REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

After Years Of Effort, Accident Rates Are Still Unacceptably High In Mines Covered By The Federal Metal And Nonmetallic Mine Safety A

Department of the Interior

Limited progress has been made in the safety record of mines other than coal mines since Federal enforcement was legislated in 1966. To be more effective, the Department of the Interior needs to make improvements in:

--Reporting and analysis of accidents, injuries, and occupational illnesses.

--Health and safety standards and ways in which they are published and enforced.

--Education and training programs for the industry.

--Identification of research needs and transfer of results to mine operators.

--Special programs for high-injury mines.

The Congress can help by:

--Amending the Federal Metal and Nonmetallic Mine Safety Act authorizing the Department to require mine operators to assume responsibility for correcting hazards.

--Authorizing types of research and levels of funding it considers appropriate.

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COMPTROLLER GENERAL OF THE UNITED STATES
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To The President of the Senate and the
Speaker of the House of Representatives

This report describes how the Department of the Interior can administer more effectively the Federal Metal and Nonmetallic Mine Safety Act. Little improvement has been made in the safety record of noncoal mines since the legislation was enacted in 1966.

The report was made at the request of the Senate Committee on Human Resources (formerly the Senate Committee on Labor and Public Welfare).

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent today to the Director, Office of Management and Budget; and the Secretary of the Interior.

Comptroller General
of the United States

C O N T E N T S

ABBREVIATIONS

GAO General Accounting Office

MESA Mining Enforcement and Safety Administration

CHAPTER 1

INTRODUCTION

BACKGROUND

The Federal Government first became involved in mine safety in 1910 when the Congress enacted legislation establishing the Bureau of Mines (30 U.S.C. 1 et. seq.). Although a Federal Coal Mine Safety Act was enacted in 1941 and amended in 1952 to provide limited enforcement authority, the Government was not authorized a strong and active mine health and safety enforcement role until passage of the Federal Metal and Nonmetallic Mine Safety Act in 1966 (30 U.S.C. 721 et. seq.) and the Federal Coal Mine Health and Safety Act of 1969 (30 U.S.C. 801 et. seq.).

The health and safety of the Nation's miners are still regulated by these two Federal laws, both administered by the U.S. Department of the Interior. Initially, the Secretary of the Interior assigned the Bureau of Mines major responsibility for carrying out both acts. On May 7, 1973, the Secretary of the Interior issued an order creating the Mining Enforcement and Safety Administration (MESA) within the Department of the Interior and transferred to it the responsibility for administering both acts. The Bureau retained the Secretary's research functions authorized under the Coal Act.

On July 24, 1975, the Chairman of the Senate Committee on Labor and Public Welfare (now the Senate Committee on Human Resources) requested that we make a comprehensive review and report on the Department of the Interior's administration of the Federal Metal and Nonmetallic Mine Safety Act. In subsequent discussions with the Chairman's office, however, we were requested to first obtain information and report on closure orders issued under the act.

On February 12, 1976, we issued to the Chairman a report entitled "Analysis of Closure Orders Issued Under the Federal Metal and Nonmetallic Mine Safety Act of 1966" (RED-76-64). It summarized and analyzed information on closure orders issued from January 1, 1972, through September 1, 1975, on several bases, including the standards cited; extent of mine closure; time required to correct the violation; and the locations, types, and sizes of the mines cited.

In accordance with the Chairman's initial request, this report evaluates the effectiveness of Interior's administration of the various provisions of the act.

BRIEF DESCRIPTION OF THE ACT AND THE INDUSTRY

The Federal Metal and Nonmetallic Mine Safety Act was enacted after more than a decade during which the Congress held hearings and funded studies of the industry's health and safety experience. The 1963 report of a broad study by a Special Mine Safety Study Board demonstrated the widespread existence of correctable hazards to life and health in mines, a high casualty rate suffered by miners from dangerous conditions beyond their control, and the ineffectiveness of State and local efforts to reduce mine health and safety hazards.

Three years later, the present act became law. Its objective is to eliminate or greatly reduce the number of fatalities, injuries, and occupational illnesses in the industry.

The act covers all nonfuel mineral commodities which fall under three general classifications: metallic ores, nonmetallic ores, and construction materials, such as crushed stone, sand, and gravel. Because the industry is involved in virtually every mineral except coal, the simplest way to refer to it is as the noncoal mining industry. The industry's operations are located in each of the 50 States, Puerto Rico, and the Virgin Islands. Some 66 different mineral commodities are extracted from mines ranging in size and complexity from simple surface operations employing a few men to huge open pits and deep multilevel underground mines employing as many as 2,500 miners each.

As of September 1976 there were over 12,600 various active mining operations subject to the act which employed almost 248,000 persons. In addition, there were slightly over 3,500 operations working on an intermittent basis or temporarily closed. Employment data on these operations were not available.

