injury measures for mining comparable to those used for other industries by the Bureau of Labor Statistics. The new system changed the way in which injuries are classified: The category of "disabling injury," where the worker misses one or more days of work, was replaced with the category of "injury with days lost," which also includes cases where the worker stays on the job but is put on light duty for a day or more. Consequently, historical data on "disabling injuries" are not comparable with current data on "injuries with days lost," and no such data are included in this report. The report does include historical data on fatalities and on total reported injuries (which include fatalities), since these categories are comparable under the two systems.

The new recordkeeping system also changed the basis on which rates of injuries are reported, from injuries per 1,000,000 employee-hours to injuries per 200,000 employee-hours. Historical data on fatality rates and all-injury rates for years before 1978 have been converted to the new basis for ease of comparison.

Fiscal-year injury data are compiled before MSHA closes out its records for the calendar year and may therefore be subject to minor revisions.

Data on worktime, employment and injuries presented in this report are compiled from reporting by mine operators, which is mandatory. Unless otherwise indicated, data on mine office workers are included in the figures reported. It should be noted that the data cover only those mining operations currently subject to the 1977 Act; oil and gas extraction operations are not included as in Standard Industrial Classification 13.

section 1 *Coal Mine Safety and Health*

MSHA's Coal Mine Safety and Health Activity in FY 1980 maintained and improved a variety of enforcement programs covering some 5,700 operations nationwide, made special efforts to curb an unusual increase in roof fall accidents, and substantially revised the regulations under which operators regularly sample respirable dust in the coal mine atmosphere. The coal mine fatality rate remained at the lowest level in history, though total reported injuries increased slightly. At the same time, coal production broke all records for the second successive fiscal year.

Enforcement responsibilities included inspection of surface coal mines in their entirety twice and underground mines four times annually, as required by the Act. In addition, frequent spot inspections were made at mines with excessive liberation of methane gas or special hazards. To obtain a more complete picture of conditions at some mines, teams of inspectors made nearly 580 "impact inspections," more than 90 percent of them at underground mines. Coal mines that are either large and complex or especially hazardous were assigned full-time resident inspectors. District managers used the Mine Profile Rating System to select mines for special attention based on their injury rates, compliance records, and health and safety management systems. Mine operators' plans for roof control, ventilation, respirable dust control, hearing conservation, mine waste structures and shaft sinking were reviewed by technical and enforcement personnel. Additional inspections and investigations were made for other purposes, such as to focus on specific aspects of safety and health, to check for correction of violations previously cited, and to determine the causes of fatalities or other serious accidents. Operators' requests for variances from mandatory safety standards were evaluated, and special investigators investigated possible cases of discrimination related to health and safety, or civil or criminal violations of the Act's provisions.

Specialists made other investigations to assist operators with difficult safety problems involving mine power systems, means of compliance with relatively new illumination requirements, and methods of mining through plugged oil and gas wells. In conjunction with Technical Support, enforcement personnel also studied issues including diesel use underground, the use of fan sprays to minimize the possibility of methane ignitions at the working face, and possible development of two-entry longwall mining sections.

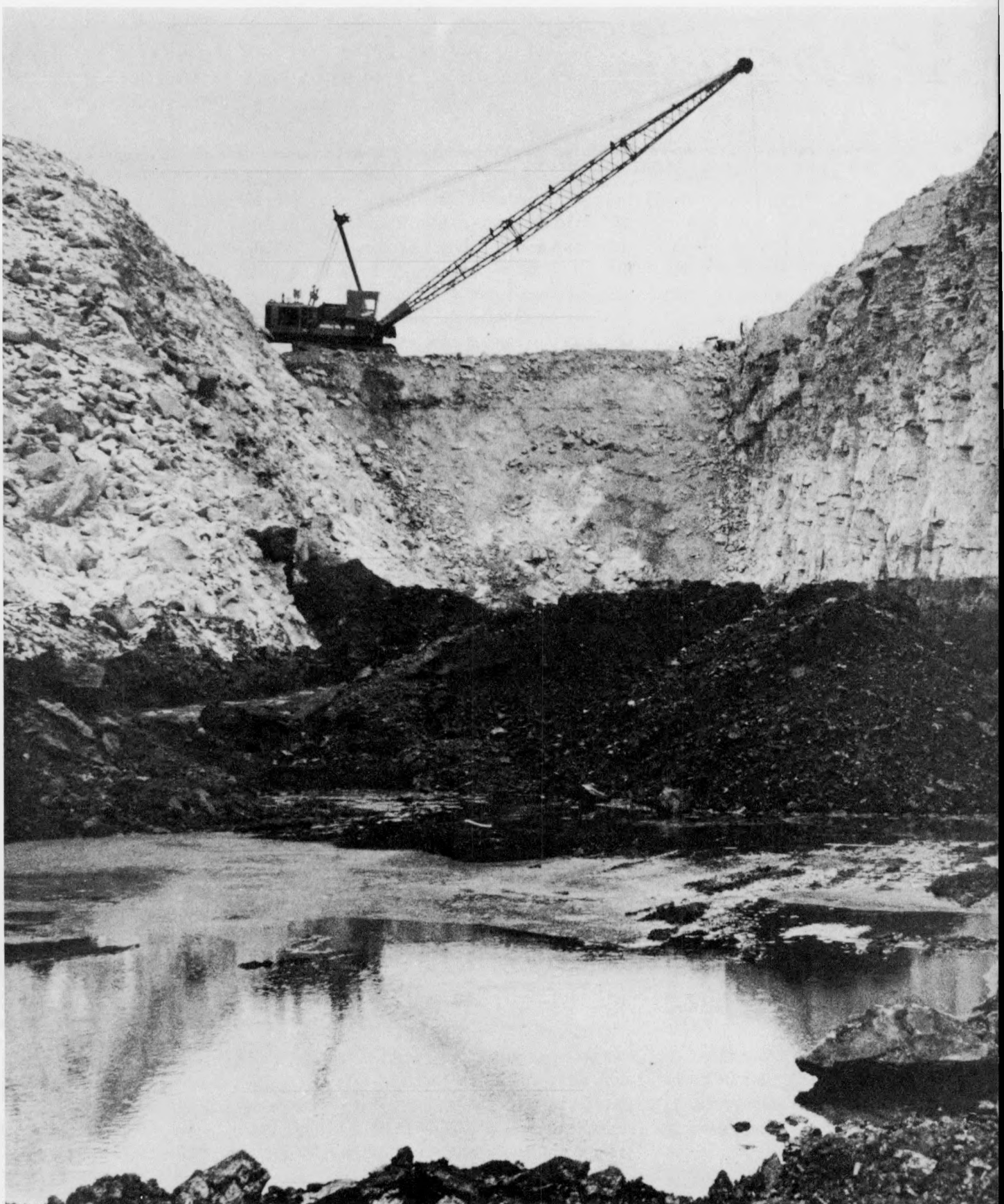
There were 130 coal mining fatalities in FY 1980, compared to 132 the previous fiscal year. The fatal-injury incidence rate remained at a record low of 0.06 per 200,000 employee-hours, the same as in fiscal years 1978 and 1979. However, the total number of reported injuries increased by about 630 over last year's total, and the all-injury incidence rate was 10.12 per 200,000 employee-hours, compared to 9.67 in FY 1979.

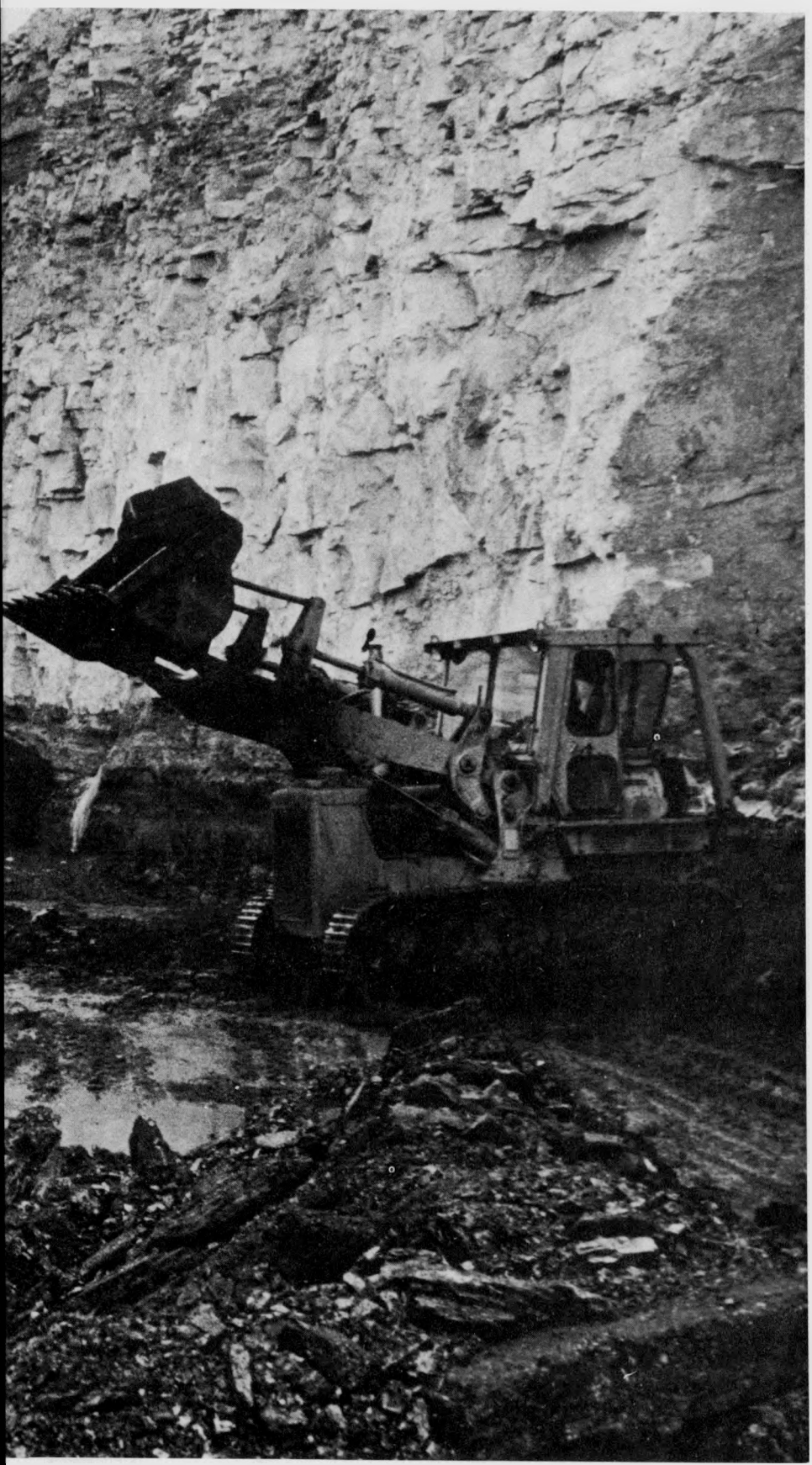
An alarming surge in fatalities due to roof falls occurred in the second half of calendar 1979 when 43 coal miners died from this cause. In response, MSHA increased its emphasis on enforcing safe roof control practices. Statistics for the last three quarters of FY 1980 indicated an improvement, with 25 roof fall fatalities recorded during this nine-month period.

Respirable dust continues to be the major health concern in coal mines because of its connection with black lung, which has disabled hundreds of thousands of coal miners. Mine operators are required to control respirable dust by engineering means and to take regular samples of dust in the mine atmosphere, which MSHA analyzes to determine compliance with the dust standard. New dust sampling regulations for underground coal mines, intended to make the dust sampling less burdensome to operators while ensuring accurate, representative results, were issued April 8. At the same time, MSHA proposed rules covering transfers of miners due to pneumoconiosis and new respirable dust sampling regulations for surface coal mine areas. A variety of other regulations, particularly on surface mining, were under review during the year to assess the need for revisions in light of current technology and mining methods.

Coal Mining Industry Statistics

During fiscal 1980, more than 240,000 people were employed in the coal mining industry, working at 2,161 underground mines, 2,237 surface mines, and 1,306 other surface operations under MSHA's jurisdiction (table 1). Employment in coal





mining increased by about 1,800 over that of the previous fiscal year. National coal production broke the record for the second year in a row, increasing by 74 million tons compared to FY 1979 figures. Approximately 834 million tons were mined, 334 at underground and 500 at surface mines.

Most underground and surface coal mines are small, employing fewer than 50 miners. However, the majority of underground coal miners work at mines with 150 or more employees. On the surface, most miners work at small mines with fewer than 50 workers.

Data on the number of coal mines in each state may be found in table 2.

Inspection Work Force

Nearly 1,400 coal mine inspectors and specialists worked to administer Federal coal mine safety and health regulations during FY 1980. Coal mine inspectors operated from 10 district offices, 18 subdistrict offices and 68 field offices throughout the 26 coal-producing states (figure 1).

The coal mine safety and health enforcement work force numbered 1,797 on Sept. 30, 1980, as compared to 1,853 at the end of fiscal 1979. Of this number, 1,367 were authorized representatives of the Secretary (ARs), 35 were in training to become ARs, and 395 were support personnel. The AR category includes inspectors, district and subdistrict managers, engineers and specialists.

At a surface coal mine, a bulldozer loads coal after the dragline, at left, has removed the overburden.

Inspection Statistics and Trends

MSHA conducted 79,295 coal mine inspections and investigations during FY 1980, 55,223 at underground mines and 24,072 at surface mines and facilities (table 3). Total inspections and investigations increased over the number made in recent years; however, regular inspections decreased slightly compared to FY 1979 (table 4).

Underground inspections included 7,325 spot checks at mines designated for frequent inspections because of excessive methane or other special hazards. There were 204 coal mines designated for such inspections at the fiscal year's end (table 5).

Additional inspections and investigations focused on specific aspects of safety and health. Electrical inspectors and engineers made 6,400 electrical inspections and 1,539 electrical investigations at coal mines. Other specialists inspected mine elevators, coal mine waste impoundments, dust control and other safety and health conditions. MSHA also made 7,450 inspections of explosives storage areas at coal mines under its agreement with the Bureau of Alcohol, Tobacco and Firearms.

Table 2 gives coal mine inspection and investigation data by state.

MSHA inspectors issued 129,921 citations to coal mine operators and independent contractors during the fiscal year for violations of safety and health regulations or of the 1977 Act (table 6). These citations encompassed virtually the entire range of safety and health conditions and practices. At underground mines, violations of electrical equipment regulations were the type most often cited; at surface mines and facilities, the most frequently cited violations involved safeguards for mechanical equipment (figure 2).

A total of 5,270 orders of withdrawal were issued at coal mines during the fiscal year, 890 because of an imminent danger to the miners, 1,672 for noncompliance with orders or citations, and the remainder for other reasons (table 6). For comparison with the number of citations and orders issued in past years, see table 4.

MSHA also responded to more than 225 telephone messages through a 24-hour "hotline" message service that has been provided for several years. This service provides for anyone concerned with the health and safety of coal miners the opportunity to report potentially hazardous conditions or practices to MSHA. Each such report was transmitted to the appropriate office, which made a special inspection or took other appropriate action.

Coal Mine Fatalities

There were 130 coal mining fatalities during FY 1980, a decrease from the 132 fatalities in FY 1979 (table 7). This was the second lowest number of coal mining deaths in any year; the only year with fewer was FY 1978, during which there was a major strike lasting three months. The fatal-injury incidence rate remained at 0.06 per 200,000 employee-hours (table 8).

Falls of roof have traditionally been the No. 1 killer in underground coal mines, and an unusually large number of such accidents occurred late in 1979. The trend was reversed in FY 1980, however, when roof falls claimed 43 of the 101 lives lost at underground coal mines, compared to 62 in calendar 1979 (table 9). In surface mining, the most frequent type of fatal accident involved haulage equipment.

Also as in previous years, new employees and workers relatively inexperienced in a job tended to suffer the greatest number of fatal injuries. Forty-three, or 33 percent, of the victims had one year or less experience in their job when they were killed; 81, or 62 percent, had less than five years' experience (table 10).

More supervisors and foremen died in coal mining accidents than persons in any other mining occupational group (table 11). Table 12 gives data on fatalities and fatality rates during the fiscal year by state.

Historically, MSHA and its predecessor agencies have encountered coal mine operators unwilling to be inspected as required under both the 1969 and 1977 Acts. Other mine operators have failed to notify the agency of their intent to open a coal mine, also required by law. From the 1969 Act's effective date through FY 1980, 12 fatalities occurred at coal mines in these two groups, three of them in FY 1980 alone. MSHA is making efforts to ensure that such operations are registered and inspected as mandated by Congress.

Coal Mine Injuries

The total number of reported injuries in coal mining increased about 3 percent in FY 1980 compared to FY 1979; the all-injury incidence rate increased about 5 percent but remained below figures prior to FY 1979 (tables 13 and 14). There were 22,515 injuries reported during the fiscal year and the all-injury incidence rate was 10.12 per 200,000 employee-hours.

Table 12 shows total reported injuries and all-injury incidence rates by state for FY 1980.

Special Enforcement Activities

Protection From Roof Falls

In FY 1980, following the surge of roof fall fatalities in late 1979,

MSHA increased its emphasis on protecting miners from falls of roof, face and rib, the most frequent cause of fatal accidents in underground coal mines. Statistics on accidents and violations were compiled, an effort was made to ensure better compliance with roof control plans, and quarterly training in roof control hazards and enforcement procedures was instituted for coal mine inspectors. Selected enforcement personnel also took part in workshops given by MSHA Technical Support specialists on the use of remote sensing techniques to predict areas with potential roof control problems in advance of mining.

Since regulations requiring cabs and canopies on electric equipment used at the coal mine face became effective in 1973, progress in installing cabs and canopies has been substantial in mines with mining heights over 42 inches. Because of unsolved human engineering problems including impaired operator vision, cramping and fatigue, the time allowed to install cabs and canopies in mining heights less than 42 inches has been extended indefinitely. As of FY 1980, however, all electric face equipment in underground coal mines with a seam height over 60 inches had either been fitted with a cab or canopy or, when appropriate, a petition for modification had been granted.

In FY 1980, 65 coal mines received MSHA approval to use automated temporary roof control systems in place of manually set temporary supports. Use of these machines, which is rapidly increasing, reduces miners' exposure to unsupported roof.

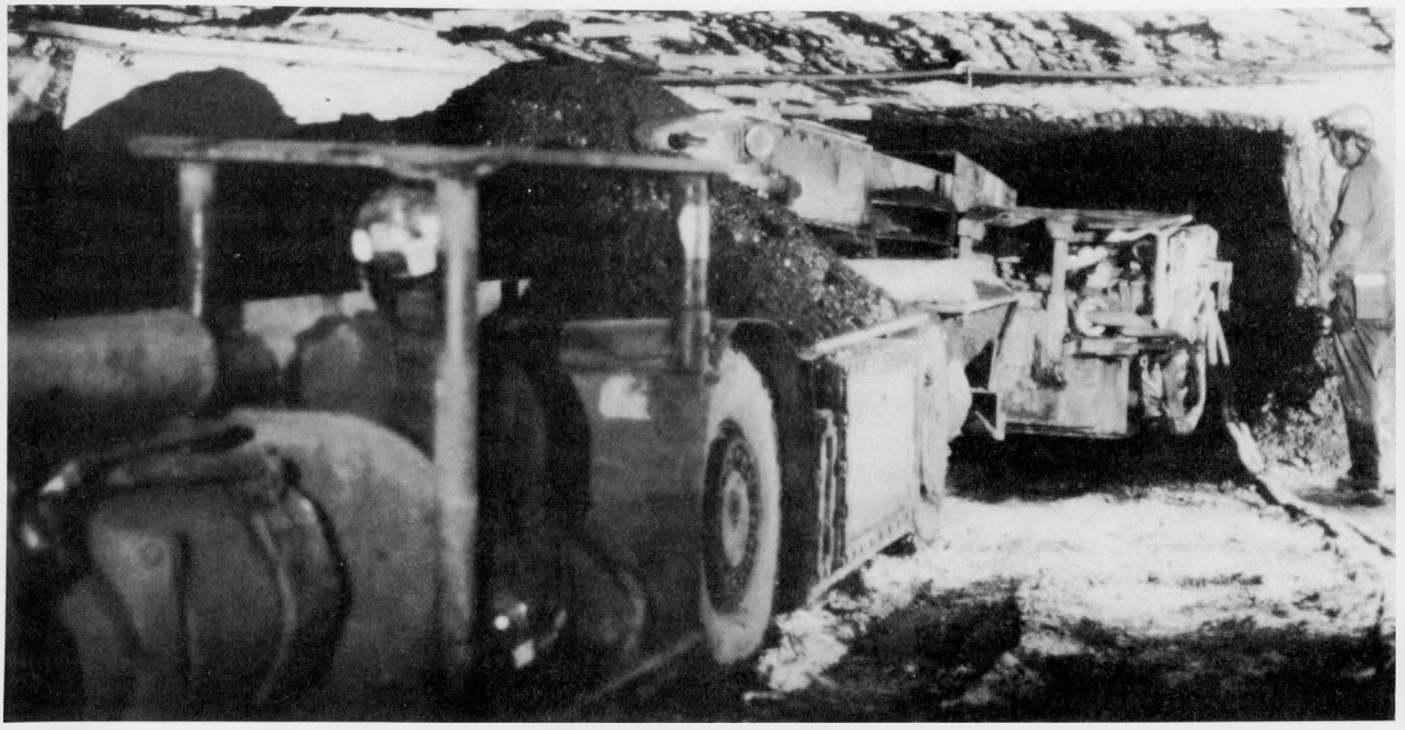
Self-Contained Self-Rescuers

Final regulations requiring that filter-type self-rescue devices currently used in all underground coal mines be replaced with self-contained, oxygen-generating devices were issued in 1978. The two-year phase-in period allowed in these regulations was scheduled to end Dec. 21, 1980.

The coal industry and MSHA have long recognized the limitations of the filter-type breathing device: lack of protection from oxygen-deficient atmospheres; lack of protection against high concentrations of carbon dioxide; excessive temperature of the filtered air in high concentrations of carbon monoxide; and limited protection against other toxic gases. The self-contained devices provide their own oxygen, generate no unbearable heat, permit no carbon monoxide to enter the breathing cycle, and remove carbon dioxide within the system.

Production models of self-contained self-rescue devices were approved during FY 1980, and MSHA, in cooperation with industry and labor officials, was conducting evaluations of the devices under simulated conditions. The evaluations covered ease of operation, train-

In an underground coal mine, a continuous mining machine cuts coal from the seam and loads it onto a shuttle car. Canopies provide the operators with added protection from roof falls.



ing necessary to ensure correct use, test procedures and use under various mining circumstances. The Bureau of Mines was also conducting additional tests of the devices' safety under extreme conditions.

To allow time for completion of MSHA's evaluations and for manufacturers to produce adequate supplies of the devices, MSHA early in FY 1981 extended the phase-in period until June 21, 1981.

Resident Inspection Program

The Resident Inspection Program continued in FY 1980 and expanded to include 78 underground coal mines. Under this program, mines are assigned a full-time MSHA inspector who makes all inspections and is available for consultation. Initially, coal mines in the program were those in two categories:

- Mines that liberate one million or more cubic feet of methane in 24 hours or have had a gas ignition or explosion resulting in death or serious injury in the past five years; have an lost-day injury rate greater than the national average; and scored less than 80 percent on their mine profile rating.
- Mines of such a size that a regular inspection of the entire mine requires 50 days or more.

In fiscal year 1980, a third category of mines was added to the program:

- Mines selected for the program by the district manager because of hazardous conditions such as a history of unintentional roof falls, ignitions, fatalities or severe injuries; extensive stand-by sections or areas requiring maintenance; or roof and trolley haulage conditions in certain coal seams.

Miners in a low-coal mine don self-contained self-rescuers during an evaluation of the devices in the mine environment.

Special Investigations

The Office of Technical Compliance and Investigations oversees investigation and handling of discrimination complaints filed under the Act, possible civil or criminal violations of the Act, and petitions for modification of mandatory safety standards.

The 1977 Act protects miners, their representatives, and job applicants in all mining industries from a broad range of actions which operators might take to discourage them from using their safety- and health-related rights. During FY 1980, coal miners filed 330 complaints of discrimination with MSHA. A total of 104 discrimination cases were listed as active at the end of the fiscal year. Forty-one of these were cases where MSHA had determined that there was a violation of the Act's discrimination provisions and had filed the case, on the miner's behalf, with the Federal Mine Safety and Health Review Commission.

During FY 1980, Coal Mine Safety and Health referred 53 civil and criminal cases to the Labor Department's Office of the Solicitor for legal action. Six cases were pending with the Department of Justice at the end of the year. Criminal sanctions were imposed for health and safety violations in three cases in fiscal 1980. During calendar 1980, 80 new investigations of possible civil or criminal violations of the Act were opened.

Also during the fiscal year, actions were taken on more than 200 petitions for modification of mandatory safety standards submitted by coal mine operators. Modifications were approved whenever it was shown that equal or greater safety could be achieved by an alternative method, or that following the standard would reduce miners' safety.

During the year, Coal Mine Safety and Health continued to upgrade the special investigations program. Ex-

tensive training was provided for about 35 special investigators, new policies and procedures were put into effect, and a special investigations field manual was in preparation.

Coal mine inspectors in the field continued to investigate all fatalities and many other serious accidents, including explosions and ignitions of mine gas (detailed in table 15). To promote awareness of the causes of accidents, publication of "Fatal Alert Bulletins" was continued. All coal mine operators received these one-page, illustrated descriptions of fatal accidents and means of prevention for use in accident prevention training. Industry has responded favorably to the bulletins.

Respirable Dust

Pneumoconiosis ("Black Lung")

About 470,000 miners and families of deceased miners have been found eligible for Federal "black lung" benefits since this compensation program began in 1970. (There are now about 240,000 active coal miners.) Federally mandated benefit payments totaled more than 1.7 billion dollars in FY 1980. These figures indicate the large number of coal miners who have suffered disability and death from dust exposure. For this reason, MSHA's major health efforts in the coal industry continue to be aimed at controlling respirable dust.

Respirable Dust Levels

Respirable dust levels in underground coal mines have improved significantly since the Federal Coal Mine Health and Safety Act took effect in 1970. Table 16 indicates improvements for certain high-risk occupations. However, dust levels in mining sections using certain types of equipment—especially longwalls and auger continuous miners—are still unsatisfactory.

Table 17 shows the percent of underground coal mining sections that were continuously in compliance with the respirable dust standard each year since 1975. Although the level of continuous compliance—74 percent since 1977—has been relatively high, the generation of dust during longwall mining operations remained a problem, and some longwall sections were continuously out of compliance during the year.

Sampling Inspections

Biannual sampling inspections, to assess the effectiveness of underground coal mine operators' dust control plans, are a major part of MSHA's health efforts. This program began in late 1975. About 28 percent of the scheduled inspections were made in CY 1976, 35 percent in CY 1977, and 29 percent in FY 1978. New inspectors, hired for this program in FY 1978, allowed MSHA to make 61 percent of the scheduled sampling inspections in FY 1979 and 78 percent in FY 1980.

Quartz (Free Silica)

Under the Act, the Secretary of Health and Human Services prescribes a formula for determining the respirable dust standard that applies in a mine when this dust contains more than 5 percent quartz. If excessive quartz is found in an area, the formula reduces the respirable dust exposure permitted there. Under a more comprehensive MSHA quartz-sampling program, the number of coal mine sections and pits operating under reduced standards has increased, from 35 at the end of FY 1978 to 101 at the end of FY 1979, and 162 at the end of FY 1980.

Transfers Due to Pneumoconiosis

If the results of an x-ray taken under the Act show evidence of pneumoconiosis, the 1977 Act provides miners with an option to transfer to a position where the respirable dust level is not over 1.0 milligrams per cubic meter of air (1.0 mg/m^3). NIOSH is responsible for the x-ray program, while MSHA notifies miners of any transfer rights and enforces their implementation. According to NIOSH, 9,700 miners had been found eligible for transfer by the end of FY 1980. About 1,700 of those eligible had exercised their option, and 525 were actively employed in underground mines under the Act's transfer provisions.

On April 8, 1980, proposed rules that would supersede the Act's interim mandatory health standard on miner transfers were published in the Federal Register. (The final rule appeared Dec. 5, 1980.) The rule provides miners at underground coal mines who show evidence of pneumoconiosis the option to work in an area with an average respirable dust concentration at or below 1.0 mg/m^3. If transferred, the miner has

the right to the same rate of pay as in the previous job plus any wage increases accruing to the new job, and the right to work in an existing job on the same shift as before transfer. The operator employing miners who have exercised this option is required to conduct a bimonthly sampling program involving each of these miners. The rule strengthens the mandatory health standard in the Act and is intended to prevent progression of pneumoconiosis among miners who show evidence of the disease.

New Dust Sampling Regulations

During the fiscal year, revised respirable dust sampling regulations for underground coal mines were issued, and considerable effort was devoted to revising the dust sampling regulations for surface coal mines and surface work areas of underground coal mines.

The final rule on underground dust sampling, published April 8 and effective Nov. 1, is intended to reduce the number of samples required while improving procedures to ensure more meaningful results. Two types of sampling are required. "Designated occupation samples" are collected on each mining unit in the environment of the occupation that receives the greatest dust exposure. Each unit is sampled for five shifts on a bimonthly basis. "Designated area samples" are required at other locations in the mine where high concentrations of respirable dust may occur. Each of these areas is sampled once every two months; if the result exceeds the standard, five more samples are required on consecutive shifts. MSHA issues a citation if the average of these five samples exceeds the standard.

Revised rules on respirable dust sampling at surface coal mines and surface areas of underground coal mines were proposed April 8; after public hearings, the final rule appeared Dec. 5.

Under the surface regulations, operator sampling of work positions selected by MSHA where respirable dust concentrations may be a problem is required once every two months. If this sample shows a concentration higher than the standard, the operator is required to take five more samples within 15 days to determine compliance or noncompliance. If noncompliance with the respirable dust standard for a work position is found, the operator is required to correct the condition and submit for approval a dust control plan describing the equipment or procedures which will be used to protect against overexposure in the future.

Both the underground and surface regulations also change requirements for certification of persons who conduct respirable dust sampling and who maintain and calibrate sampling equipment.

Revised Computer System

To support MSHA's revised respirable dust program, a new computer system was tested and put in place during FY 1980. Each district and subdistrict office is equipped with a terminal and printer which allows data to be entered directly into the system. The system helps assure the accurate and prompt processing of respirable dust samples sent to MSHA by coal mine operators.

Other Health Activities

Noise

During FY 1980, mine operators conducted noise surveys on approximately 180,000 coal miners, of whom 107,000 worked underground and 73,000 at surface worksites of surface and underground mines.

As in recent years, the major sources of excessive noise reported were underground auger continuous miners, heavy mobile surface machines such as bulldozers, and coal preparation plants. It has been difficult to develop effective retrofit engineering controls for many of these sources.

Asbestos in Construction Operations

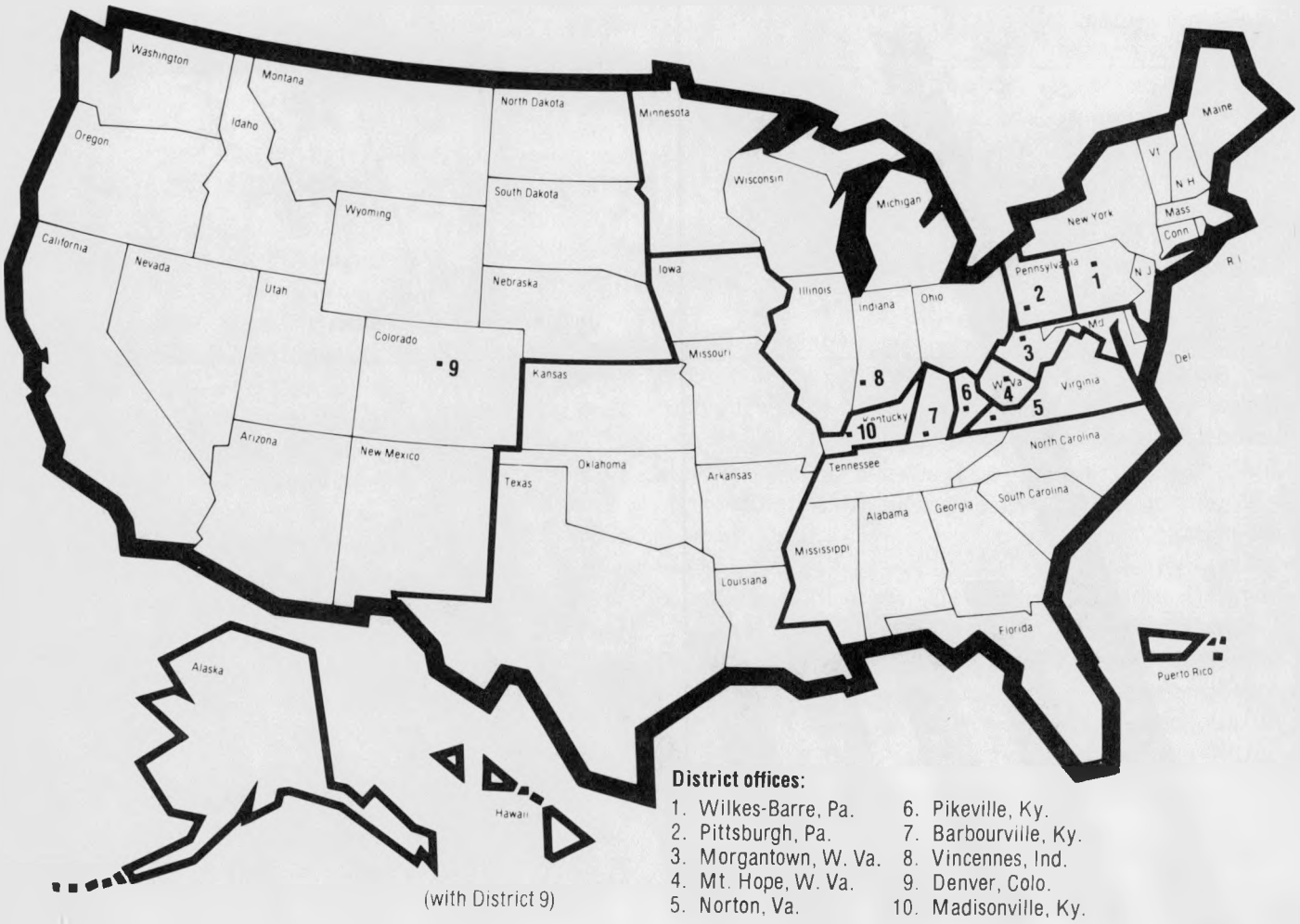
Asbestos exposure is a serious respiratory health hazard and is linked to cancer. During FY 1980, inspection guidelines for coal mine construction sites where asbestos is used were developed and issued. The guidelines cover determination of exposure factors, sampling procedures for airborne asbestos fibers, evaluation of results, issue of citations, engineering controls, personal protection, housekeeping and waste disposal. Trade names of asbestos-containing panel materials and a list of substitute materials in the form of glass-fiber-reinforced plastic sheets were also provided.

Survey of Toxic Substances

Each district in FY 1980 made a survey of possible toxic substances in coal testing laboratories, central shops and preparation plants.

The surveys list products and substances found in these facilities which may have potentially toxic or hazardous components and, where appropriate, contain remarks on their use, composition, physical properties and any control measures. They also estimate the number of facilities where such substances are found and the numbers of personnel exposed. The surveys were under review at the year's end.

FIGURE 1.—Coal Mine Safety and Health district offices, FY 1980.



District offices:

1. Wilkes-Barre, Pa.
2. Pittsburgh, Pa.
3. Morgantown, W. Va.
4. Mt. Hope, W. Va.
5. Norton, Va.
6. Pikeville, Ky.
7. Barbourville, Ky.
8. Vincennes, Ind.
9. Denver, Colo.
10. Madisonville, Ky.

FIGURE 2.—Coal mine safety and health violations most frequently cited, FY 1980.

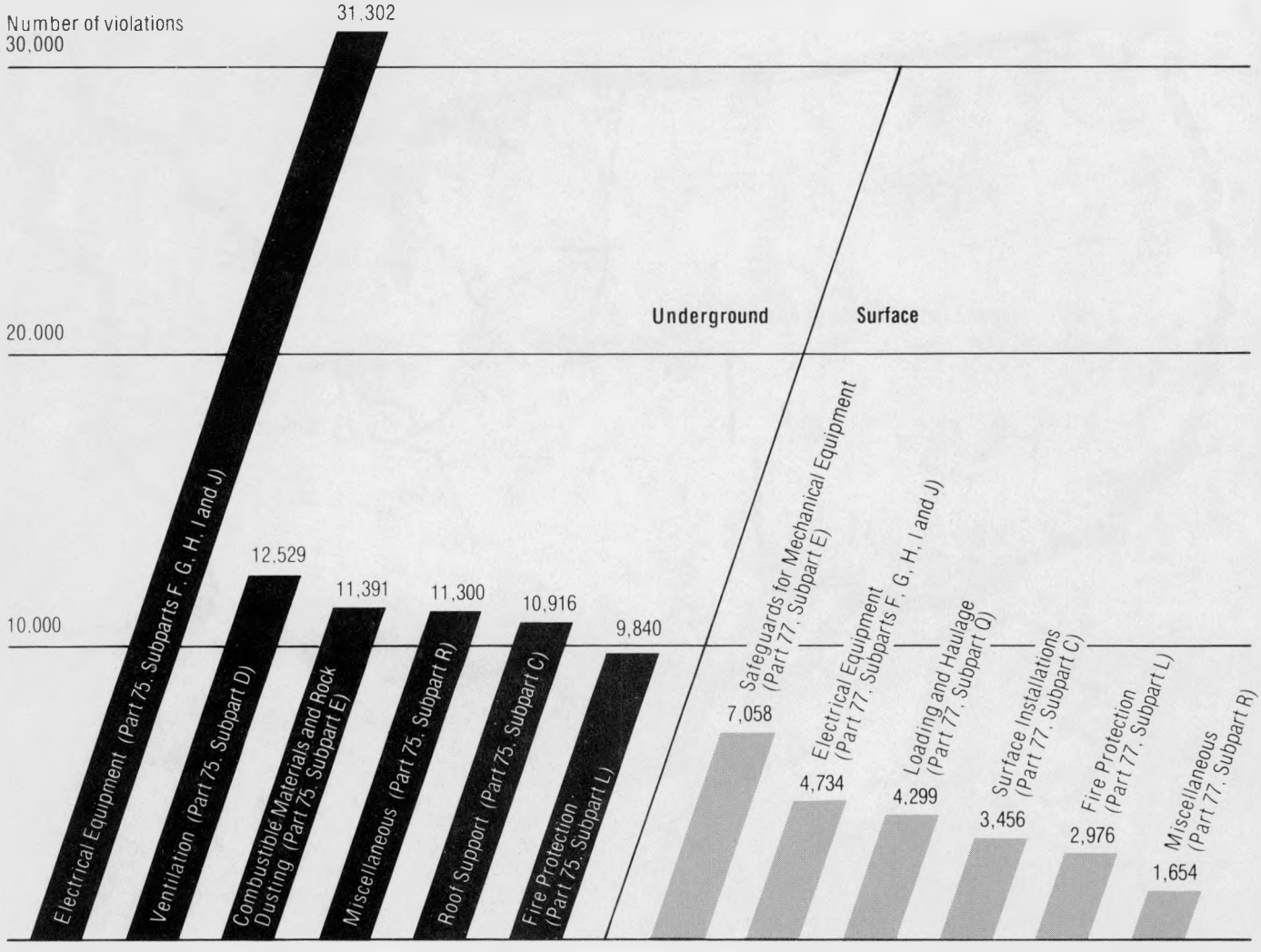


TABLE 1.—Coal mining industry statistics, FY 1980

Type of operation	Number of operations*	Number of workers†	Employee-hours
Underground mines	2,161	127,402	220,262,501
Surface mines	2,237	71,154	132,903,232
Other surface facilities‡	1,306	43,040	73,571,741
Total	5,704	241,596	426,737,474

* Status A (active, producing), status E (active, not producing, miners working) and status G (new, under construction, miners working).

† As of Sept. 30, 1980.

‡ Includes approximately 180 active construction sites.

TABLE 3.—Coal mine inspection data, by type of operation, Fiscal Year 1980

Type of operation	Number of operations*	Inspections			Investi-gations
		Regular	Spot†	Other	
Underground	2,161	8,081	22,651	17,513	6,978
Surface mines and surface facilities of underground mines	3,543	6,877	7,593	7,946	1,656
Total	5,704	14,958	30,244	25,459	8,634

* Status A (active, producing), status E (active, not producing, miners working) and status G (new, under construction, miners working).

† To determine whether an imminent danger exists and whether there is compliance with safety and health standards or any issued citations or orders.

TABLE 2.—Coal mine inspection data by state, FY 1980

State	Operations*	Inspections			Investi-gations
		Regular	Spot†	Other	
Alabama	190	401	1,030	380	343
Alaska	1	2	—	3	—
Arizona	3	5	7	3	2
Arkansas	10	15	24	20	12
Colorado	61	175	979	214	169
Georgia	1	—	—	—	—
Illinois	106	279	1,271	1,068	546
Indiana	88	187	277	229	79
Iowa	7	15	11	33	7
Kansas	7	22	21	40	5
Kentucky	1,573	4,117	6,503	6,343	1,826
Maryland	48	94	104	99	50
Missouri	16	36	47	69	7
Montana	17	23	33	39	8
New Mexico	9	20	65	25	23
North Dakota	14	19	16	46	11
Ohio	286	638	1,341	1,152	503
Oklahoma	43	109	107	193	43
Pennsylvania (bit.)	836	1,943	3,701	2,969	1,050
Pennsylvania (anth.)	282	505	611	1,011	121
Tennessee	227	508	846	756	197
Texas	16	30	40	95	2
Utah	36	125	441	284	188
Virginia	649	2,158	5,811	3,060	961
Washington	3	3	2	—	—
West Virginia	1,135	3,478	6,902	7,221	2,440
Wyoming	40	51	54	107	41
Total	5,704	14,958	30,244	25,459	8,634

* Status A (active, producing), status E (active, not producing, miners working) and status G (new, under construction, miners working).

† To determine whether an imminent danger exists and whether there is compliance with safety and health standards or any citations or orders.

TABLE 4.—Coal mine inspection data, CY 1975-1977 and FY 1978-1980

Inspection data	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Inspections:						
Regular	12,549	13,341	15,246	13,973	15,712	14,958
Spot*	38,003	27,080	24,639	23,364	20,623	30,244
Other	19,997	20,248	13,885	13,858	29,245	25,459
Total inspections	70,549	60,669	53,770	51,195	65,580	70,661
Investigations	4,080	4,181	2,180	5,298	6,724	8,634
Citations	111,463	139,007	129,929	111,645	140,666	129,921
Orders	6,142	5,829	4,897	4,001	4,570	5,270

* To determine whether an imminent danger exists and whether there is compliance with safety and health standards or any issued citations or orders.

TABLE 5.—Underground coal mines designated for frequent spot inspections because of excessive methane liberation or other hazardous conditions,* by state, FY 1980

State	Number of mines†
Alabama	16
Colorado	11
Illinois	20
Kentucky	24
New Mexico	1
Ohio	12
Pennsylvania	43
Tennessee	2
Utah	9
Virginia	17
West Virginia	49
Total	204

* Under section 103(i) of the 1977 Act.

† As of Sept. 30, 1980.