Although most operations are crushed stone and sand and gravel, the underground mining sector is significant because of the types of commodities it produces. Domestic supplies of potash, trona, lead, zinc, sulfur, and fluorspar are almost entirely furnished from underground mines, as well as a significant portion of the nation's gold, silver, molybdenum, and salt supply.

The following table provides a summary of the industry's operations by type, as of September 1976.

MESA classification of type of operation	Active operations: Number of operations	Active operations: Number of employees	Number of inactive and intermittent operations
Underground	683	39,207	397
Open pit	1,501	51,448	329
Crushed stone	3,688	79,853	699
Sand and gravel	5,899	40,813	2,089
Mills	868	36,439	74
Total	12,639	247,760	3,588

Individual mines also vary in ground formation and composition, water content, air conditions, and feasible mining methods. Of increasing importance is the fact that they also vary in the potential health hazards of the substances to which miners are exposed.

This wide range of types and conditions of noncoal mines complicates the task of promulgating and adopting effective standards, and the job of inspecting mines to determine compliance.

MAJOR PROVISIONS OF THE ACT

The major provisions of the Metal and Nonmetallic Act relate to:

--enforcement of health and safety standards,

--development and promulgation of health and safety standards,

--an appeals process for mine closure orders,

--mandatory reporting of occupational accident, injury, and illness information,

--education and training of the mining industry, and

--agreements with State enforcement agencies which enable them to conduct the major enforcement programs in their respective States.

The following provides a brief description of these major provisions.

Enforcement

The act authorizes mine inspections by the Secretary of the Interior or his duly authorized representatives for the following purposes:

--Obtaining, utilizing, and disseminating information relating to health and safety conditions and the causes of deaths, injuries, and occupational diseases.

--Determining whether there is compliance with health and safety standards or orders issued under the act.

--Evaluating the manner in which a State plan, approved under the act, is being carried out.

The act requires that each underground mine be inspected at least once a year, but it does not establish a minimum number of inspections for surface mines.

In carrying out these provisions, MESA attempts, on an annual basis, to conduct at least four regular inspections at each active underground mine and at least one regular inspection at each active surface mine, followed by spot inspections to insure abatement if violations have been cited. MESA also conducts special surveys and accident investigations.

Inspectors are authorized to issue notices to mine operators citing violations of mandatory standards and to specify a reasonable time for abatement (correction) of the hazard. If the mine operator fails to correct the violation within the time specified, inspectors may either extend the time for abatement for extenuating circumstances or issue an order withdrawing employees from the mine or affected area. Such withdrawals are commonly referred to as "closure orders for noncompliance." The inspectors are also empowered to issue an order requiring immediate withdrawal of employees from affected areas if they find an imminent danger condition that could reasonably be expected to cause death or serious physical harm before the hazard can be abated. These withdrawals are commonly referred to as "closure orders for imminent danger."

MESA conducts several different types of inspections in carrying out these act provisions. "Regular," "spot," and "limited area" inspections are primarily for the purpose of determining compliance with mandatory standards. Regular inspections generally cover an entire mine and associated mill, whereas limited area inspections cover only some areas or levels and are conducted at large mines where it is not feasible to conduct a regular inspection during a single visit. A spot inspection is conducted for a specific purpose, such as to determine if previous violations have been corrected.

Special surveys are conducted to study or evaluate a plan for controlling hazards associated with specific aspects of a mining operation, such as hoisting or ground control.

Accident investigations include all mine visits required to determine the causes of accidents, including necessary rescue and recovery operations. Violation notices and closure orders are usually incidental to special surveys and accident investigations, but can be issued whenever violations are identified.

Mandatory standards promulgated under the act became enforceable on July 31, 1970. As shown in the table below, the number of regular and spot inspections conducted by MESA annually increased substantially between 1971 and 1975.

Inspections during calendar years

	1971	1972	1973	1974	1975
Regular	5,174	6,701	8,545	11,281	16,500
Spot	3,283	6,320	8,017	10,560	14,502
Total	8,457	13,021	16,562	21,841	31,002

The staff time expended on the 31,002 regular and spot inspections conducted in 1975 represents about 89 percent of MESA's total field effort for that year. The remaining 11 percent was devoted to other functions such as accident investigations, special surveys, and industry education.

MESA inspections are conducted by a field enforcement staff which operates from 6 districts, 12 subdistricts, and 52 local field offices located throughout the United States and Puerto Rico. In addition to inspectors, this staff includes managers, supervisors, technical specialists, and inspector trainees. As shown in the table below, the size of the field staff was significantly increased between 1970 and 1975.