TABLE 6.—Citations and orders of withdrawal issued at coal mines, FY 1980

Cited	Citations	Orders of withdrawal			
		Imminent danger	Noncompliance	Other	Total orders
Parts of 30 CFR:					
Part 45: Independent Contractors	24	1	—	—	1
Part 48: Training and Retraining of Miners	517	2	30	201	233
Part 50: Notification, Investigation, Reports and Records of Accidents, Injuries, Illnesses, and Coal Production in Mines	763	—	16	2	18
Part 70: Mandatory Health Standards—Underground Coal Mines	5,558	—	55	31	86
Part 71: Mandatory Health Standards—Surface Work Areas of Underground Coal Mines and Surface Coal Mines	2,753	1	139	3	143
Part 75: Mandatory Safety Standards—Underground Coal Mines	94,354	549	1,074	1,954	3,577
Part 77: Mandatory Safety Standards, Surface Coal Mines and Surface Work Areas of Underground Coal Mines	25,571	192	305	246	743
Part 82: Notification of Legal Identity	28	—	2	—	2
Part 90: Procedures for Transfer of Miners With Evidence of Pneumoconiosis	22	—	—	—	—
Sections of the Act	331	145	51	271	467
Total	129,921	890	1,672	2,708	5,270

TABLE 7.—Coal mining fatalities, CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	99	104	91	73	95	93
Surface areas at underground mines	12	5	9	10	9	8
Strip	32	23	27	20	12	22
Auger	3	1	2	1	—	—
Culm bank	—	—	—	—	—	—
Dredge	—	—	—	—	—	—
Independent shops and yards	—	—	1	—	2	2
Mechanical cleaning plants	9	8	9	10	14	5
Subtotal	155	141	139	114	132	130
Office	—	—	—	—	—	—
Total	155	141	139	114	132	130

TABLE 8.—Coal mining fatality rates per 200,000 employee-hours,* CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	0.09	0.10	0.09	0.08	0.08	0.08
Surface areas at underground mines	0.10	0.04	0.07	0.09	0.07	0.06
Strip	0.07	0.04	0.05	0.04	0.02	0.03
Auger	0.41	0.17	0.36	0.25	—	—
Culm bank	—	—	—	—	—	—
Dredge	—	—	—	—	—	—
Independent shops and yards	—	—	0.03	—	0.05	0.06
Mechanical cleaning plants	0.06	0.05	0.05	0.07	0.07	0.02
Subtotal	0.08	0.07	0.07	0.07	0.06	0.06
Office	—	—	—	—	—	—
Total	0.08	0.07	0.07	0.06	0.06	0.06

* Prior to 1978, fatality rates were based on 1,000,000 employee-hours of exposure. The 1975-1977 rates shown above have been converted to the current 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of this and other recordkeeping changes, see "Note on the Data in This Report," page 4

TABLE 9.—Coal mining fatalities by location and type of accident, CY 1975-1977 and FY 1978-1980

Location and type of accident	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground mines (underground and surface areas):						
Roof fall	53	38	38	39	53	43
Haulage	19	19	14	18	23	27
Machinery	16	17	16	2	11	15
Electrical	8	5	4	5	9	8
Other	3	27	21	11	8	8
Total	99	104	93	75	104	101
Surface mines and other surface operations:						
Haulage	19	14	13	10	11	12
Machinery	19	9	7	8	1	6
Electrical	6	3	6	6	6	2
Other	12	11	20	15	10	9
Total	56	37	46	39	28	29
Grand total	155	141	139	114	132	130

TABLE 10.—Coal mining fatalities by victim's experience, FY 1980

Part A.—By total mining experience

Years	Fatalities
Less than 1	10
1	8
2	12
3	12
4	8
5	13
6	5
7	6
8	7
9	6
10	8
11	3
12	2
13	1
14	5
15	—
16	—
17	1
18	—
19	1
20 or more	15
Unknown	7

Part B.—By experience on regular job

Years	Fatalities
Less than 1	43
1	14
2	16
3	4
4	4
5	8
6	6
7	5
8	3
9	5
10	3
11	—
12	1
13	—
14	1
15	1
16	—
17	—
18	—
19	1
20 or more	5
Unknown	10

TABLE 11.—Coal mining fatalities by victim's occupation, FY 1980

Occupation	Fatalities
Supervisor, foreman	21
Laborer	17
Mining machine operator	13
Rock, roof bolter	13
Electrician	11
Haulage, dump	7
Mechanic, maintenance	6
Timberman, jacksetter	6
Rail transportation and haulage	5
Bulldozer, mobile equipment operator	5
Unknown	4
Powderman, blaster	3
Drill operator	3
Front-end loader operator	3
Cleanup, ventilation	2
Beltman, boom operator	2
Welder, machinist	2
Dragline, crane, shovel operator	2
Truck driver	2
Loading machine operator	1
Dredge, barge, boat	1
Technical, professional, clerical	1
Total	130

TABLE 12.—Coal mining fatalities, total injuries and rates per 200,000 employee-hours, by state, FY 1980

State	Fatalities	Fatality rate	All injuries	All-injury rate
Alabama	6	0.06	1,078	10.67
Alaska	—	—	14	16.01
Arizona	—	—	18	1.83
Arkansas	—	—	4	3.55
Colorado	3	0.06	586	12.53
Georgia	—	—	—	—
Illinois	9	0.05	1,681	8.69
Indiana	5	0.09	224	3.87
Iowa	—	—	4	2.63
Kansas	—	—	22	6.22
Kentucky	26	0.06	2,458	6.02
Maryland	—	—	40	4.24
Missouri	—	—	71	5.78
Montana	—	—	95	5.88
New Mexico	1	0.05	53	2.82
North Dakota	—	—	59	5.29
Ohio	7	0.05	1,838	12.72
Oklahoma	—	—	70	4.04
Pennsylvania (bit.)	12	0.03	4,028	12.47
Pennsylvania (anth.)	4	0.16	424	16.47
Tennessee	5	0.15	184	5.35
Texas	—	—	144	5.53
Utah	1	0.03	656	17.41
Virginia	14	0.09	2,018	13.67
Washington	—	—	70	11.13
West Virginia	33	0.07	6,277	12.41
Wyoming	4	0.06	399	6.20
Total	130	0.06	22,515	10.12

TABLE 13.—All coal mining injuries, CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	14,710	19,147	17,076	12,343	15,367	16,139
Surface areas at underground mines	1,259	1,524	1,369	970	1,221	1,297
Strip	3,299	4,528	4,763	3,486	3,427	3,253
Auger	58	56	41	27	22	10
Culm bank	23	19	20	20	16	13
Dredge	1	—	—	—	3	4
Independent shops and yards	215	348	272	223	222	202
Mechanical cleaning plants	1,338	1,676	1,654	1,341	1,568	1,549
Subtotal	20,903	27,298	25,195	18,410	21,846	22,467
Office	23	46	36	32	35	48
Total	20,926	27,344	25,231	18,442	21,881	22,515

TABLE 14.—Coal mining all-injury rates per 200,000 employee-hours,* CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	13.98	17.57	16.56	14.23	13.47	14.65
Surface areas at underground mines	10.72	12.74	11.29	9.20	9.32	10.30
Strip	6.83	8.76	8.02	6.19	5.13	4.92
Auger	7.98	9.76	7.30	6.80	7.66	2.95
Culm bank	10.83	7.47	9.68	12.36	7.47	6.36
Dredge	4.36	—	—	—	11.80	9.91
Independent shops and yards	6.58	10.14	8.02	7.83	5.90	5.59
Mechanical cleaning plants	9.19	11.39	10.03	9.25	7.98	7.60
Subtotal	11.35	14.25	12.90	10.74	10.02	10.53
Office	0.41	0.74	0.54	0.46	0.42	0.52
Total	11.03	13.82	12.49	10.34	9.67	10.12

* Prior to 1978, injury rates were based on 1,000,000 employee-hours of exposure. The 1975-1977 rates shown above have been adjusted to the current 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of this and other recordkeeping changes, see "Note of the Data in This Report," page 4

TABLE 15.—Ignitions and explosions in underground coal mines, by state, FY 1980*

State	Ignitions and explosions
Alabama	29
Colorado	4
New Mexico	2
Ohio	1
Pennsylvania	22
Utah	13
Virginia	7
West Virginia	33
Total	111

* Based on reporting by mine operators.

TABLE 16.—Results of MSHA respirable dust sampling at selected high-risk occupations, selected years (milligrams of respirable coal mine dust per cubic meter of air)

Occupation	CY 1968-1969*	CY 1973†	CY 1976†	FY 1980†
Longwall (jacksetter, tailgate, shearer operator, stall driver)	NA	2.6	1.8	2.1
Jacksetter, auger continuous miner	NA	4.2	1.9	2.1
Continuous miner operator	6.5	2.1	1.3	1.3
Cutting machine operator	5.9	1.8	1.2	1.1

NA = Not applicable (no samples taken)

* Survey of 29 mines

† Average of all full-shift samples taken by MSHA inspectors during the year.

TABLE 17.—Percentage of underground coal mine sections in compliance with the 2.0-mg/m^3 respirable dust standard throughout the year, CY 1975-FY 1980

Year	Sections in continuous compliance, percent*
CY 1975	69
CY 1976	64
CY 1977	74
CY 1978	74
CY 1979	74
FY 1980	74

* Based on all sampling by MSHA and mine operators throughout the year

section 2 *Metal and Nonmetal Mine Safety and Health*

The metal and nonmetal mine safety and health enforcement program covers about 8,000 year-round active and 7,000 intermittent or seasonal metal and nonmetal mining operations located in the United States, Puerto Rico and the Virgin Islands.

There were 114 fatalities at metal and nonmetal mines and mills in fiscal 1980, the same number as in fiscal 1979. However, a record yearly low was established in calendar year 1980, when 103 fatalities occurred. The previous low record was 113 in calendar year 1976. While the fatal-injury incidence rate was unchanged in FY 1980, the rate of all reported injuries declined by 10 percent.

Metal and nonmetal mine inspectors made 22,555 regular inspections and 9,453 followup inspections to check on correction of violations cited during regular inspections. Some other types of inspections and investigations included inspections of explosives storage facilities under MSHA's agreement with the Bureau of Alcohol, Tobacco and Firearms, investigations of fatal and serious nonfatal accidents, and frequent inspections of mines that liberate excessive amounts of explosive methane gas.

Discrimination complaints filed by metal and nonmetal miners under the Act increased during fiscal 1980, as did cases of possible knowing and willful violations of safety and health requirements by metal and nonmetal mine operators. MSHA conducted 399 investigations of these types of cases. Requests from metal and nonmetal mine operators for variances from mandatory safety standards also increased. Inspectors investigated each request and MSHA granted those that would provide equal or greater safety by alternative methods.

Metal/Nonmetal's Program in Accident Reduction (PAR) at selected mines needing extra attention was continued, with encouraging results. The program mines achieved a 32-percent reduction in the number of lost-workday injuries per 200,000 employee-hours during fiscal 1980 compared with fiscal 1979, that is, a reduction of 935 lost-workday accidents.

A Compliance Assistance Visit (CAV) program was initiated in fiscal 1980 in metal and nonmetal mining under which an inspector points out to mine operators potential violations of regulations without penalties being assessed. CAVs are conducted on the mine operator's request at new mines not yet operating; seasonal, closed or abandoned mines before reopening; and new facilities or new installations of equipment in an operating mine.

The 1977 Act stresses protection of miners from toxic substances and harmful physical agents. The core of the metal and nonmetal mine 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 calls for improved health standards covering sampling, medical surveillance, recordkeeping and job transfers for miners with occupational illnesses. In developing these standards, the Act gives the Health and Human Services Department's National Institute for Occupational Safety and Health (NIOSH) a key role.

To meet the Act's increased emphasis on health, development work, begun in fiscal 1979, continued during fiscal 1980 on new or revised standards for radiation exposure in surface mines and mills, and exposure to welding fumes, asbestos fibers and silica dust. NIOSH was expected to develop criteria documents and recommend new exposure limits for silica dust and asbestos fibers by the end of fiscal 1981, and to assist in developing welding fume standards through toxicological and epidemiological research. On April 21, 1980, MSHA received a petition for an emergency temporary radiation standard from the Oil, Chemical and Atomic Workers Union and the Public Citizen Health Research Group. The petition called for a reduction in established exposure limits. In response, MSHA and NIOSH began a reassessment of current radiation standards for underground mines.

Also during fiscal 1980, NIOSH began planning a new surveillance program to identify more systematically toxic substances and harmful physical agents in non-coal mines and mills.

Because Congressional oversight hearings in the fall of 1979 and a number of administrative law judges' decisions indicated a need to clarify MSHA's standard on equipment guarding, "MSHA's Guide to Equipment Guarding" was published and

distributed to the metal and nonmetal mining industry in FY 1980. A special edition of MSHA's regulations covering metal and nonmetal mining and milling as of Jan. 1, 1980, was also distributed to all operators. This edition reflects the many changes in these regulations that resulted from the elimination of unenforceable "advisory" standards the previous year, as the Act required. Also during fiscal 1980, the final report was published on the June 18, 1979, explosion disaster at the Belle Isle underground salt mine, near Franklin, La., in which five miners died.

Several significant projects were ongoing at the year's close. With recent development of underground oil shale mines, increased reopening of old gold and silver mines in the West, and the Belle Isle explosion, it has become increasingly important to ensure the adequacy of MSHA's procedures for identifying "gassy" metal and nonmetal mines where methane could pose an explosion hazard and to assure that such mines are safely operated. A committee was established early in FY 1981 to review policies and regulations in this area. MSHA continued working with the operators of underground oil shale mines to assure miners' safety under their special mining conditions. Comments from the mining community were solicited for a comprehensive review and revision of MSHA's metal and nonmetal mine safety and health standards. The comment period closed Aug. 3, and comments were under review at the end of the fiscal year.

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 1980 there were 8,256 year-round active and 6,630 intermittent or seasonal mining operations, for a total of 14,886 operations in all 50 states, Puerto Rico and the Virgin Islands.

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, dredges and stone quarries.

The average number of people working in these mines in fiscal 1980 was 306,651, and reported employee-hours totaled 540 million. Employment in individual mines ranged from fewer than five to more than 2,600. Table 18 shows the number of operations, workers and employee-hours worked in the various categories of metal and nonmetal mines. See table 19 for the number of operations in each state.

Inspection Work Force

Metal and nonmetal mine inspection is supervised from six district offices and 12 subdistrict offices (figure 3). There are 71 field offices, located in nearly every state and Puerto Rico.

At the end of FY 1980, the metal and nonmetal enforcement program included 662 authorized representatives of the Secretary (ARs), three employees in training to become ARs and 173 support personnel for a total of 838 employees.

A major objective in fiscal 1980 was to improve the effectiveness of inspector training. During the fiscal year a committee evaluated the present training for entry-level metal and nonmetal inspectors and made recommendations for future training. Experienced inspectors completed newly-developed two-week technical courses in ground control, industrial hygiene, electrical safety and other subjects at the National Mine Health and Safety Academy. A course in citation and order writing was developed, and inspectors who were trained as instructors trained other inspectors in the field. Supervisory inspectors completed two weeks of advanced training at the Academy. There are also agreements with several universities and colleges under which metal and nonmetal mine inspectors can further their education, and programs under which MSHA technicians can advance to become mine inspectors and specialists.

Inspection Statistics and Trends

MSHA inspectors conducted 32,008 inspections in metal and nonmetal mines and mills during fiscal 1980. Of these, 22,555 were regular inspections and 9,453 were followup inspections to check for compliance with citations issued during regular inspections. Table 20 shows inspection data for the fiscal year at the various types of metal and nonmetal mining operations. Metal and nonmetal mine inspection data by state are presented in table 19.

All regular and many followup inspections of metal and nonmetal mines and mills include evaluation of known or potential health hazards as well as safety conditions and practices. These health evaluations often require full-shift or area sampling for harmful airborne contaminants or

physical agents. Table 21 summarizes health sampling during fiscal 1980. Compared to fiscal 1979, full-shift samples for respirable quartz dust and noise decreased substantially, while full-shift samples for total silica, nuisance dust and other toxic substances showed a modest increase. The number of inspections and mines where full-shift samples were taken remained about the same. The proportion of overexposures (26 percent) also remained about the same. Area sampling activities at underground mines and other confined work places were approximately the same in fiscal 1980 as in FY 1979.

Also in FY 1980, three large trona (soda ash) mines in Wyoming and five Louisiana salt mines were sampled at frequent intervals because of the presence of potentially explosive methane gas.

During FY 1980 Federal metal and nonmetal mine inspectors issued 26,103 citations to mine operators for violations of mandatory safety and health standards. As in previous years, five groups of standards accounted for the majority of citations: Use of Equipment; Electricity; Loading, Hauling and Dumping; Travelways and Escapeways; and Air Quality, Ventilation, Radiation, and Physical Agents. These five groups accounted for 77 percent of the citations issued in FY 1980 (figure 4).

About 89 percent of the citations issued in fiscal year 1980 were for violations of safety standards, and about 11 percent for violations of health standards. Nearly 90 percent of the 2,742 health citations cited excessive exposure to or failure to control noise and dust.

Table 22 shows health citation data for fiscal years 1978-1980. Health citations decreased by nearly half from fiscal 1979 to fiscal 1980. One reason is that many samples indicating overexposures were taken where citations were already in effect; these citations were continued or modified. About 3,500 health violations were abated during fiscal 1980 and about 2,000 were pending at the year's end.

Metal and nonmetal inspectors issued 1,073 closure orders in FY 1980. Of the total, 57 percent were for situations of imminent danger (table 23). As in previous years, imminent danger orders most often were for unsafe means of loading, hauling

Aerial view illustrates the scope and complexity of operations at a surface metal mine in the West.

and dumping (26 percent) and inadequate ground control (12 percent). The 251 closure orders issued for noncompliance with citations most often were for air quality, ventilation, radiation and physical agents; unsafe means of loading, hauling, and dumping; and inadequate guarding and use of equipment. A total of 209 closure orders were issued for reasons other than imminent danger and noncompliance.

In fiscal 1980, 93 percent of the closure orders issued were for safety reasons. The other 73 orders were issued for reasons related to miners' health.

Citations and orders issued in FY 1980 by state and by mine type are included in tables 19 and 20, respectively. Historical data on citations (notices prior to the 1977 Act) and orders are included in table 24.

Metal and Nonmetal Mine Fatalities

There were 114 fatalities at metal and nonmetal mines and mills in the United States in fiscal 1980, the same number as in fiscal 1979 (table 25). A record low was achieved, however, in calendar 1980, when 103 fatalities occurred. The previous low of 113 was in calendar 1976. Compared to fiscal 1979, there was an increase of fatalities at underground mines, from 28 to 32; a decrease at surface mines, from 58 to 56; and a decrease at mills, from 28 to 25. There was one office-worker fatality.

The fatal-injury incidence rate remained the same as the last fiscal year, 0.04 per 200,000 employee-hours (table 26).

Haulage accidents continued to be the leading cause of death in metal and nonmetal mining in fiscal 1980, with a total of 36 fatalities. Twelve fatalities each occurred from falling, rolling or sliding materials and from slips or falls of persons. Electrical accidents caused 11 deaths. Machinery accidents, which caused eight fatalities, were not among the four leading causes of death as had been the case for many years.

As in past years, falls of roof, face or rib were the most frequent cause of fatalities in underground mines. Nine miners died from this cause, an increase from six in fiscal 1979 (table 27). In surface mines the leading cause of death was powered haulage; at mills it was slips or falls of persons.

In fiscal 1980 new employees and workers relatively inexperienced in their jobs continued to suffer the most fatal accidents (table 28). Thirty-seven percent of the victims of fatal accidents had one year or less experience in their regular job when they were killed, and 42 percent had less than five years' mining experience.

Table 29 lists fiscal year 1980 fatalities by occupation. Fatalities and fatal-injury incidence rates by state are shown in table 30.

Metal and Nonmetal Mine Injuries

The total number of reported injuries in metal and nonmetal mining in FY 1980 was 17,731, as compared to 20,023 injuries reported for fiscal 1979 (table 31). The all-injury incidence rate was 6.56 per 200,000 employee-hours of exposure, a 10-percent decrease from the 7.29 injuries per 200,000 employee-hours reported in fiscal year 1979 (table 32).

Reported injuries and all-injury rates by state for fiscal 1980 are listed in table 30.

Special Enforcement Activities

Program in Accident Reduction

For mines with high injury rates and potentially serious safety problems, more than the usual inspections to check compliance with standards is needed to significantly reduce accidents and injuries. Such mines need special emphasis on the promotion of good safety programs with job safety analysis, accident prevention training, and safety awareness on the part of both management and labor. This is the basis of the Program in Accident Reduction (PAR), one of MSHA's most successful cooperative safety programs, which was started in FY 1976 and includes about 60 operations each year.

At the beginning of each program year, the operations and safety practices of selected mines are evaluated and recommendations to prevent accidents and injuries are made to mine management and labor. During the year, assistance in carrying out the recommendations is available, and progress is monitored and evaluated monthly. Significant reductions in accidents and injuries have been achieved in the program mines each year. Data for fiscal 1980 indicated continued success for the program, with a reduction of 935 lost-workday injuries compared to FY 1979, a 32-percent decrease in the number of injuries.

Compliance Assistance Visits

The Compliance Assistance Visit (CAV) program was instituted in fiscal 1980 in the metal and nonmetal mining industries to assist operators in complying with the 1977 Act by alerting them to potentially hazar-

Inspector and company official use a torque wrench to check roof bolts in an underground metal mine.

dous conditions or practices before beginning operations, reopening a mine, or using new equipment or facilities in an operating mine. Inspectors conduct CAVs on the mine operator's request and issue notices of violation without penalties being assessed. Industry's acceptance of the program is shown by the 2,124 CAVs requested and conducted and the 14,911 CAV-nonpenalty notices written during the fiscal year.

Special Investigations

In fiscal 1980, 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 similar accidents in the future. As in the past, reports of these investigations and other information were made available to industry, labor organizations, state agencies and others as a tool for education in accident prevention. Information on fatal accidents was widely distributed in one-page "Fatalgrams."

MSHA also investigates complaints of safety- and health-related discrimination filed by metal and nonmetal miners and possible knowing or willful violation of standards and regulations by metal and nonmetal mine operators. Metal and nonmetal mine inspectors were selected in FY 1980 to fill positions as special investigators to investigate such cases. A training course was developed for newly-assigned special investigators, and a manual was in preparation. During fiscal 1980, Metal and Nonmetal's special investigators made 179 investigations of discrimination complaints filed under the Act and 220 investigations of possible knowing or willful violations.

Industrial Hygiene Sampling Activities

Silica

About 11 percent of all MSHA's respirable dust samples and about 19 percent of all total dust samples taken by MSHA at metal and nonmetal mines and mills in FY 1980 indicated overexposure to silica, which can cause silicosis.

More than 70 percent of the overexposed employees were using respirators. However, since personal protective equipment was acceptable only as a temporary control during FY 1980, where overexposed employees were using personal protective equipment, operators were cited for inadequate engineering controls.

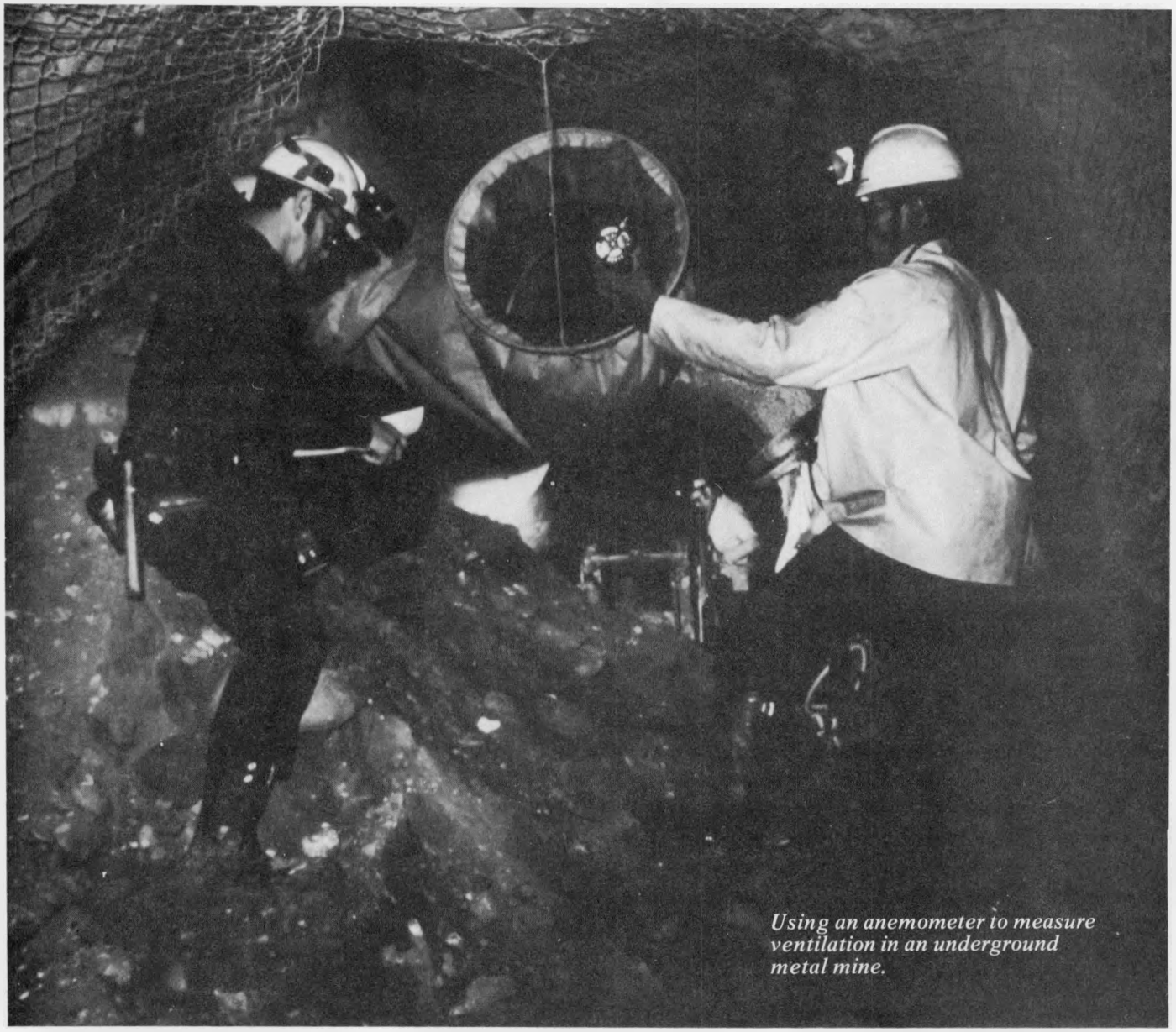
Since the confirmation of several silicosis cases at two silica flour mills, MSHA (with NIOSH assistance) has redoubled its enforcement effort at approximately two dozen such mills nationwide.

Noise

Of all noise dosimeter samples taken, about 35 percent indicated overexposure. More than 70 percent of the overexposed employees wore hearing protection but, as with dust, operators were cited for inadequate engineering controls.

Other Full-Shift Samples

Table 33 shows the number of times that miscellaneous, less common but highly hazardous contaminants were



Using an anemometer to measure ventilation in an underground metal mine.

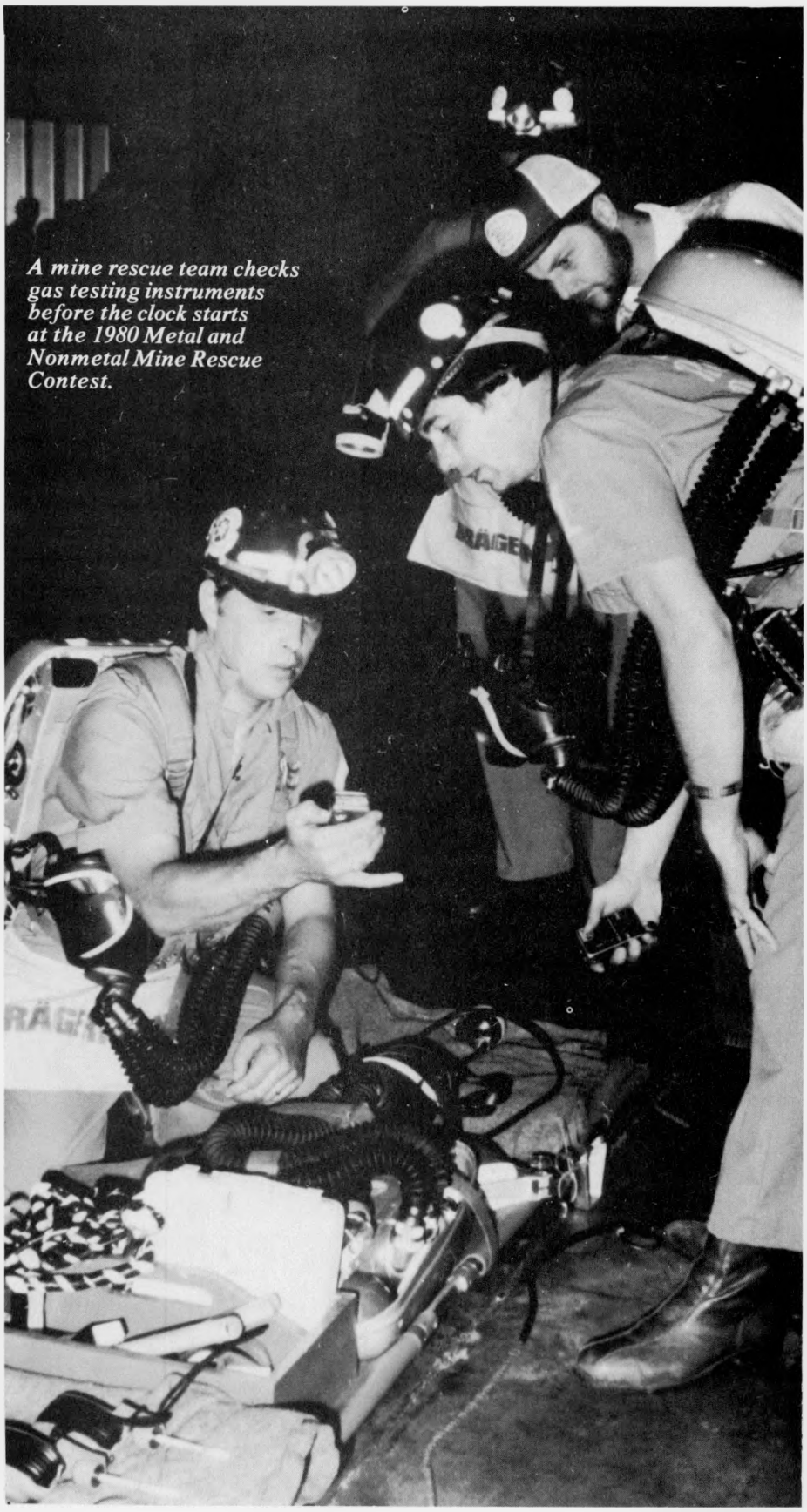
sampled for during fiscal year 1980. Exposure to these contaminants in excess of current mandatory standards was rarely found. However, exposure to some (e.g., arsenic, asbestos, lead) sometimes exceeded levels that are considered acceptable by NIOSH.

Radiation

The most significant radiation hazard in mining is from radon daughters, radioactive atoms that form from the radon gas in the air of uranium and some non-uranium mines. MSHA has set a limit of 1.0 Working Level (WL) for radon daughter concentrations in any active working area. The Working Level is a measure of the potential alpha particle energy of radon daughters in the mine atmosphere.

MSHA inspectors sampled for radon daughters during 487 inspections at 165 underground uranium mines and 102 inspections at 92 underground non-uranium mines in fiscal 1980. The average concentration of radon daughters detected at uranium mines was 0.42 WL. Twelve of these samples (eight of them at two mines) were over 10 WL. If these extraordinarily high readings are excluded, the average is 0.38 WL. The average concentration found at underground non-uranium mines was 0.12 WL. Of the 92 non-uranium mines sampled, 22, or 24 percent, had readings over 0.1 WL. Eleven of these had readings exceeding 0.3 WL, and four had readings of over 1.0 WL. Table 34 summarizes MSHA radon daughter data from 1975 through FY 1980.

The mandatory upper limit of exposure for radon daughter products has been set by MSHA at 4 Working Level Months (WLM) per year. The WLM represents cumulative exposure for 173 hours to 1.0 WL. Data reported by mine operators for calendar year 1979 indicate that 14,598 employees at underground uranium



A mine rescue team checks gas testing instruments before the clock starts at the 1980 Metal and Nonmetal Mine Rescue Contest.

mines received an average radiation exposure of 0.60 Working Level Months. This was a significant reduction from the 1978 average of 0.92 WLM for 6,679 employees. The percentage of workers receiving less than 2.0 WLM increased, while the percentage receiving more than 4.0 WLM decreased. (See table 35 for further data.)

There are two possible reasons for this trend. First, radiation levels in the uranium mines have decreased; second, more stringent standards adopted in August 1979 have elicited more complete reporting. In particular, the 1979 data probably include more employees who worked only part of the year. Similar data compiled by the Atomic Industrial Forum indicated that only 35 percent of uranium mine employees were underground 1,500 or more hours during the year.

MSHA began a new audit of radiation sampling and recordkeeping at underground mines during fiscal 1980. Twenty-seven uranium and three non-uranium mines were audited. The audit found that some operators were not properly time-weighting their exposure calculations and a few small operators were not sampling.

Other Health Activities

Fiber Screening Program

During fiscal 1980 MSHA metal and nonmetal mine 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. Of the approximately 2,300 operations for which data were available through fiscal 1980, 18 percent yielded dust samples containing more than two mineral fibers per milliliter of air, the MSHA limit for asbestos exposure over an 8-hour period. Of these, 40 were analyzed for asbestos; 16 (40 percent) actually contained asbestos fibers.

Subsequent MSHA inspections at operations found to have asbestos fiber concentrations over the exposure limit include evaluation of full-shift employee exposure.

Miscellaneous Health Investigations

Also during fiscal 1980, MSHA health specialists investigated heat stress in deep underground mines, vanadium exposure and its effects at an open pit mine and mill, controls for mercury exposure at a mercury mine and mill, and safe work practices when using cyanides as mill reagents.

Long-Term Health Studies

The NIOSH study of morbidity among portland cement workers, requested by the Cement, Lime, Gypsum, and Allied Workers union and the Portland Cement Association, was postponed during FY 1980 but resumed in 1981.

NIOSH completed its study of the exposure effects of talc minerals in fiscal 1980. Major talc deposits in Montana, North Carolina and Texas were characterized as to mineral content and habit, and exposure levels and medical reactions among mine and mill workers in these areas were also studied. All three deposits were found to be low in free silica and trace elements; true fibers were found in the Texas deposit, acicular fibers in the North Carolina deposit, and no fibers in the Montana deposit. The only pulmonary symptom discovered among the workers (whose average exposure time was seven to 10 years) was a higher-than-expected prevalence of bilateral pleural thickening, the significance of which is unclear. An earlier study of New York talc mine and mill workers found both exposure to true fibers and pleural thickening.

In early 1981 NIOSH also completed an environmental and mortality investigation of 19 crushed-stone quarries (10 limestone, five traprock and four granite) that have the characteristics upon which the MSHA fiber screening program is based. Preliminary findings of the environmental study were negative—worker exposure to mineral fibers was not detected. Mortality data have not yet been analyzed. A similar NIOSH study at attapulgite (clay) mines and mills in Florida and Georgia, postponed from FY 1980, was begun in mid-1981.

FIGURE 3.—Metal and Nonmetal Mine Safety and Health district and subdistrict offices, FY 1980.

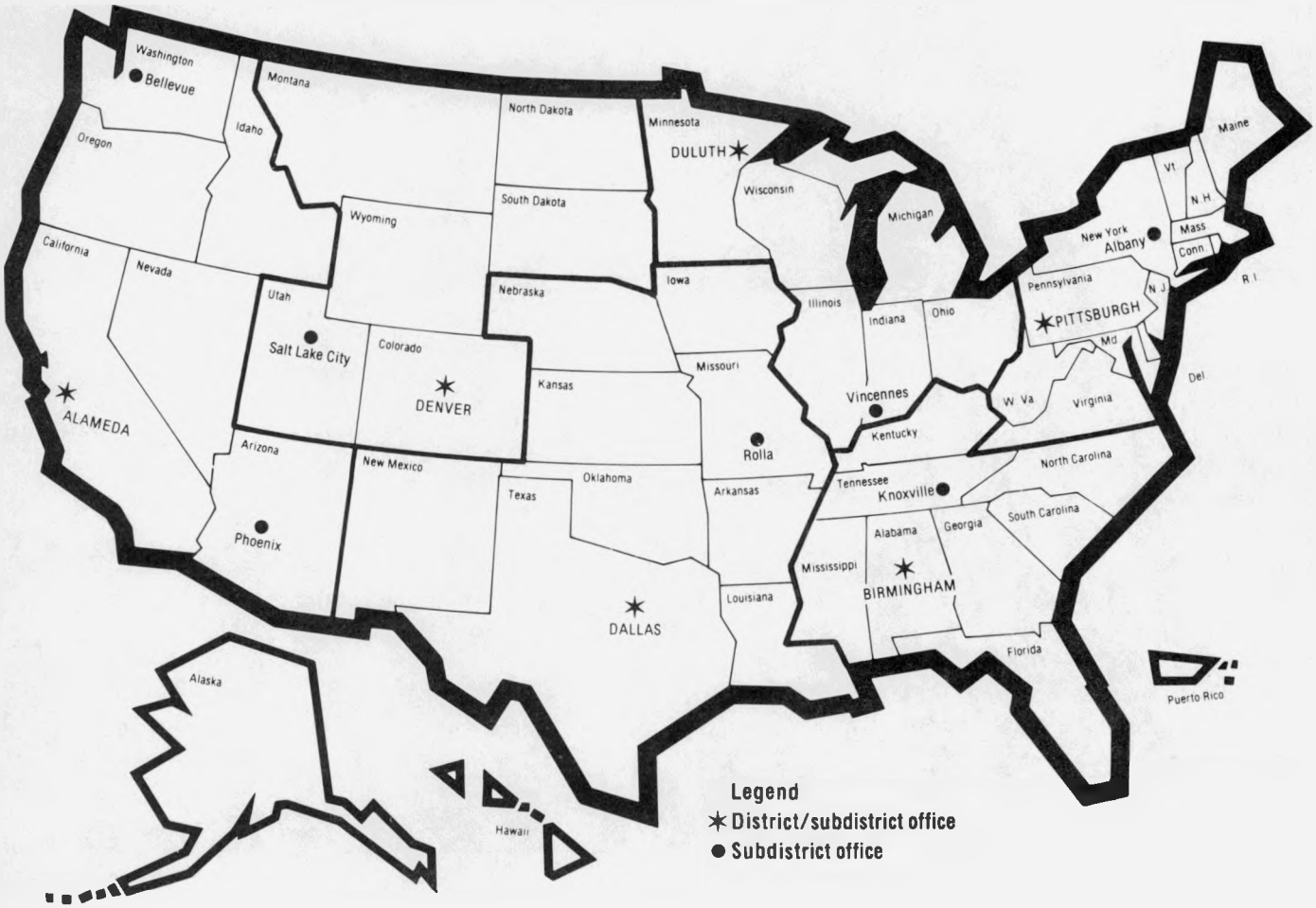
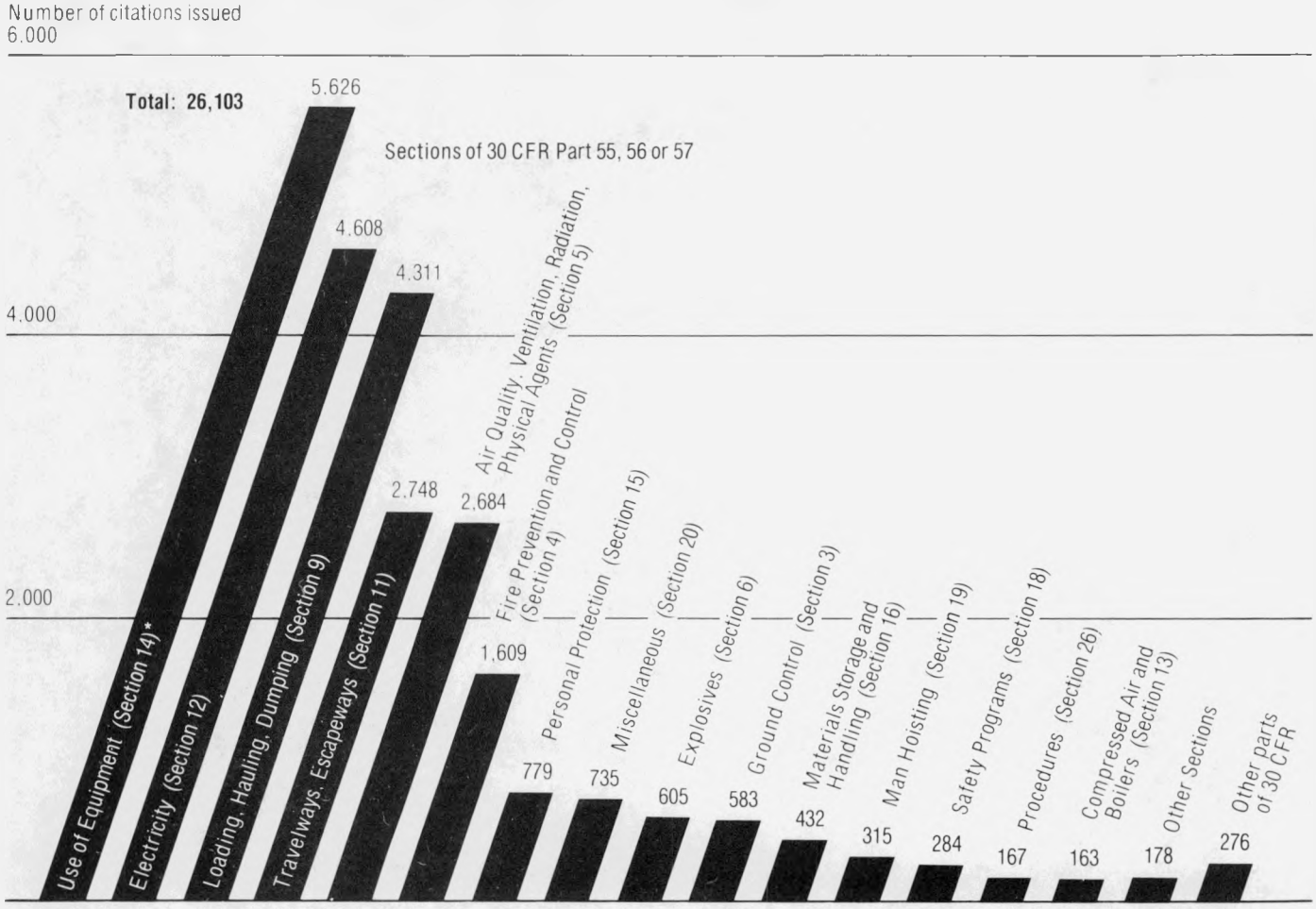


FIGURE 4.—Metal and nonmetal mine safety and health violations cited, FY 1980.



* Includes 58 citations involving welding that were treated as health violations (see table 22).

TABLE 18.—Metal and nonmetal mining industry statistics, FY 1980

Type of operation	Number of operations*	Number of workers	Employee-hours
Underground	902	37,543	67,820,124
Open pit	1,603	41,080	74,968,039
Stone quarries	3,983	39,463	67,624,970
Sand and gravel	7,626	41,135	60,357,194
Mills*	772	108,038	200,204,456
Subtotal	14,886	267,259	470,974,783
Office	—	39,392	69,293,166
Total	14,886	306,651	540,267,949

* "Number of operations" includes only those milling operations with their own MSHA identification number. "Number of workers" and "Employee-hours" include data from all milling operations.

TABLE 20.—Metal and nonmetal mine inspection data, by type of operation, FY 1980

Type of operation	Number of operations	Inspections		Citations issued	Orders issued
		Regular	Compliance followup		
Underground	902	2,169	948	5,003	387
Open pit	1,603	2,275	720	2,083	98
Stone quarries	3,983	6,349	3,232	8,266	258
Sand and gravel	7,626	10,461	3,769	8,027	226
Mills*	772	1,301	784	2,724	104
Total	14,886	22,555	9,453	26,103	1,073

* Milling operations with separate identification numbers; some mills on mine sites do not have their own ID numbers.

TABLE 21.—Industrial hygiene sampling at metal and nonmetal mines, FY 1980

Type of sample	Samples taken	Inspections samples taken	Mines samples taken
Full-shift samples:			
Respirable quartz dust	6,845	1,900	1,527
Total silica and nuisance dust	6,499	2,013	1,397
Noise dosimeter	16,784	4,866	3,626
Other*	1,541	267	211
Total full-shift samples	31,669	6,246†	4,211†
Area samples:			
General air quality	NA	932	319
Toxic and asphyxiant gases	NA	801	379
Radiation	5,684	589	257
Total area samples	NA	1,461†	585†

NA = Not applicable. (Individual samples are not taken for general air quality or for toxic and asphyxiant gases.)

* See table 33.

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

TABLE 19.—Metal and nonmetal mine inspection data by state, FY 1980

State	Operations	Inspections		Citations issued	Orders issued
		Regular	Compliance followup		
Alabama	213	379	232	484	6
Alaska	194	216	12	75	5
Arizona	325	586	221	801	28
Arkansas	216	425	383	290	25
California	719	963	454	1,201	49
Colorado	544	295	202	1,557	66
Connecticut	121	223	83	306	1
Delaware	10	20	3	2	—
Florida	244	452	296	768	12
Georgia	277	541	275	445	14
Hawaii	40	54	1	75	—
Idaho	265	273	106	278	29
Illinois	451	673	378	1,212	40
Indiana	311	500	218	795	12
Iowa	543	897	200	386	22
Kansas	369	677	110	151	10
Kentucky	163	332	133	253	6
Louisiana	174	372	190	338	19
Maine	168	176	89	463	2
Maryland	94	174	92	357	3
Massachusetts	208	296	202	521	10
Michigan	548	559	291	1,668	142
Minnesota	551	502	159	654	5
Mississippi	146	226	206	167	4
Missouri	517	1,115	264	603	22
Montana	270	279	175	689	56
Nebraska	323	588	70	165	9
Nevada	319	346	125	407	14
New Hampshire	64	84	59	223	4
New Jersey	117	250	108	207	12
New Mexico	257	607	141	814	55
New York	706	1,051	402	1,172	35
North Carolina	361	730	200	302	17
North Dakota	134	73	42	120	1
Ohio	460	658	247	785	4
Oklahoma	280	616	405	264	20
Oregon	347	395	193	650	9
Pennsylvania	432	746	297	743	9
Rhode Island	29	26	18	45	—
South Carolina	157	284	57	113	2
South Dakota	254	179	117	333	20
Tennessee	284	556	162	255	2
Texas	576	1,137	425	971	72
Utah	267	601	316	785	61
Vermont	144	248	69	154	16
Virginia	242	367	144	487	8
Washington	504	641	236	654	39
West Virginia	62	105	71	245	7
Wisconsin	568	634	76	159	5
Wyoming	215	264	204	905	54
Puerto Rico	99	157	285	548	7
Virgin Islands	4	7	9	58	3
Total	14,886	22,555	9,453	26,103	1,073

TABLE 22.—Health citations issued at metal and nonmetal mines, FY 1978-1980

Standard cited	Citations* issued		
	FY 1978	FY 1979	FY 1980
Noise standards: exposure limits, abatement measures, and personal protection	2,621	2,842	1,380
Control of harmful airborne contaminants to be by means of ventilation or protection with respirators†	1,345	1,492	812
Exposure to harmful airborne contaminants not to exceed Threshold Limit Values†	490	479	252
Radiation standards: concentration and exposure limits	41	184	156
Holes to be collared and drilled wet, or other efficient dust control measures to be used	135	83	58
Welding operations to be shielded and well-ventilated	93	64	58
Ventilation standards: equipment and procedures	27	24	18
Dust, gas, mist and fume surveys to be conducted by mine operators	21	13	8
All health standards	4,773	5,181	2,742

* Notices of violation, prior to March 9, 1978; citations thereafter.

† In most cases, the harmful airborne contaminant was dust.

TABLE 23.—Orders of withdrawal issued at metal and nonmetal mines, FY 1980

Cited	Imminent danger	Non-compliance	Other	Total
Sections of 30 CFR Part 55, 56 or 57:				
Section 3: Ground Control	73	1	4	78
Section 4: Fire Prevention and Control	8	12	2	22
Section 5: Air Quality, Ventilation, Radiation, Physical Agents	10	57	6	73
Section 6: Explosives	17	3	4	24
Section 9: Loading Hauling, Dumping	162	43	16	221
Section 11: Travelways and Escapeways	19	19	3	41
Section 12: Electricity	69	20	7	96
Section 13: Compressed Air and Boilers	—	1	—	1
Section 14: Use of Equipment (guarding)	18	37	14	69
Section 15: Personal Protection	50	8	6	64
Section 16: Materials Storage and Handling	8	1	2	11
Section 18: Safety Programs	2	1	—	3
Section 19: Man Hoisting	16	—	5	21
Section 20: Miscellaneous	—	9	—	9
Section 21: Gassy Mines	1	—	2	3
Section 26: Procedures	—	1	—	1
Other parts of 30 CFR and sections of the Act	160	38	138	336
Total	613	251	209	1,073

TABLE 24.—Metal and nonmetal mine inspection data, CY 1975-1977 and FY 1978-1980

Inspection data	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Inspections:						
Regular	16,500	19,404	22,817	12,450	18,376	22,555
Spot, compliance followup*	14,502	15,384	15,026	10,287	10,387	9,453
Total inspections	31,002	34,788	37,843	22,737	28,763	32,008
Notices, citations†	87,793	113,414	121,507	57,227	44,194	26,103
Orders	3,217	4,398	5,039	2,899	1,165	1,073

* Prior to March 9, 1978, spot inspections included inspections other than regular inspections. Since that date, compliance followup inspections are made to check on compliance with citations issued on regular inspections.

† Prior to March 9, 1978, notices of violation were issued for violations of mandatory safety and health standards. Since that date, citations are issued. Citations, which are issued under the 1977 Act, entail mandatory civil penalties; notices of violation, which were issued under the Federal Metal and Nonmetallic Mine Safety Act of 1966, did not entail civil penalties.

TABLE 25.—Metal and nonmetal mining fatalities, CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	43	37	42	34	28	32
Open pit	12	11	14	14	16	12
Stone quarries	27	17	20	22	22	24
Sand and gravel	21	24	25	30	20	20
Mills	20	24	32	33	28	25
Subtotal	123	113	133	133	114	113
Office	—	—	1	1	—	1
Total	123	113	134	134	114	114

TABLE 26.—Metal and nonmetal mining fatality rates per 200,000 employee-hours,* CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	0.12	0.11	0.11	0.11	0.08	0.09
Open pit	0.03	0.03	0.04	0.04	0.04	0.03
Stone quarries	0.08	0.05	0.06	0.07	0.06	0.07
Sand and gravel	0.07	0.08	0.08	0.10	0.06	0.07
Mills	0.03	0.03	0.03	0.04	0.03	0.02
Subtotal	0.06	0.05	0.06	0.06	0.05	0.05
Office	—	—	0.003	0.003	—	0.003
Total	0.05	0.04	0.05	0.05	0.04	0.04

* Prior to 1978, fatality rates were based on 1,000,000 employee-hours of exposure. The 1975-1977 rates shown above have been converted to the current 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of this and other recordkeeping changes, see "Note on the Data in This Report," page 4.

TABLE 27.—Metal and nonmetal mining fatalities by location and type of accident, CY 1975-1977 and FY 1978-1980

Location and type of accident	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground:						
Electrical	1	1	3	1	1	1
Explosives and breaking agents	1	7	4	3	3	7
Fall of roof, face, side or rib	7	8	9	10	6	9
Falling, rolling or sliding material	4	5	2	—	—	5
Handling material	1	2	5	3	—	—
Hoisting	NA	NA	NA	2	3	2
Ignition or explosion of gas or dust	4	—	—	—	5	—
Inundation	—	—	—	—	—	1
Machinery	6	2	4	2	1	—
Powered haulage	8	8	12	7	5	4
Slips or falls of persons	5	3	3	5	4	—
Other	6	1	—	1	—	3
Total	43	37	42	34	28	32
Surface:						
Electrical	5	—	7	5	8	7
Explosives and breaking agents	—	1	1	2	—	2
Fall of face, rib, side or highwall	3	2	2	12	2	1
Falling, rolling or sliding material	1	2	5	1	2	4
Handling material	2	3	5	3	1	2
Hoisting	NA	NA	NA	4	—	—
Ignition or explosion of gas or dust	—	—	—	—	—	3
Machinery	22	22	14	5	9	5
Powered haulage	20	20	20	29	23	26
Slips or falls of persons	7	2	5	4	8	5
Other	—	—	—	2	5	1
Total	60	52	59	67	58	56
Mills:						
Electrical	2	2	6	2	3	3
Falling, rolling or sliding material	1	1	2	4	4	3
Handling material	5	6	5	6	1	2
Ignition or explosion of gas or dust	—	—	—	—	—	1
Machinery	3	8	11	7	3	3
Powered haulage	2	3	4	6	10	6
Slips or falls of persons	1	2	3	4	5	7
Other	6	2	1	3	2	—
Total	20	24	32	32	28	25
Office	—	—	1	1	—	1
Grand total	123	113	134	134	114	114

NA = Not applicable. (Revised accident classifications were adopted in 1978, causing some changes in presentation of data.)

TABLE 28.—Metal and nonmetal mining fatalities by victim's experience, FY 1980

Part A.—By total mining experience

Years	Fatalities
Less than 1	20
1	13
2	8
3	5
4	2
5	4
6	—
7	3
8	1
9	2
10	—
11	1
12	—
13	2
14	1
15	—
16	1
17	1
18	1
19	1
20 or more	15
Unknown	33

Part B.—By experience on regular job

Years	Fatalities
Less than 1	42
1	16
2	7
3	2
4	1
5	3
6	3
7	2
8	—
9	4
10	1
11	2
12	1
13	3
14	1
15	1
16	1
17	1
18	—
19	2
20 or more	6
Unknown	15

TABLE 29.—Metal and nonmetal mining fatalities by victim's occupation, FY 1980

Occupation	Fatalities
Laborer	24
Supervisor, foreman	19
Truck driver	11
Mechanic, maintenance	8
Miner	6
Preparation plant operator	6
Rail transportation and haulage	5
Electrician	4
Front-end loader operator	4
Bulldozer, mobile equipment operator	4
Drill operator	3
Welder, machinist	3
Dragline, crane, shovel operator	3
Powderman, blaster	3
Mining machine operator	1
Hoist, cage, skip operator	1
Loading machine operator	1
Beltman, boom operator	1
Dredge, barge, boat	1
Technical, professional, clerical	1
Other or unknown	5
Total	114

TABLE 30.—Metal and nonmetal mining fatalities, total injuries, and rates per 200,000 employee-hours, by state, FY 1980

State	Fatalities	Fatality rate	All injuries	All-injury rate
Alabama	3	0.06	236	4.82
Alaska	—	—	14	5.30
Arizona	4	0.02	2,065	11.40
Arkansas	1	0.02	345	5.97
California	6	0.04	1,058	7.54
Colorado	8	0.08	1,149	11.04
Connecticut	—	—	44	4.65
Delaware	—	—	—	—
Florida	7	0.06	466	3.67
Georgia	—	—	399	4.22
Hawaii	—	—	25	4.11
Idaho	3	0.08	391	10.41
Illinois	2	0.03	296	5.15
Indiana	—	—	205	5.27
Iowa	4	0.10	205	5.06
Kansas	4	0.13	166	5.19
Kentucky	—	—	178	5.35
Louisiana	6	0.10	290	4.94
Maine	1	0.18	19	3.36
Maryland	—	—	154	6.13
Massachusetts	1	0.08	39	3.25
Michigan	5	0.05	469	4.60
Minnesota	1	0.01	904	6.17
Mississippi	—	—	78	5.01
Missouri	1	0.01	532	5.60
Montana	—	—	177	5.87
Nebraska	—	—	41	3.19
Nevada	1	0.02	334	7.07
New Hampshire	1	0.26	26	6.65
New Jersey	—	—	124	5.30
New Mexico	10	0.07	1,600	11.30
New York	1	0.02	336	5.59
North Carolina	1	0.02	234	4.67
North Dakota	—	—	9	2.61
Ohio	5	0.07	210	2.96
Oklahoma	—	—	97	3.54
Oregon	2	0.12	129	8.03
Pennsylvania	5	0.06	465	5.33
Puerto Rico	—	—	93	5.06
Rhode Island	—	—	4	3.94
South Carolina	5	0.22	83	3.57
South Dakota	1	0.04	394	13.98
Tennessee	3	0.05	407	6.14
Texas	7	0.04	1,177	6.66
Utah	8	0.09	611	7.01
Vermont	—	—	79	7.06
Virgin Islands	—	—	22	3.08
Virginia	2	0.04	284	5.31
Washington	1	0.05	93	4.35
West Virginia	—	—	73	4.82
Wisconsin	2	0.09	100	4.26
Wyoming	2	0.02	802	6.59
Total	114	0.04	17,731	6.56

TABLE 31.—All metal and nonmetal mining injuries, CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY'1980
Underground	4,017	3,389	4,509	4,854	5,309	5,090
Open pit	2,204	1,627	1,445	2,116	2,563	2,261
Stone quarries	2,735	2,295	2,344	2,370	2,463	2,080
Sand and gravel	1,417	1,214	1,315	1,561	1,714	1,357
Mills	3,813	4,653	5,201	7,009	7,898	6,874
Subtotal	14,186	13,178	14,814	17,910	19,947	17,662
Office	50	67	73	92	76	69
Total	14,236	13,245	14,887	18,002	20,023	17,731

TABLE 32.—Metal and nonmetal mining all-injury rates per 200,000 employee-hours,* CY 1975-1977 and FY 1978-1980

Type of operation	CY 1975	CY 1976	CY 1977	FY 1978	FY 1979	FY 1980
Underground	11.67	10.51	14.05	15.84	16.16	15.01
Open pit	6.05	4.57	4.30	6.08	6.59	6.03
Stone quarries	8.30	7.38	7.37	7.54	7.21	6.15
Sand and gravel	4.94	4.29	4.34	5.35	5.46	4.50
Mills	4.94	4.91	5.43	7.47	7.70	6.87
Subtotal	6.77	5.94	6.63	8.15	8.31	7.50
Office	0.19	0.22	0.23	0.29	0.22	0.20
Total	6.01	5.24	5.81	7.15	7.29	6.56

* Prior to 1978, injury rates were based on 1,000,000 employee-hours of exposure. The 1975-1977 rates shown above have been adjusted to the current 200,000-hour base to permit direct comparisons for all years. For a more detailed discussion of this and other recordkeeping changes, see "Note on the Data in This Report," page 4.

TABLE 33.—MSHA sampling for miscellaneous airborne contaminants at metal and nonmetal mining operations, FY 1980

Contaminant	Samples taken
Metals and metallic oxides:	
Dust samples	530
Welding fume samples	523
Asbestos fibers	262
Forms of silica other than quartz	65
Nonasbestiform talc	55
Toxic and asphyxiant gases	45
Mists (sulfuric acid, oil)	21
Cyanides	17
Other nonmetallic minerals (graphite, mica)	15
Mercury vapor	8
Total	1,541

TABLE 34.—Results of MSHA radon daughter sampling at underground metal and nonmetal mines, CY 1975-1977 and FY 1978-1980

Types of mines and year	Samples taken	Average concentration detected (WL)	Percent of samples over 0.3 WL*	Percent of samples over 1.0 WL†
Uranium mines:				
CY 1975	1,028	0.71	52.0	13.6
CY 1976	1,180	0.58	46.8	12.4
CY 1977	1,857	0.51	44.2	10.9
FY 1978	1,004	0.41	39.9	7.0
FY 1979	5,744	0.46	39.4	9.6
FY 1980	5,194	0.42	37.3	7.4
Non-uranium mines:				
CY 1975	370	0.31	35.9	7.6
CY 1976	1,071	0.22	21.8	5.3
CY 1977	915	0.12	14.0	0.5
FY 1978	501	0.18	23.0	2.0
FY 1979	477	0.08	8.2	0.4
FY 1980	490	0.12	10.0	1.8

* Title 30 CFR 57.5-37 provides for weekly sampling and employee exposure recordkeeping by operators in areas where concentrations of radon daughters exceed 0.3 WL.

† Title 30 CFR 57.5-39 provides that miners shall, in general, not be exposed to concentrations of radon daughters greater than 1.0 WL.

TABLE 35.—Radiation exposure of underground uranium miners, CY 1979*

Exposure received	Miners receiving indicated exposure (percent)
Less than 1 WLM	76.9
1 to 2 WLM	13.3
2 to 3 WLM	7.3
3 to 4 WLM	2.4
More than 4 WLM†	Less than 0.1

* Based on reporting by mine operators. Data are collected on a calendar year basis, so CY 1979 data are the latest available as of the end of FY 1980.

† Title 30 CFR 57.5-38 provides that no person shall be permitted to receive an exposure of more than 4 WLM in any calendar year.

section 3 Standards, Regulations and Variances

The Office of Standards, Regulations and Variances, which coordinates MSHA's rulemaking activities, continued work on regulations required by the 1977 Act, pursued other rulemaking projects begun before the Act was passed, and initiated reviews of existing regulations.

Significant new regulations in FY 1980 included provisions for identification of independent contractors employed on mine sites. Published July 1, 1980, the regulations make such contractors responsible for violations of the Act, standards or regulations committed by them or their employees. The rule provided the initial mechanism for integrating independent contractors into MSHA's enforcement system, and was favorably received by the mining industry.

Another new regulation, mandated by the Act, was issued July 11, 1980, requiring mine rescue teams at all underground mines. Effective July 11, 1981, the standard establishes minimum requirements for mine rescue equipment, its storage and maintenance; rescue notification plans; and team members' experience, health and training. The regulation allows for regulatory flexibility by permitting alternative mine rescue plans for small, remote mines or those with special mining conditions.

Work continued on safety and health standards for surface construction work at mines, as required by the Act. MSHA was planning to propose a rule based on the construction standards issued by the Occupational Safety and Health Administration (OSHA). MSHA chose this approach because the hazards of surface construction work are similar, whether on or off a mine site. This would also have the advantage of providing one set of surface construction standards in the Labor Department.

MSHA on Aug. 15, 1980, proposed a rule setting forth criteria for identifying mines that have a pattern of violations. The Act contains more stringent enforcement provisions for such mines. Congress included this strong enforcement tool in the law as an additional safeguard for miners, which can be used against operators who chronically disregard safety and health. MSHA planned to engage in the full rulemaking procedure for this very significant regulation. With this proposal, MSHA had initiated or completed nearly all the rulemaking mandated by the 1977 Act.

One rulemaking project begun prior to the Act's passage concerned the sampling of respirable dust in underground coal mines. On April 8, 1980, MSHA published a final rule revising sampling procedures for respirable dust in underground coal mines, effective Nov. 1, 1980. At the same time MSHA proposed changes in the sampling program for surface mines and the program providing for transfer of miners with evidence of developing pneumoconiosis. MSHA also proposed changes to allow representatives of miners to participate in both surface and underground dust sampling programs. Public hearings were held on these proposals.

MSHA also in FY 1980 proposed revisions to approval standards on electric cap lamps, signaling devices, and electrical components and headlights for mobile diesel-powered transportation equipment. These proposals would modify requirements for equipment approval to allow MSHA to test and certify equipment that incorporates advanced technology.

During 1980, MSHA began a comprehensive review of its existing regulations covering metal and nonmetal mining, many of which raise a wide range of health and safety issues. On March 25, 1980, MSHA published a notice in the Federal Register soliciting public input for this project. The agency planned to encourage further public participation throughout the review. Work also continued during the fiscal year on MSHA's review of the civil penalty assessment regulations. Comments from the mining community were considered, and changes in the assessment regulations were proposed early in FY 1981. MSHA planned to continue reviewing regulations during the 1981 fiscal year to determine their continued relevance and effectiveness.

The office also coordinates MSHA's handling of petitions for modification from mine operators seeking variances, specific exemptions from mandatory safety standards. Such petitions are granted when investigation shows that an equal or greater measure of safety can be achieved by an alternative method,

or that application of the standard would reduce miners' safety. During FY 1980, MSHA received 289 petitions from coal mine operators and 123 from metal and nonmetal mine operators. Actions were taken on 248 petitions (table 36).

TABLE 36.—Actions taken on petitions for modification, FY 1980

Action taken	Coal mine petitions	Metal and nonmetal mine petitions
Granted	89	9
Denied	20	4
Dismissed or withdrawn*	99	20
Denial appealed	4	—
Total	212	33

* Petitions were never completed or were withdrawn by the operator

section 4 Assessments

The 1977 Act requires MSHA to assess civil monetary penalties for violations of mandatory standards or provisions of the Act. MSHA carries out this duty through the Office of Assessments. Not only are mine operators subject to these civil penalties, but directors, officers and agents of corporate operators can be individually subject to civil penalties for violations they knowingly permitted. Miners who willfully violate regulations against smoking in hazardous areas are also subject to civil penalties.

The Act specifies that penalties are to be no more than $10,000 for each violation. It also provides for a penalty of up to $1,000 per day for failure to correct a violation within the time allowed.

MSHA tries to ensure that the assessment process is efficient and effective with a maximum of "due process" protection. After an inspector issues a citation for a violation, a copy is forwarded to the central assessment office in Wilkes-Barre, Pa. The citation, together with the inspector's statement detailing facts related to the operator's negligence, the gravity of the violation, and the operator's efforts to achieve compliance, is reviewed by an independent assessment specialist.

In computing the penalty, MSHA considers six criteria established by the Act:

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

Under assessment regulations, a formula system is used to compute penalties for most violations assessed. Each criterion is assigned a range of points which, when totaled, are converted to a dollar amount, using a penalty conversion table. Size and history points are computed from automated records. The operator's ability to continue in business is presumed to be unaffected by the assessment unless the operator submits information on this criterion for MSHA's consideration.

The results of this initial review are mailed to the operator and the representative of the miners at the mine. These individuals have 10 days to notify the assessment office that a conference is requested or that additional evidence will be submitted for consideration.

The conference after the initial assessment is an important part of the civil penalty process. At the conference the operator and representative of miners can meet with assessment personnel and present additional facts or advance legal arguments before the amount of the proposed penalty is finally determined. A conference, if held, must take place within 33 days of receipt of the initial review documents. The conference may be held in person or by telephone, or the parties may submit written comments and documentation. Based on the conference and the evidence submitted, the initial findings are affirmed or modified. Then a proposed assessment is issued.

Usually the conference resolves the issues and the penalty is paid. More than 80 percent of the penalties collected in FY 1980 were collected after conferences.

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

If the operator requests a hearing before the commission, the assessment office immediately notifies the commission and refers the case to the Office of the Solicitor for processing.

Cases referred to the commission receive a hearing in accordance with the Administrative Procedure Act. An administrative law judge hears the facts and issues a decision. The judge's decision may be appealed to the commissioners by any party—the operator, the miners' representative or MSHA. If neither appealed nor paid, the administrative law judge's assessment becomes the commission's final order.

Under the Act, once a proposed penalty becomes a final order of the commission it must be paid unless appealed to the United States Court of Appeals. If a case is appealed to the

Federal court, the court is limited to a review of the record to determine if there is substantial evidence to support the decision. No new evidence is considered. This contrasts with the review procedure under the 1969 Coal Act, where an operator was entitled to a *de novo* jury trial in the Federal district court.

Where a final order of the commission remains unpaid, it accrues 8 percent interest per year, and is subject to collection in the Federal courts. The Act also authorizes a separate collection action to reduce the assessment order to a judgment.

The regulations provide that the Office of Assessments may choose to waive in whole or in part the use of the assessment formula if conditions surrounding the violation warrant. Although an effective penalty can usually be derived from the formula, some violations may be of such a nature or seriousness that it is not possible to arrive at an appropriate penalty using the formula.

Accordingly, it may be appropriate in certain cases, such as fatalities, serious injuries or unwarrantable failures to comply with standards, to waive the formula and make a special assessment. Special assessments take into account the six criteria in the Act. The findings are presented in narrative form. In FY 1980, 3,672 violations, less than 5 percent of the total, received special assessments amounting to $5.0 million.

During fiscal 1980, MSHA assessed 165,232 violations with penalties amounting to $28.2 million. Conferences were held on more than 120,000 violations during the year.

As of Sept. 30, 1980, the Wilkes-Barre Office had a working inventory of 3,714 violations. All formula-type assessments were processed in less than 17 days. The working inventory and processing time were the lowest in the history of the assessment program.

On Sept. 30, 1980, the conference offices had a working inventory of 8,797 cases.

During FY 1980, 2,445 cases were referred to the Office of the Solicitor for a hearing. As a result of an agreement between the Department of Labor and the Department of Justice, the Office of Assessments in FY 1980 discontinued referring collection cases to Justice and began referring them to the Labor Department's Office of the Solicitor. As of the end of FY 1980, 9,703 cases were pending enforcement action by the Justice Department and 3,334 cases were pending enforcement action by the Labor Department solicitor.

During FY 1980 the Office of Assessments completed the review of its regulations promised when the rules were issued in 1978. After review of written comments from industry and labor and several informal meetings with members of the mining community during the fiscal year, MSHA early in FY 1981 proposed significant changes in the way proposed penalties are calculated. The proposed changes include provisions that would set a fixed minimum penalty of $20 for non-serious violations, exclude from the operator's history of violations any assessed a minimum penalty or contested, award greater "good faith" credit for timely efforts to correct violations, provide separate tables for determining seriousness of health violations, and include separate point scales for independent contractors in the penalty point system. The proposed changes are intended to make the assessment system more effective and equitable.

section 5 *Office of the Solicitor, Division of Mine Safety and Health*

The Division of Mine Safety and Health of the Labor Department's Office of the Solicitor continued as MSHA's legal advisor during FY 1980. The division was instrumental in establishing precedents in both administrative and court litigation, issuing new regulations, updating existing ones, reducing the backlog of civil penalty collection cases, and coordinating efforts with other agencies.

During the fiscal year the agency continued to prevail in the courts of appeals on the issue of whether the warrantless-inspection provision of the Act is constitutional. In addition to the Third, Fourth and Fifth Circuits, which had already ruled in MSHA's favor on the issue, the Fifth Circuit ruled in the agency's favor in *Marshall* v. *The Texoline Co.*, 612 F.2d 935 (1980). The Supreme Court denied petitions for a hearing in three other such cases, *Marshall* v. *Nolichuckey Sand Co.*, 606 F.2d 693 (6th Cir. 1979), *cert. denied,* 446 U.S. 908 (1980); *Marshall* v. *Stoudt's Ferry Preparation Co.*, 602 F.2d 589 (3d Cir. 1979), *cert. denied*, 444 U.S. 1015 (1980); and *Donofrio* v. *Marshall*, 605 F.2d 1196 (3d Cir. 1979), *cert. denied*, 444 U.S. 1102 (1980).

The division lost a warrantless-inspection case for the first time in a Federal district court during the summer of 1980 (*Marshall* v. *Dewey*, No. 79-C-114 (E.D. Wis.)). Another judge in the same district subsequently ruled in the agency's favor on the issue (*Marshall* v. *Cedar Lake*, No. 79-C-181). Because the trial judge in *Dewey* declared a portion of the Act unconstitutional, the division recommended appeal to the Supreme Court, which reversed the decision in June of 1981.

In the courts of appeals generally, the division won all 26 cases decided during the year. Besides the constitutionality of warrantless inspections, the issues included questions of jurisdiction under the Act and interpretations of various MSHA standards.

During FY 1980, the division completed the process, begun the previous year, of shifting responsibility for most trial litigation to the regional and field solicitors' offices. Divisional trial attorneys continue to handle a small caseload, mainly emergency cases that present new issues or have special significance, temporary reinstatements of discharged miners in discrimination cases and certain unusual injunction cases. In addition, division trial staff provided coordination and policy guidance to the regional trial offices. During FY 1980, more than 3,000 new administrative proceedings were initiated. Final dispositions were achieved in more than 3,500 cases. Civil penalties totaling more than $1,250,000 were collected through the efforts of Labor Department attorneys.

Administrative law judges issued several important decisions during the fiscal year. These included *Leechburg Mining* v. *MSHA*, Case 78-MS-21 (May 1, 1980), affirming MSHA's enforcement procedures requiring cabs and canopies on electrical face equipment in coal mines; *Climax Molybdenum* v. *Secretary of Labor*, Docket No. WEST 79-92-RM (Feb. 25, 1980), upholding MSHA's right to use cameras in underground mines to document violations of the Act; and *Secretary of Labor* v. *Old Ben Coal Company*, Docket No. LAKE 79-238, *et al.* (July 25, 1980), affirming MSHA's respirable coal mine dust enforcement program.

The 1977 Act gave the Secretary of Labor new powers and responsibilities to protect miners who have been fired or otherwise discriminated against because they asserted their health and safety rights under the Act. In FY 1980, the Secretary initiated more than 80 actions on behalf of such miners. In addition, 11 discharged miners were temporarily reinstated pending completion of their cases. Several other discharged miners were voluntarily returned to their jobs after negotiations between division counsel and the operator's counsels.

In other Federal litigation, division trial attorneys brought more than 40 injunctive actions to prevent mine operators from denying mine inspectors entry into mines or continuing operations in violation of MSHA withdrawal orders.

Besides civil and administrative litigation work, the division's attorneys helped the Department of Justice prepare criminal litigation against several companies and individuals alleged to have willfully violated the Act. During the fiscal year, these efforts resulted in the filing of five Federal indictments or informations.

Administrative litigation before the Federal Mine Safety and Health Review Commission continued to spawn important decisions. Early in the year the commissioners upheld MSHA's interim policy of citing mine operators for violations by their independent contractors *(Secretary of Labor* v. *Old Ben Coal Company*, 1 FMSHRC 1480 (Oct. 29, 1979)). The commission's order was later affirmed on appeal to the U.S. Court of Appeals for the D.C. Circuit. The commissioners also ruled that to establish that defective equipment has been taken out of service, an operator must show that the equipment has been rendered inoperable (*Secretary of Labor* v. *Eastern Associated Coal Corp.*, 1 FMSHRC 1473 (1979)).

In a major decision that went against MSHA, the commission ruled that miners are not entitled to compensation when they accompany inspectors on other than "regular" inspections (*Secretary of Labor* v. *Helen Mining Co.*, 1 FMSHRC 1796 (Nov. 21, 1979)). The case was pending in the D.C. Circuit Court of Appeals (No. 79-2537) at the end of the year.

Finally, the commissioners issued several decisions delineating the scope of administrative law judges' authority in procedural matters.

The division also advised MSHA during new rulemaking and in revising existing standards. Division attorneys worked with MSHA in drafting rulemaking documents, conducting public hearings, and reviewing public comments and testimony in rulemaking proceedings. In addition, resources began to be devoted to a comprehensive long-term review of standards currently in effect. This reevaluation is a part of the agency's ongoing program of regulatory reform. The section of this report covering standards, regulations and variances, and the appendix, contain more information on MSHA rulemaking in FY 1980.

In April 1980, the division organized a collection unit to collect final civil penalties assessed under the Act and help eliminate a backlog of such cases in the Nashville and Philadelphia regions. Through the end of FY 1980, the division had received 2,034 new cases for action. Approximately 3,000 to 4,000 collection cases from these regions remained backlogged in the Department of Justice. The division had collected penalties amounting to $36,000 in 104 cases; these penalties were paid in response to demand letters mailed to the mine operators before filing suit. Sixty-eight MSHA cases (25 civil actions) had been filed for collection in Federal district court. The collection unit is working with U.S. attorneys to develop effective procedures and guidelines to handle both new and backlogged civil penalty collection cases.

The division took part in negotiating memoranda of understanding to coordinate enforcement, investigation and research with other agencies. A new memorandum of understanding was signed with the Treasury Department's Bureau of Alcohol, Tobacco and Firearms to supersede a 1971 agreement on explosives safety between ATF and MSHA's predecessor agency. Agreements with the Labor Department's Employment Standards Administration and the National Labor Relations Board dealt with overlapping jurisdiction in discrimination complaints. An agreement was made with the Department of Energy's Fossil Energy Division to assure that safety and health protections would be built into new mining technologies at an early stage of research and development.

The division also reviewed and assisted MSHA in commenting on legislative proposals on subjects including regulatory reform, revision of the Federal criminal code, reform of Federal paperwork requirements and exemption of certain nonmetal mining from MSHA's jurisdiction.

section 6 *Federal Mine Safety and Health Review Commission*

The Federal Mine Safety and Health Review Commission was created by Congress as an independent agency under the Mine Safety and Health Act of 1977. Its main purpose is to resolve enforcement disputes between MSHA and the operators of the nation's mines. The commission also provides a forum for resolving certain safety and health controversies between miners, or their representatives, and mine operators.

During FY 1980, the commission had 16 administrative law judges and five presidentially appointed commissioners. The judges hold hearings and issue initial decisions, which may be reviewed by the commissioners at their discretion. Following a decision to review, usually in response to a petition by the aggrieved party, the commissioners issue their own decision affirming, reversing or modifying the decision of the judge. If not reviewed, the administrative law judge's decision becomes the final order of the commission.

Case Disposition

The commission began fiscal year 1980 with about 3,500 cases awaiting hearing and initial decision by an administrative law judge; 3,261 additional requests for hearings were received during the year from the mine operators, miners or miners' representatives. During the same period the administrative law judges issued decisions in 3,912 cases. Thus, the pending caseload was reduced to about 2,800 cases at the close of the year.

The commissioners voted to grant review of 69 of the administrative law judges' decisions issued during the fiscal year. The commissioners issued decisions or final orders in 71 cases, and 80 cases were pending review at the year's close.

Significant Decisions

Certain decisions during the 1980 fiscal year had major policy implications for the 1977 Act's implementation.

Section 103(f) of the Act provides that a representative authorized by the miners must be given an opportunity to accompany the MSHA inspector during a mine inspection. The Act further provides that this representative must suffer no loss of pay during the inspection. During the fiscal year the commission issued two decisions interpreting this new right of miners. In *Magma Copper Company* v. *Secretary of Labor, et al.*, 1 FMSHRC 1948 (Dec. 10, 1979), the commission held that the right to compensation exists for representatives accompanying two or more MSHA inspectors or inspection teams who, in making a regular inspection, are travelling to different parts of the mine simultaneously. In *Secretary of Labor* v. *The Helen Mining Company*, 1 FMSHRC 1796 (Nov. 21, 1979), the commission interpreted the law to read that, while a representative of miners is entitled to accompany an inspector during any inspection, the representative is entitled to be paid by the operator only for the time spent on "regular" quarterly or semi-annual inspections. It was held that the right to walkaround pay did not extend to a "spot" inspection, required by section 103(i) of the Act because the mine liberated excessive quantities of methane. Both decisions were appealed to the circuit courts. The commission's decision in *Magma Copper* was upheld by the Ninth Circuit Court of Appeals in May 1981.

Another important issue before the commission was whether the owner-operator of a mine could be held responsible under the Act for violations by independent contractors the owner engaged to perform work at the mine site. In *Secretary of Labor* v. *Old Ben Coal Company*, 1 FMSHRC 1480 (Oct. 29, 1979), the commission held that because the Secretary's decision to issue the citation to Old Ben was grounded on considerations of consistent enforcement, it was made for reasons consistent with the purposes and policies of the 1977 Act and would not be disturbed on review. The commission's order was affirmed on appeal to the District of Columbia Circuit Court.

In *Secretary of Labor* v. *Old Ben Coal Company*, 1 FMSHRC 1954 (Dec. 12, 1979), the commission reversed a precedent set by the Interior Department's Board of Mine Operations Appeals under the 1969 Coal Act, establishing the elements for proving a violation for accumulation of combustible materials under 30 CFR 75.400. (This standard was contained in section 304(a) of the 1969 Act and was carried over intact to the 1977 Act.) The Board had held that three elements were necessary to constitute a violation: (1) an ac-

cumulation of combustible material existed; (2) the operator knew or should have known of the accumulation; and (3) the operator failed to undertake cleanup within a reasonable time. The commission held that a violation is proved where the evidence shows that an accumulation of combustible material existed, and that the second and third elements in the Board's decision should be considered in determining the civil penalty, not in determining whether a violation occurred. The decision noted that the 1969 Act's legislative history demonstrates Congress's intention to prevent, not merely minimize, such accumulations.

section 7 *Technical Support*

The Directorate of Technical Support uses its engineering and scientific resources to solve technological problems encountered in the enforcement of the Act. The directorate also collects, analyzes and publishes information on injuries and occupational illnesses in the mining industry; tests and approves equipment, components, explosives and materials used in mines; and assists MSHA inspectors and mine operators in identifying hazards so that corrective action can be taken. Technical Support assists in preparation of technical course material, provides criteria and other technical information for development of standards, and coordinates interagency research efforts. The directorate's technical reports and services are available to other Federal, state and local agencies on request.

MSHA's technical support centers in Pittsburgh, Pa., and Denver, Colo., maintain technical capability for conducting operations at mines in the East and West. National data on mining accidents, injuries, illnesses, employment and production are collected and analyzed at the Health and Safety Analysis Center in Denver, Colo. Engineering review and testing related to approval and certification of mining equipment are performed at the Approval and Certification Center's facilities in Triadelphia and Beckley, W.Va. MSHA's special equipment for locating and rescuing trapped miners in case of disaster was maintained at Hopewell, Pa., and Salt Lake City, Utah, during FY 1980.

Electrical Systems

Technical support provides engineering and technical services on safety problems involving mine electrical systems and equipment. These services are in the areas of electrical power, electronics, illumination, communications, controls and instrumentation, and include evaluating the designs of unique electronic safety devices. Their purpose is to improve electrical systems safety and testing and to develop procedures for constructing, installing, modifying, testing and maintaining electrical systems to meet the most current nationally acceptable safety practices.

In response to requests from enforcement personnel, Technical Support's electrical specialists made 51 field investigations. They also responded to more than a thousand requests for technical reports or other information. Technical assistance was given on problems with communications, medical instruments, direct-current haulage systems protection, high-voltage alternating-current systems protection, safety grounding of power systems and revisions of regulations. Besides solving immediate problems, data from investigations were useful for illustrating the need for design changes in equipment and in court testimony.

Technical Support repaired, calibrated and evaluated 46 electrical devices for the enforcement offices.

Because of the number of fatalities associated with poor cable splicing, Technical Support developed a device to assist inspectors in determining if a splice is defective. The device measures leakage current from the splice and indicates any defect. To reduce accidents due to the raised beds of large haulage trucks contacting overhead high-voltage lines, a warning device to alert the driver that the bed is up was developed and demonstrated at a southern Ohio coal mine.

Roof and Ground Support

Technical Support's roof and ground support specialists provide engineering expertise on safe mine roof and rib design; structural safety of underground mine openings; roof control problems encountered by enforcement personnel; automated or remote temporary roof support systems; and roof, rib or face protection methods. These methods include the installation of cabs and canopies on mining equipment, rock burst evaluation and remote sensing.

In FY 1980 activities focused on four main efforts: minimizing the need for miners to enter areas of unsupported roof; better roof control through use of new roof support systems and more effective mining methods; increased use of remote sensing technology to identify potentially adverse roof conditions in advance of mining; and development and implementation of rock burst plans.

Accident statistics indicate that most roof fall fatalities occur in newly mined areas beyond permanent supports. Technical Support in FY 1980 devoted considerable effort to reducing miners' exposure to unsupported roof through use of

automated temporary roof support (ATRS) systems. Personnel investigated, evaluated, and conducted engineering analyses of ATRS systems. In FY 1980, 50 approvals were issued for use of ATRS systems in 65 mines in lieu of traditional temporary roof support posts which had to be set by miners entering the area of unsupported roof. Of these, 28 mines received approvals for retrofitting single-boom roof bolting machines as the sole means of temporary roof support.

Technical Support assisted coal mine enforcement personnel in evaluating ATRS systems for use in place of manually set temporary supports. The directorate also worked with MSHA enforcement personnel, manufacturers and mine operators to devise more effective systems.

At the request of enforcement personnel, Technical Support conducted 142 roof and ground control investigations at mining operations producing borate, coal, copper, gold, lead, limestone, molybdenum, phosphate, salt, silica, silver and trona. Types of assistance provided included slope-stability analyses of open pit walls; recommendations on supporting strata near a fault zone; analysis of roof and rock bolt installations, timber installations, roof and rock fall fatalities, rock slides, highwall failures and rock bursts; and detailed aerial and satellite photography analyses of mining operations for potential ground control problems.

Nine investigations were made in underground mines to determine the effectiveness of point resin-anchored bolts and two other commercially available roof bolting systems as sole supports under adverse mining conditions. Technical Support conducted 95 laboratory analyses to determine if new and existing roof bolting systems meet current standards and specifications. Such studies assisted MSHA in identifying reliable items for inclusion in roof control plans and helped manufacturers ensure that quality products are available to the mining industry.

The use of remote sensing techniques to predict potential areas of ground instability in advance of mining continued expanding in FY 1980; linear analyses of 125 coal mines, using aerial and satellite photography, were made at the request of MSHA and mine operators. A program to promote use of remote sensing by MSHA's coal mine safety and health districts was initiated in FY 1980. Introductory workshops on remote sensing were held for district personnel. The development and use of geophysical remote sensing techniques (very-low-frequency and electrical resistivity) to locate faults and fracture zones were continued. Technical Support participated in a joint project with the U.S. Geological Survey's Water Resources Division to correlate linear and fracture zones with water problems in underground mines.

A major accomplishment was Technical Support's adaptation of a television camera and videotape readout system for evaluating $1^{3}/_{8}$-inch-diameter mine roof and rock bolt holes. This is the only available battery-operated system for viewing and recording holes of such a small diameter. Analysis and evaluation of roof and rock bolt holes enables engineers to develop better support systems.

The first review of rock burst monitoring and prevention plans submitted by metal and nonmetal mine operators was completed in FY 1980. Operators of mines in which outbursts of stressed rock have occurred are required to develop plans for preventing these rock bursts or monitoring rock movements so miners can be withdrawn from hazardous areas. Since the development and implementation of the plans, no fatal accidents attributed to rock bursts have been reported.

Updates on current roof control technology were presented at five mining industry and engineering conferences.

Industrial Safety

Technical Support's activities in the area of industrial safety cover a variety of problems. Efforts are concentrated on fires, dust and gas explosions, haulage and machinery accidents, use of explosives, ventilation control structures, hoist safety and nondestructive testing of hoist ropes. During FY 1980, Technical Support personnel participated in 100 laboratory and 65 field investigations of industrial safety problems.

Laboratory testing, performed on request from MSHA and other agencies, included determining explosion hazards from coal, metallic and agricultural dusts to promote safe handling and use. Flash point and fire resistance tests were made on liquids, plastics and construction materials to evaluate their safety for use in underground mining.

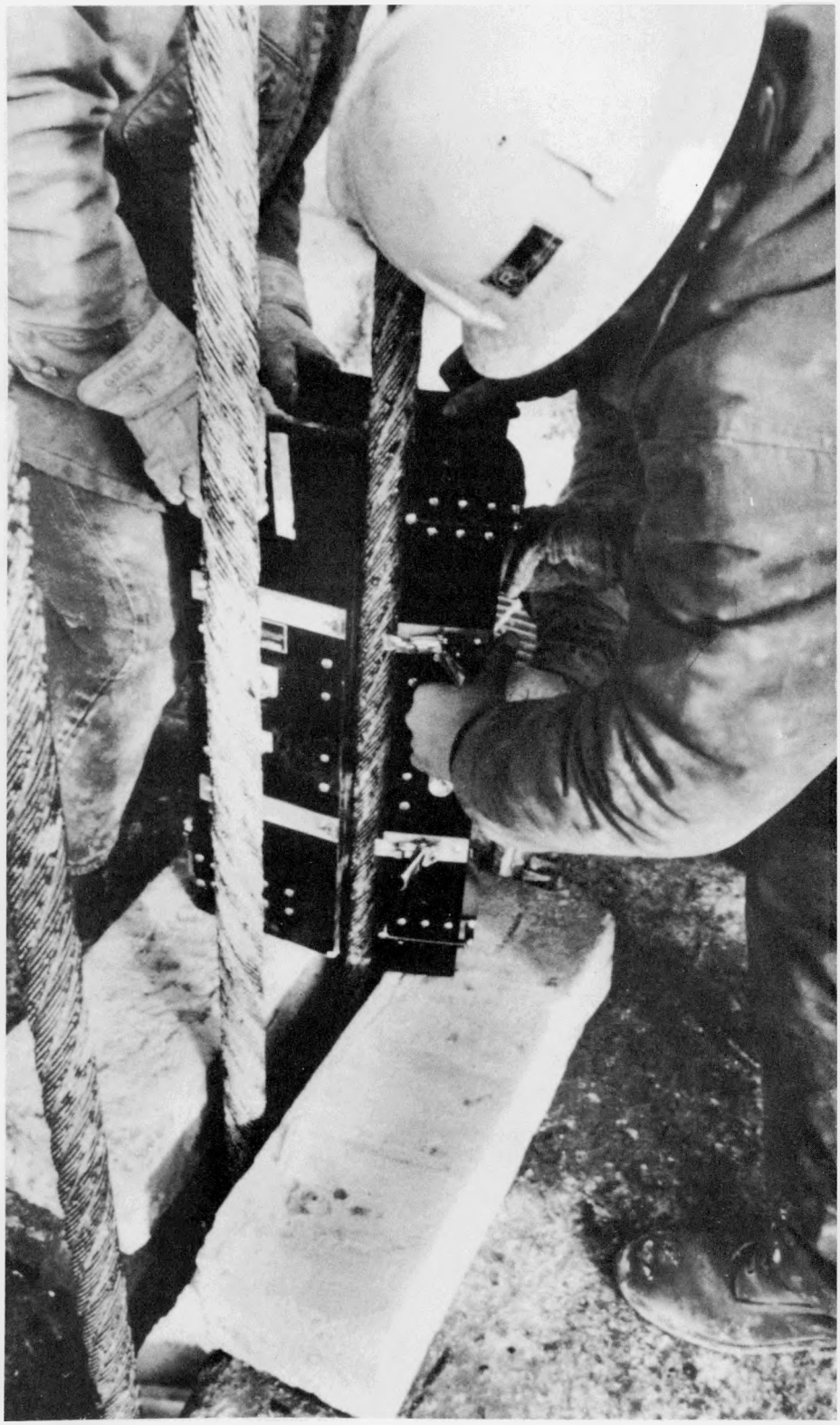
A major effort is directed toward developing an explosion-quenching system for use at the mining face, where ignitions of methane by friction—a relatively common occurrence—represent a potential explosion hazard. In tests, explosively actuated canisters containing gaseous and dry chemical agents successfully quenched all methane ignitions before development of critical pressures and flame extent. Canister designs are currently being modified to reduce their noise levels to below 150 decibels without affecting the timing and dispersion patterns of quenching agents.

Numerous field investigations were conducted at the request of enforcement personnel. Industrial safety personnel completed reports on three major explosions: a gas explosion at the Belle Isle salt mine, St. Mary Parish, La.; a coal dust explosion at the Kaiser cement plant, Helena, Mont.; and a coal silo explosion at Y & O Coal Co., Beallsville, Ohio. Field investigations and other assistance in the use of explosives dealt with the safety practice of ANFO bulk mixing in underground limestone mines, stray currents on electric blasting caps and the causes of misfired explosives and means of recovery. Infrared viewing instruments were used to locate burning areas in a coal mine waste impoundment. Eight field investigations involved wire rope analyses and six concerned petitions for modification of mandatory safety standards.

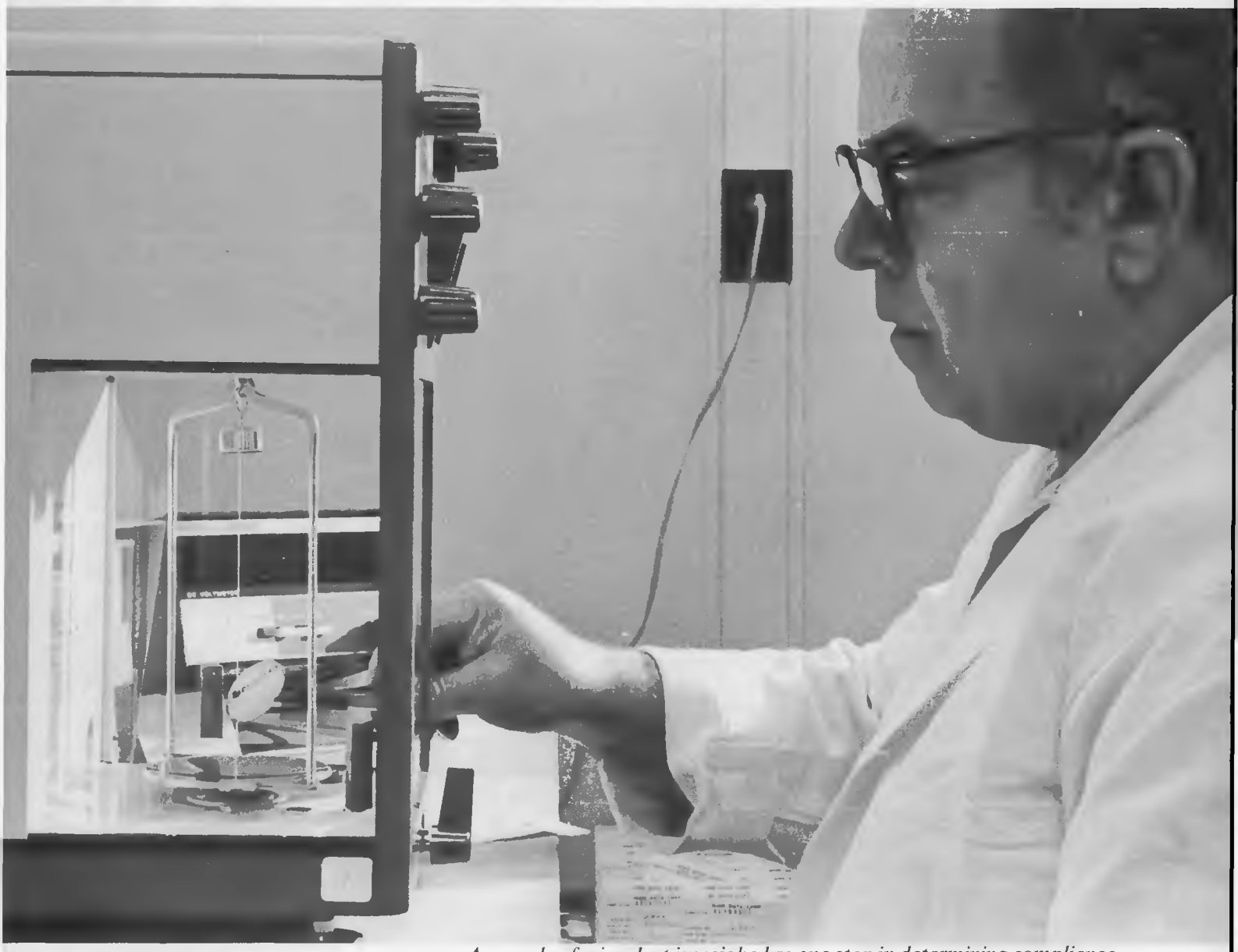
Under an agreement between MSHA and the Interior Department's Office of Surface Mining, Technical Support reviewed and recommended for approval 26 blasting plans for surface coal mines.

Technical assistance was provided to metal and nonmetal enforcement personnel in implementing new mandatory standards, primarily provisions in 30 CFR Part 57 concerning fire doors and fire-retardant timbers in mine entrances. Recommendations on means for meeting these standards were provided to enforcement personnel for use by mine operators. The subjects of boilers, compressors and pressure vessels, hoists and hoisting, explosives and fire-resistant hydraulic fluids were also reviewed as part of the general re-evaluation of metal and nonmetal standards.

In addition, 37 reports were issued and presentations made at conferences and symposiums.



MSHA has promoted the use of nondestructive instrumentation, such as this electronic device, to test hoist ropes while still in service.



A sample of mine dust is weighed as one step in determining compliance with respirable dust standards.

Mine Waste

Technical Support specialists assist MSHA and industry with problems in mine waste handling and disposal, including refuse piles, waste impoundments and tailings structures. They also deal with geotechnical engineering problems such as mining near bodies of water, underground disposal of radioactive and industrial waste, underground storage of oil and natural gas, highwall and open pit slope stability, and various aspects of mining-related construction.

Coal mine operators must submit engineering plans for the design, construction and maintenance of waste embankments and impoundments to the MSHA district manager for approval based on an in-depth technical review. During FY 1980, Technical Support engineers reviewed 240 of these plans. A report was prepared for each plan that had to be rejected, indicating the technical deficiencies. Field evaluations of 120 disposal sites were made in conjunction with plan reviews and, on requests for assistance, six sites were investigated to resolve special problems encountered during and after construction. One metal and nonmetal tailings dam failed during FY 1980; the failure was investigated.

Eight major investigations on geotechnical problems included analysis of a stream relocation and potential flooding of an adjacent mine portal, and the testing of soil and coal refuse samples for com-

pliance with impoundment construction specifications and design assumptions. Technical Support gave extensive assistance to Coal Mine Safety and Health on problems with the technical interpretation of regulations on mine waste impoundments. Technical Support also consulted with the Solicitor's Office on questions about the adequacy of coal mine barrier pillars and the potential for flooding of adjacent mines, mining through gas wells, and man-made bulkheads used to seal mine openings and prevent flooding from the surface.

Laboratory projects included studies of the compaction characteristics of coarse coal refuse and the engineering properties of anthracite fines.

Two coal mining sites in Illinois and Ohio were investigated in relation to mining under bodies of water. MSHA's task force on underground oil storage completed its testing of the pumping and withdrawal of oil from the Energy Department's Weeks Island storage facility. Technical Support participated in standards review committee meetings on mining under bodies of water and drilling gas and oil wells through coal mines. The review committee evaluated current regulations and guidelines to ensure that they are applicable to current mining practices. Personnel also provided technical assistance to the Office of Standards on a proposed metal and nonmetal tailings regulation and a contracted economic impact study required before this regulation can be proposed.

Eight training sessions were conducted for mine waste specialists in the enforcement activities. Computer capabilities were improved with the mounting and "debugging" of several stability and hydraulics programs.

Review of 56 state reclamation plans for the Interior Department's Office of Surface Mining was completed. Recommendations on mine reclamation research needs were made to the Bureau of Mines. Technical Support also reviewed four reports on MSHA-regulated tailings dams issued by the U.S. Army Corps of Engineers under the National Dam Safety Program.

Ventilation

Technical Support's ventilation specialists provide services in the area of mine ventilation and in mine emergencies to MSHA enforcement personnel and the industry. Digital and analog ventilation simulators are used, calibration services are available, and other technical activities are performed.

Technical Support conducted 133 field investigations concerning ventilation in the 1980 fiscal year. Subjects included a method for making methane tests at the working face without personnel advancing beyond the last permanent roof support, and a modified face ventilation system that could allow the end of the line brattice to be maintained at the last permanent roof support. Both these innovations could help prevent injuries from roof falls by reducing the need for miners to enter areas without permanent roof supports.

Special investigations were made on the Energy Department's strategic oil storage facility at Weeks Island, La., its nuclear waste storage project at Carlsbad, N.M., and various petitions filed by mines classed as gassy. Ventilation specialists were also involved in evaluating petitions for modification of mandatory safety standards at salt, oil shale and uranium mines.

Responses were made to about 1,000 technical information requests on air contaminants, equipment calibration, fans, nuclear waste depository design, diesel use underground, digital computing, natural ventilation and other topics. More than 140 instruments were calibrated for MSHA enforcement personnel. Ventilation specialists participated in investigations of five mine fires and explosions.

Dust

Technical Support provides field and laboratory assistance to enforcement personnel in evaluating health hazards to the miner from mine dust.

During FY 1980, Technical Support processed 492,629 dust samples and associated data from the underground and surface coal mine operators' sampling program. Data from 50,058 dust samples collected on coal mine health inspections were encoded and transmitted to MSHA's automated data processing center for storage. In addition, 4,190 respirable dust filter cassettes were examined as part of MSHA's quality surveillance program on filter cassettes supplied to the coal mining industry, and 1,570 preweighed filter cassettes were distributed to Coal Mine Safety and Health field offices to substantiate weighing procedures.

The high-priority program to establish the feasibility of a machine-mounted respirable dust monitor continued. A prototype device providing electronic storage and readout, designed to connect with commercially available respirable dust monitors and continuously provide information to the mining machine operator, was built and successfully tested. A machine-mounted monitor with combined sensor and electronic storage and readout was built and successfully field-tested using commercially available equipment and the electronics of the prototype device.

During FY 1980, 56,835 respirable coal mine dust samples collected on inspections and 158 special samples were processed for quartz evaluation, and about 2,000 analyses were made. X-ray diffraction analyses were made on 17,735 mineral samples from non-coal mines to determine quartz content.

Standard laboratory techniques were used to analyze 340 dust samples for numbers of particles and their size distribution. Samples collected for evaluation of fiber content were analyzed by phase contrast, resulting in more than 2,750 analyses. Special electron microscopy was used to analyze 124 samples for asbestos identification.

Field investigations on dust hazards were made at 36 operations producing coal, silica sand and flour, limestone, crushed stone, lime and phosphate, cement, uranium, manganese and clay.

An industrial hygiene survey was made to measure workers' exposures to natural graphite dust at a graphite plant. Surveys to assess employees' exposures to asbestos fibers were conducted at a slope-hoist room, at a dispatcher's house where flame safety lamps were cleaned and, on request from the Federal Aviation Administration, at an airport radar room. Technical Support also developed guidelines for coal mine operators in laying out dust sampling locations for the area sampling program and prepared documentation on legal questions about proposed changes in the respirable dust regulations.

Toxic Materials

Technical Support analyzes and evaluates mine air samples and provides assistance in analysis, evaluation and control of toxic liquids, vapors, gases and aerosols which may be present in mine atmospheres.

During fiscal 1980, more than 3,350 complete gas analyses were performed in the laboratory for MSHA and other agencies. A total of 1,672 samples, mainly welding fumes, were analyzed for up to 16 elements using atomic absorption techniques and emission spectroscopy. More than 350 industrial hygiene samples were analyzed to identify and determine the quantity of contaminants present. In continuing quality assurance programs in the laboratories, more than 2,000 samples were analyzed to insure intra- and inter-laboratory comparability.

In addition to 42 field investigations, several hundred responses were made to requests for technical assistance related to toxic materials. These included studies on the use of solvents underground, gasoline spills, substitution of lower-grade diesel fuels, diesel emissions, mercury exposures and oil shale health hazards. Industrial hygiene surveys were conducted to measure workers' exposures to welding fumes and other airborne contaminants at a maintenance shop and a new construction site.

An evaluation of the cavity atmosphere in the Energy Department's Weeks Island Strategic Petroleum Reserve oil storage area was conducted and remains an ongoing project as the cavern is filled. The study's purpose is to determine if the process used to render the atmosphere noncombustible was successful and to monitor changes with time and filling.

Technical Support's mobile analytical laboratory was used during several emergency responses in FY 1980.

Physical Agents

Technical Support works to define hazards and to advance measurement and control technology in the areas of radiation, noise, vibration, heat and other physical agents.

On request from enforcement personnel and industry, 105 field investigations in these areas were performed. These included radiation surveys at uranium and non-uranium mines, water sampling and analysis for radium-226, audits at uranium mines, and evaluation of noise control in surface and underground operations. Specialists responded to more than a thousand requests for technical assistance.

An acoustical calibration laboratory was brought into operation to calibrate and evaluate the noise-measuring instruments used by MSHA inspectors. During FY 1980, 2,300 instruments were calibrated for both coal and metal/nonmetal enforcement personnel. In addition, 180 field alpha and gamma survey meters were calibrated for company, state and MSHA officials.

A joint program with NIOSH was established to analyze the physiological effects of excessive vibration in the mining industry. Technical Support cooperated with NIOSH in surveying more than 200 uranium miners for Raynaud's syndrome, which may be caused bv working with vibrating machinery.

Programs were also established to evaluate possible hazards of lasers, microwaves, illumination and other physical agents.

Approval and Certification

Technical Support's Approval and Certification Center tests and approves equipment, components, instruments, materials and explosives to ensure that these products are safe for use in mines. To achieve this goal, the directorate made numerous multidisciplinary scientific and

engineering investigations in FY 1980, completing 6,000 approval actions.

To facilitate approval actions and scientific investigations, the center developed five new standard application procedures, 11 new standard operating procedures and 11 new standard test procedures in FY 1980. These procedures apply to electrical and diesel equipment, dust collection systems, explosion-proof enclosures, intrinsically safe instruments, batteries, cables, cable splices and fire-resistant hydraulic fluids. In addition, new and revised technical policies were developed on external temperature tests, metal halide bulbs, connectors on longwall and shortwall lighting circuits, cables, two-fault intrinsic safety tests, sintered metallic brakes, protection against external arcs and sparks, and boring machines equipped for auxiliary face ventilation.

The center increased the emphasis on its program to assure the quality of approved products. Personnel tested 125 previously approved products for compliance with approval standards and evaluated 51 quality control manuals from manufacturers of products submitted for approval. Five complaints of failure of approved products were investigated. Six approvals were rescinded and manufacturers of 38 other previously approved products were required to take corrective action.

Approval and Certification responded to 50 major requests for technical assistance on approved products from MSHA enforcement personnel. This assistance included a survey of electrical and diesel equipment for Metal/Nonmetal at four salt mines in Louisiana and the development of calibration procedures to assure the accuracy of coal mine inspectors' photometers.

The power distribution system at the Approval and Certification Center's test track in Triadelphia, W.Va., became fully operational. The system enables personnel to run any electric mining equipment on 300-volt DC, 480-volt DC, 600-volt DC, 600-volt AC or 1,000-volt AC current.

Investigations were conducted on a shuttle car, scoop and roof bolter under a voluntary program in which MSHA grants certificates of braking system performance.

Technical Support cooperates with NIOSH in approving new respiratory protective equipment such as self-rescuers and self-contained breathing apparatus for mining use. A total of 36 products in this category were approved during FY 1980. In addition, extensions of approval were issued to cover the production models of two one-hour self-contained self-rescue devices, after tests to ensure that the rapid-start features of the self-rescuers did not constitute a methane or coal dust ignition hazard.

Health and Safety Data Analysis

Technical Support's Health and Safety Analysis Center (HSAC) analyzes data collected nationally on mine fatalities, injuries and illnesses to identify mine safety and health problems, assist MSHA in allocating inspection resources, and evaluate the effectiveness of MSHA programs. National statistics are published in annual informational reports, with preliminary data issued quarterly.

HSAC processed 169,611 reports from operators on mine injuries, illnesses, employment and production during the fiscal year. National data on mine injuries and employment for calendar 1979 were compiled and published.

New regulations on identification of independent contractors for MSHA's purposes (30 CFR Part 45) took effect July 11, 1980. Under these regulations, any contractor working at a mine must have an MSHA ID number; a contractor employed at several mines uses the same ID number at each. MSHA issued 1,639 ID numbers to contractors from July through September, with special attention paid to preventing duplication.

During the fiscal year, HSAC responded to more than 8,000 requests for information. The center also distributed 6,422 management data reports; maintained address listings of mine operators and other interested persons, providing mailing labels or tapes on request; and prepared annual safety award certificates for 679 establishments and 1,200 individuals. Personnel prepared 17 internal reports on current injury trends, a special report on distribution of mines by injury incidence rate for the President's Commission on Coal, and two major sets of graphs, which depict trends in mining through 1978 and compare statistics on 18 controlling companies.

In FY 1980 all HSAC's computer programs were converted to a new operating system because of the acquisition of new equipment by the Interior Department's Water and Power Resources Service*, which provided MSHA's computer services. In addition, several new computer models and simulators were developed for use by Technical Support engineers. Other new systems were developed for MSHA management to track calibration of inspectors' noise dosimeters, compile data on miners' radiation exposure reported by operators, list mines selected by

*Now the Bureau of Reclamation.

Metal/Nonmetal's PAR program criteria by subdistrict and training center, make initial screenings of mines for patterns of violations, and guide management in allocating inspectors' time. Three programs were devised to apply new statistical methods in safety and health analysis. HSAC produced a user's guide for Metal/Nonmetal's Management Information System, maintained by HSAC; inspection data in this system and other information in HSAC's files can now be obtained directly at computer terminals in MSHA headquarters and Metal/Nonmetal district offices.

HSAC's library also began functioning in FY 1980, with the hiring of a full-time librarian and acquisition of books, government documents and microfiche materials related to MSHA's mission. The library provides information, arranges interlibrary loans and makes computer searches for bibliographic data as needed by MSHA personnel and others in the mining community.

Mine Emergency Operations

Technical Support's mine emergency personnel responded in FY 1980 to two incidents at underground coal mines, neither involving deaths or injuries. Support in gas analysis and logistics was supplied over a week in controlling a fire at one mine, and a survey using a borehole TV camera succeeded in locating the source of flooding at another.

Mine emergency personnel also made a TV survey of an abandoned shaft in a salt mine to determine its condition and the source of water in order to assist the company in reclaiming the shaft.

Five field tests of seismic equipment designed to locate trapped miners were conducted to ensure the readiness of personnel and equipment in case of emergency. An improved seismic location system with improved reliability, capabilities and performance was brought into operation. Equipment for remotely sealing mines by injecting flyash was transferred from Massachusetts to the main facility in Hopewell, Pa.

Mine emergency equipment was demonstrated at five industry conferences in FY 1980.

section 8 *Education and Training*

The Directorate of Education and Training approves mine operators' plans for training employees, develops training materials, assists operators in developing and improving training programs at individual mines, certifies miners to perform critical tasks, administers grants to state mine agencies, lends support to mine safety organizations, and provides MSHA's audiovisual services. The directorate has 10 training centers and 24 field offices throughout the country, a small headquarters staff and other supporting activities. Its personnel numbered 150 at the end of FY 1980.

The 1977 Act called for regulations requiring mine operators to provide specific, appropriate training to new and experienced employees. These regulations were issued Oct. 13, 1978; by the end of FY 1980, Education and Training had approved about 25,000 mine operators' plans and other programs for providing the required training.

An amendment to MSHA's appropriations for FY 1980 prohibited enforcement of the training regulations at shell dredging, sand and gravel, surface stone, surface clay, colloidal phosphate and surface limestone operations.

During FY 1980, MSHA approved 4,500 new training plans and 2,500 revisions of existing plans. With most mines having received approvals for their training plans, Education and Training emphasized evaluations of training plans and programs to determine whether the training received is benefiting the individual miner.

Based on injury statistics and on requests from operators and enforcement personnel, Education and Training selected mines for detailed monitoring and evaluations. The evaluations included meetings with management and miners' representatives, review of training materials, observing classroom and on-the-job training, interviewing miners on the job, and making recommendations for improving training programs. Education and training specialists evaluated 681 training plans for effectiveness in FY 1980. These evaluations included about 400 special surveys of roof control training made because of concern over the high rate of roof fall accidents in underground coal mines.

Most operators have responded favorably to training plan evaluations and statistics indicate that participating mines generally have improved accident rates. In the majority of training regions, the all-injury incidence rate for participating mines declined by more than 10 percent.

Education and training continued to assist mine operators in preparing training plans, training instructors and designing training courses. Particular attention was given to small operations. Operators revised and improved about 2,000 training plans during the year based on reviews of their programs and on-site evaluations. More than 3,400 industry instructors were trained and monitored.

The directorate developed 64 training courses and testing programs during the year, including those necessary to qualify miners for sampling and maintaining and calibrating sampling equipment under new coal mine regulations on sampling for respirable dust. Education and Training also issued more than 18,000 certifications and qualifications for mine personnel to perform critical tasks such as methane sampling, noise sampling and electrical hoisting.

In FY 1980, Education and Training participated in more than 30 mine rescue contests conducted by industry groups.

State Grants Program

Under section 503 of the 1977 Act, funds are available to assist state departments of mines to develop and enforce effective mine health and safety laws and regulations; to improve state workmen's compensation, occupational-disease laws and programs related to mine employment; and to promote Federal-state coordination and cooperation in improving health and safety conditions in the mines.

The state grants program was established under the Federal Coal Mine Health and Safety Act of 1969; FY 1980 was the second full fiscal year that state grants were available under the 1977 Act to promote safety and health in the metal and nonmetal mining sector. There were 34 states participating in the grants program during fiscal 1980 (table 37) and more states were expected to become involved in FY 1981. In FY 1980, state grants were widely used to fund programs for training and retraining miners under the MSHA training

regulations. Additional projects supported with these grants included revisions of state mining laws and regulations, college and vocational-technical mining programs, instructor training, mobile classrooms to bring training to remote areas, and other safety and health activities.

Safety Associations

One effective means of reinforcing safety training has been through safety organizations. Federal health and safety officials, state mine agencies, management, mining companies, insurance companies and labor organizations participate actively in many of these. The associations are dedicated to preventing fatalities and injuries and improving health and safety in all phases of the mineral industries.

The Joseph A. Holmes Safety Association, one of the oldest of these organizations, was founded in 1916 by 24 leading national organizations representing the mining, metallurgical and allied industries. Named after the first director of the Bureau of Mines, the association seeks to stimulate the safety movement by annually making awards to individuals, officials and groups for outstanding achievements in safety and for individual heroism in saving lives. It also gives awards for individual safety achievement spanning 10 to 40 years' employment and for outstanding safety performance by companies and safety organizations.

At a Wyoming trona mine, new employees receive training in an underground classroom.

The Joseph A. Holmes Safety Association's support functions were transferred to MSHA in March 1979; the secretary-treasurer is in Education and Training. Since the transfer, 1,128 10-year awards, 1,100 20-year awards, and 650 30-year awards for periods worked without lost-time injuries had been granted to individuals as of the fiscal year's end. There were 180 major awards granted to groups of mineral-industry employees for their safety records.

The Holmes Safety Association (distinct from the Joseph A. Holmes Safety Association) was founded in 1926. This association seeks to improve health and safety awareness among officials and employees in all phases of the mineral industries. MSHA inherited its support functions from the Bureau of Mines.

Since its founding, the Holmes Safety Association's membership has grown to 350,000 in 43 states. As of Sept. 30, 1980, the Holmes Safety Association comprised four state and 43 district councils, encompassing 1,529 safety chapters. The councils held 200 meetings with a total attendance of 10,430, and the chapters held 100,526 meetings with an attendance of 1,260,061. MSHA personnel are active in safety chapters and district councils and in using prepared safety material for on-the-job safety meetings. Demand for safety material prepared by the national council for the chapters continues to increase. About 29,100 copies of monthly safety topic material were distributed during FY 1980.

TABLE 37.—State grant funding, FY 1975-1980

State	FY 1975	FY 1976	FY 1977	FY 1978	FY 1979	FY 1980
Alabama	42,000	265,835	177,079	334,480	286,883	—
Arizona	—	—	—	—	153,792	90,526
Arkansas	—	43,538	65,090	90,000	131,091	123,868
Colorado	—	36,696	137,791	46,235	286,233	381,831
Connecticut	—	—	—	—	—	50,892
Florida	—	—	—	—	—	68,748
Idaho	—	—	23,493	—	27,567	155,000
Illinois	117,500	282,078	52,400	125,000	240,862	149,012
Indiana	35,166	45,280	—	84,225	151,420	181,633
Iowa	—	—	—	—	15,559	63,980
Kentucky	210,000	528,000	1,221,641	1,410,455	1,060,882	1,229,297
Louisiana	—	—	—	—	67,538	45,054
Massachusetts	—	—	—	—	62,279	192,815
Michigan	—	—	—	—	—	151,500
Minnesota	—	—	—	—	—	184,788
Mississippi	—	—	—	—	—	57,900
Missouri	—	—	—	—	271,727	67,459
Montana	76,000	—	—	—	24,574	13,204
Nevada	—	—	—	—	90,114	—
New Hampshire	—	—	—	—	—	24,426
New Jersey	—	—	—	—	62,662	139,006
New Mexico	—	—	—	—	111,478	252,362
New York	—	—	—	—	91,371	269,528
North Carolina	—	—	—	—	199,152	142,625
Oklahoma	34,170	133,283	128,000	213,580	146,381	153,790
Pennsylvania	105,000	133,000	212,548	303,750	550,000	64,517
Rhode Island	—	—	—	—	16,269	29,618
South Carolina	—	—	—	—	15,046	39,573
South Dakota	—	—	—	—	44,085	65,343
Tennessee	—	20,000	100,081	201,420	277,481	205,319
Utah	15,000	145,000	245,797	245,300	240,300	183,200
Virginia	243,000	200,514	519,449	462,633	460,469	577,496
Washington	—	—	—	—	—	39,732
West Virginia	167,644	150,000	234,860	383,661	595,154	368,912
Wisconsin	—	—	—	—	133,920	34,770
Wyoming	—	—	159,553	34,627	146,100	58,000
Total	1,045,480	1,983,224	3,277,782	3,935,366	5,960,389	5,855,724

Audio Visual Services

MSHA's education and training activities include producing motion pictures and visual aids for use by the mining community. Specialists at the Audio Visual Services office in Pittsburgh, Pa., film, video-tape and photograph many different mining operations and situations for this purpose.

In FY 1980, films produced by MSHA were shown 26,800 times to 583,900 persons. There were 3,500 prints of films sold. The office produced five new training films: "Ground Control in Surface Coal Mining," "Hazard Recognition and Avoidance in Surface Coal Mining," "Transportation and Communication in Underground Coal Mines," "Coal Dust Hazards and Controls," and "Hazard Recognition and Avoidance in Underground Coal Mines." Five video-tape-recorded programs, three television safety messages and one radio announcement were also produced.

The office continued to provide graphics services and assistance to MSHA personnel in preparing reports, presentations, training sessions, special seminars and workshops, and in the development under contract of programmed training materials for use by industry.

The audio visual services office was responsible for development of a modular training program to help coal mine operators comply with the training regulations. The office also provided instructors' guides and visual aids for training mine personnel to sample and to maintain equipment under the new regulations on coal mine dust sampling.

section 9 National Mine Health and Safety Academy

The National Mine Health and Safety Academy in Beckley, W.Va., provides training for Federal mine inspectors and offers courses and other programs on mine safety and health for personnel in government, labor and the mining industry.

Resident Education

The Academy's Department of Resident Education develops and presents numerous programs for students at the Academy, from one-day short courses to resident programs of up to 13 weeks' duration.

The department has four branches: Mine Safety Engineering, Safety Technology, Industrial Hygiene and General Studies. Specialists in each subject develop and present courses, tailoring them to the needs of each group of students. They also develop workbooks, laboratory manuals, programmed instruction manuals and pocket-size safety manuals as needed.

The resident education department spent 7,425 hours on classroom and laboratory instruction during fiscal 1980. The teaching staff also gave technical advice to groups in and outside the Academy, assisted in developing regulations and guidelines, and counseled Academy students. The staff developed and presented a two-day course in communications and human relations for metal and nonmetal mine inspection personnel in the field. They also took part in the task analysis project and criterion-referenced course development which were being conducted during the fiscal year under the guidance of the Academy's research and planning office.

Resident training activity at the Academy declined somewhat during fiscal 1980 compared to the previous year (table 38). A total of 13,761 students attended classes or other special programs for 43,622 student-days. MSHA and other Federal employees, including both entry-level and advanced trainees, accounted for 66 percent of all student-days at the Academy (table 39).

Continuing Education

The Department of Continuing Education plans and develops the Academy's programs for nonresident students, including correspondence courses and off-site seminars. The Department's staff also develop instructional materials for nonresident students, cooperate in developing resident courses, and arrange cooperative educational programs with other government agencies, industry and labor organizations, and educational institutions.

The department has published 10 programmed instruction manuals and 18 safety manuals. More than 800,000 copies of these publications have been distributed through the Academy, other MSHA offices and the U.S. Government Printing Office.

At the end of FY 1980, 1,681 MSHA employees had completed 2,574 correspondence courses offered by the Academy. These figures do not include completions of the Academy's programmed instruction workbooks, used by MSHA offices and by a number of community colleges and vocational-technical schools in miner training programs.

The continuing education department includes the Academy's instruction laboratory and its learning resource center, with more than 124,000 titles available to all Academy students and other mine safety and health personnel. These titles include books, journals, microfiche, microfilm, films, videocassettes, slides, tapes and maps.

Research and Planning

In fiscal 1980 the Office of Research and Planning continued its task analysis of the mine inspection process. Both Academy and inspection personnel participated in this project to develop a comprehensive inventory of all the activities involved in inspecting a mine. This inventory is to be used to plan the training of new inspectors and ensure that their needs are met by the combination of classroom and on-the-job training. By the year's end, the inventory of tasks for metal and nonmetal mine inspection was completed, and the inventory for coal mine inspection was well under way.

The research and planning office worked throughout the year with resident education staff on the project to apply the principles of criterion-referenced instruction to inspector training courses. This instruction method involves setting specific goals for each step in a highly structured series of units, ensuring that students will adequately grasp each element in the course. It also allows students to

set their own pace and frees instructors to give students more individual attention. The research and planning office provided task inventories, training and consultation to Academy staff in their work towards designing courses according to this method.

TABLE 38.—Academy staffing, student loads and course offerings, CY 1975-1977 and FY 1978-1980

Year	Staff	Student-days (nearest thousand)	Courses
CY 1975	34	12,000	8
CY 1976	71	10,000	12
CY 1977	80	28,000	29
FY 1978	82	54,000	66
FY 1979	90	56,000	85
FY 1980	85	44,000	90

TABLE 39.—Student enrollment at the National Mine Health and Safety Academy, FY 1980

Category	Students		Student-days	
	Number	Percent	Number	Percent
MSHA	5,540	40	22,066	51
Other Federal	2,097	15	6,571	15
State and local	3,357	24	7,354	17
Industry and labor	1,940	14	6,195	14
Other	827	6	1,436	3
Total	13,761	100*	43,622	100

* Detail may not add to total because of rounding.

APPENDIX

NEW AND PROPOSED MINE SAFETY AND HEALTH REGULATIONS, FY 1980

Final Rules

April 8, 1980. Respirable Dust. 30 CFR Parts 11, 70, 71, 75 and 90. 45 FR 23990-24005. This rule amends the definition of respirable dust in MSHA's coal mine health standards to be consistent with section 202(e) of the Act. It also revises procedures for sampling respirable dust in underground coal mines. Sampling is required in active workings outby the working face as well as at the face; fewer samples must be taken; personnel who sample or who maintain and calibrate sampling equipment must be certified by MSHA.

July 1, 1980. Independent Contractors. 30 CFR Part 45. 45 FR 44494-44498. This rule provides for the identification of independent contractors performing services or construction at mines under the Act. The rule permits MSHA to hold contractors responsible for violations committed by them or their employees. Contractors may obtain an ID number from MSHA by filing certain information. Mine operators must maintain certain information on each contractor working at the mine. The rule also provides for service of documents on such contractors.

July 11, 1980. Mine Rescue Teams. 30 CFR Part 49. 45 FR 46992-47005. This rule requires that all underground mines must have mine rescue teams available in case of emergency. Provisions cover team size and availability; rescue equipment, its storage and maintenance; rescue notification plans; and team members' experience, health and training. Alternative mine rescue capability is permitted in the case of small, remote mines or mines with special conditions. This rulemaking is required under section 115(e) of the Act.

Proposed Rules

April 8, 1980. Miner Participation in Respirable Dust Sampling Procedures. 30 CFR Part 70. 45 FR 24008-24009. This rule would require that underground coal mine operators give representatives of miners the opportunity to take part in procedures for sampling respirable dust. Its purpose is to promote cooperation between operators and miners whose health may be affected so as to ensure the effectiveness of the respirable dust control program.

April 8, 1980. Respirable Dust. 30 CFR Part 71. 45 FR 24009-24017. This rule would amend the procedures for sampling respirable dust at surface coal mines and surface work areas of underground coal mines. Proposed revisions include changes in the number of samples required, the sampling schedule, and the certification requirements for personnel who sample or who maintain and calibrate sampling equipment. Provision for participation in the sampling program by representatives of miners is also included. (The final rule, which did not include the participation provision, was issued Dec. 5, 1980.)

April 8, 1980. Coal Miners Who Have Evidence of the Development of Pneumoconiosis. 30 CFR Part 90. 45 FR 24017-24027. This rule would supersede the interim mandatory health standard in section 203(b) of the Act. It would provide underground coal miners with evidence of developing pneumoconiosis the option to work in an area of the mine where the respirable dust concentration is at or below 1.0 milligrams per cubic meter of air. The miner would receive the same rate of pay as in the previous job, plus any increases accruing to the new job, and would have the right to work in an existing job on the same shift as before transfer. The operator would have to conduct a bimonthly sampling program involving each transferred miner. (The final rule was issued Dec. 5, 1980.)

May 16, 1980. Electric Cap Lamps. 30 CFR Part 19. 45 FR 32557. This rule would amend requirements for approval of electric cap lamps for underground mining so

that MSHA may approve lamps that incorporate technical improvements. When a manufacturer requests MSHA to approve a cap lamp that cannot be adequately tested under existing regulations, MSHA would be allowed to modify its own design, construction and test requirements to investigate the lamp. MSHA would issue an approval if the lamp assures the same degree of protection as those approved under current requirements.

Aug. 15, 1980. Pattern of Violations. 30 CFR Part 104. 45 FR 54656-54659. In section 104(e), the Act contains provisions for ordering the closure of mines which have a pattern of violations of safety and health standards. This rule sets forth proposed criteria for identifying such mines and notifying their operators.

Aug. 22, 1980. Electrical Components and Headlights for Mobile Diesel-Powered Transportation Equipment. 30 CFR Part 36. 45 FR 56308-56309. This rule would modify approval requirements for mobile diesel-powered transportation equipment for use in "gassy" metal and nonmetal mines. It would permit the use of certain electric-powered accessories on such equipment, allowing operators to obtain equipment incorporating advanced technology.

Aug. 22, 1980. Definition of Signaling Device. 30 CFR Part 23. 45 FR 56312-56313. This rule would delete a portion of the definition of "signaling device" in requirements for the approval of telephones and signaling devices used in mines. New developments in communications technology no longer require the design restriction in the current definition. The rule would also add a requirement that all line-powered telephone and signaling devices be equipped with a standby power source.

FIGURE 5.—MSHA headquarters organization as of September 30, 1980.

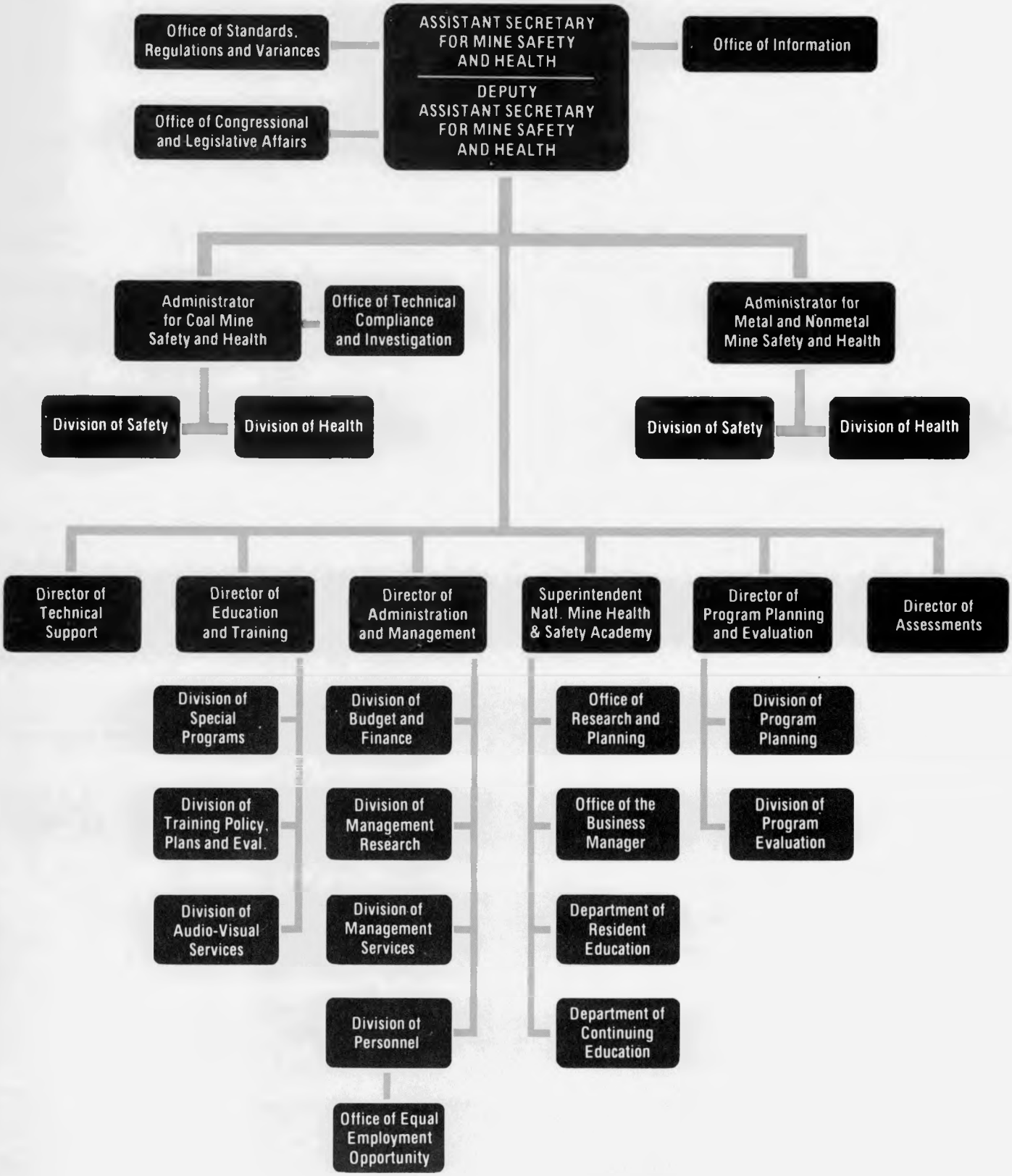


FIGURE 6.—MSHA field organization as of September 30, 1980.

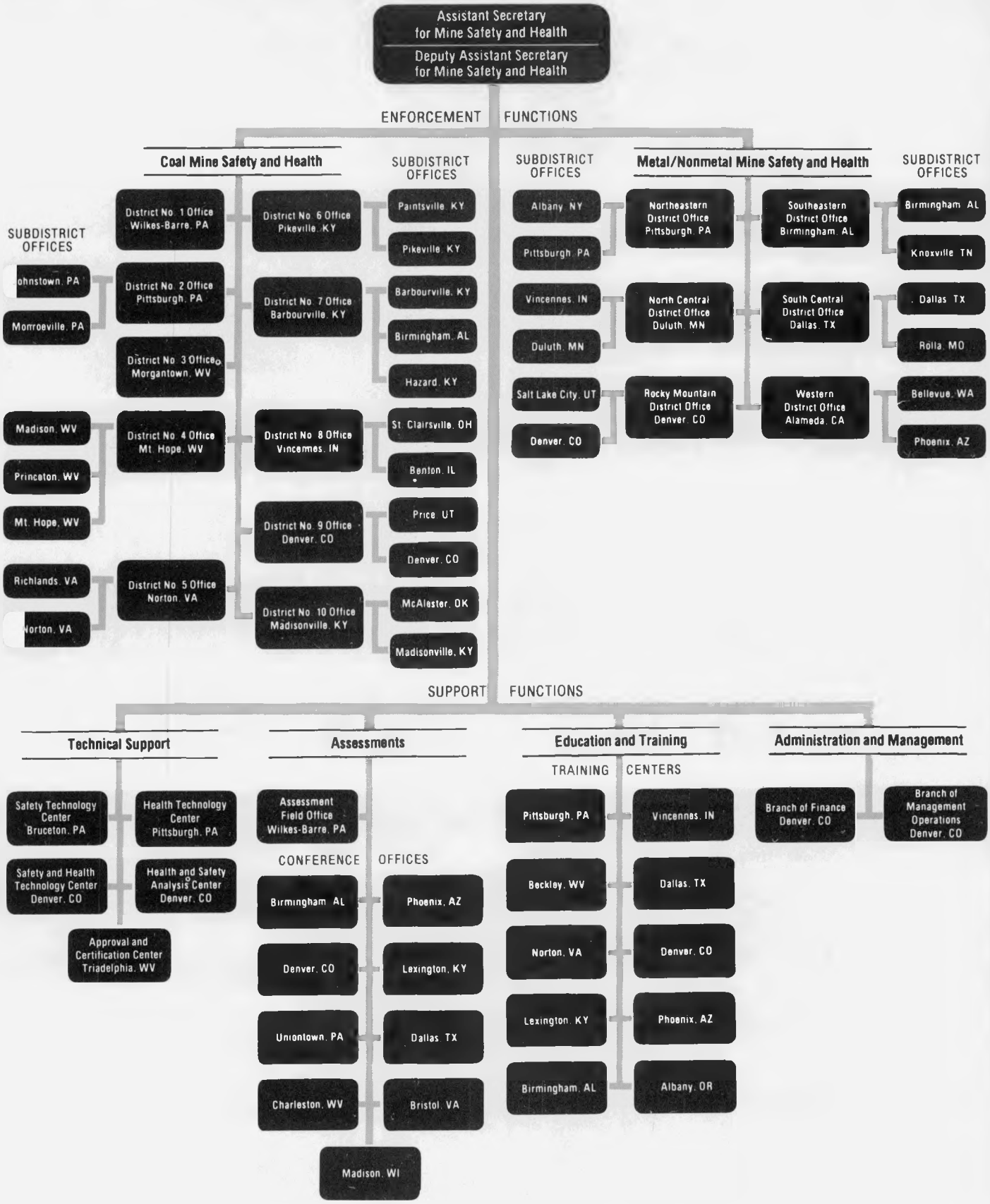


FIGURE 7.—Appropriations for MSHA activities, FY 1980.

*U.S. GOVERNMENT PRINTING OFFICE : 1983 0-381-608/4242