Enforcement staff at year end

	1970	1971	1972	1973	1974	1975
District and sub-district managers	20	24	20	20	17	18
Supervisory engineers/ inspectors	3	7	6	11	16	34
Mine inspectors	72	132	140	145	211	271
Mine inspection trainees	19	24	8	26	32	26
Technical specialists	14	16	14	23	32	41
Total	128	203	188	225	308	390

The field enforcement staff also receives assistance from MESA's Technical Support activity. Technical Support includes scientists, engineers, and technicians who, among other duties, provide inhouse engineering and scientific assistance to MESA enforcement personnel and the mining industry in complying with the requirements of the noncoal mine act and the coal mine act. MESA operates two Technical Support Centers; one is located in Pittsburgh, Pennsylvania, the other in Denver, Colorado. The Pittsburgh Center deals primarily with coal and the Denver Center with noncoal mines.

Promulgation of standards

The act requires the Secretary to develop and promulgate health and safety standards after consultation with advisory committees, which he is authorized to appoint to assist him in the development of standards. Each advisory committee must include an equal number of persons qualified to represent the views of mine operators and mine workers and at least one representative from State mine inspection or safety agencies.

After consultation with an advisory committee, the Secretary must publish notice of proposed standards in the Federal Register and allow interested parties at least 30 days to submit written comments or arguments. Proposed mandatory standards and standards which have been approved by an advisory committee must be so designated. The Secretary, after considering relevant comments, may promulgate such standards. Any person adversely affected by a proposed mandatory standard not approved by an advisory committee, however, may request that a public hearing be held. In such cases, the Secretary cannot promulgate the standard until he has held the hearing and decided, on the basis of the evidence presented, that the standard should be promulgated.

Advisory committee members are appointed for terms not to exceed 1 year. Additional reappointments are permitted. Most standards presented to the advisory committee are developed by one of MESA's 15 Standards Development Committees. These committees are composed of from 3 to 5 MESA Enforcement and Technical Support personnel who have expertise and knowledge in the subject area of their respective committees.

Appeals process

Originally, an operator could appeal a closure order either directly to the Federal Metal and Nonmetallic Mine Safety Board of Review--created by the act and composed of five members appointed by the President with the advice and consent of the Senate--or through the Secretary of the Interior. The Secretary and Board of Review could annul, revise, or

uphold an order. However, no closure orders were ever appealed to the Board of Review.

On June 27, 1975, the Congress revised the appeals procedures by abolishing the Board of Review. Now mine operators can only appeal through the Board of Mine Operations Appeals within Interior's Office of Hearings and Appeals.

Mandatory reporting

The Secretary of the Interior is to require mine operators subject to the act to submit, at least annually, reports on the occurrence of accidents, injuries, and occupational illnesses. The Secretary is required to compile, analyze, and publish this information.

Since 1973 MESA has required mine operators to report to its Health and Safety Analysis Center the average number of employees and total staff-hours worked for each quarter of the calendar year, and detailed information regarding certain occupational injuries and illnesses within 10 days of their occurrence or diagnosis. The Center, located in Denver, Colorado, has developed a computerized information system to record this data on a mine-by-mine basis. The Center uses injury data to compute injury frequency rates (the number of injuries per million staff-hours worked). The Secretary has also assigned the Center responsibility for conducting indepth studies and analyses of the data it collects.

Education and training

The act requires the Secretary to develop education and training programs for employers and employees subject to the act. These programs are to be directed toward recognition, avoidance, and prevention of accidents or unsafe and unhealthful working conditions. The Secretary of the Interior has issued regulations to help attain these objectives, including the training of metal and nonmetal miners in several areas such as the use of respiratory equipment, mine rescue methods for underground mines, and first aid training for supervisors and other personnel.

MESA's Education and Training group has primary responsibility for development, dissemination, and review of education programs to carry out the provisions of the 1966 act, as well as similar provisions in the coal mine act. Ten training centers are located throughout the country and instructors at these centers provide mandatory and recommended courses to mine personnel and also train industry personnel (cooperative instructors) to teach such courses.

During 1975 there were 75 full-time instructors in MESA's Education and Training group. In addition, there were 322 MESA inspectors, engineers, and technical specialists and over 6,000 industry personnel certified as instructors in one or more courses. These personnel, with the assistance of 94 State instructors, provided training to about 79,000 mine personnel during the year.

State plan agreements

The act provides that any State desiring to develop and enforce health and safety standards for mines subject to the act submit its plan to the Secretary. The Secretary is required to approve such plans whenever a State gives satisfactory evidence of having developed standards which are substantially as effective as Federal mandatory standards, and of having established a single agency to administer the plan and enforce the standards. The State must also devote adequate funds to the program and have adequate qualified personnel to enforce it. In addition, the State must agree to make appropriate reports required by the Secretary and provide reasonable safeguards against loss of life or property from closed or abandoned mines.

The Secretary is specifically prohibited from issuing violation notices and closure orders for noncompliance in States where an approved State plan is in effect. The Secretary, however, is required to inspect each underground mine in such States at least once a year and to issue closure orders in instances of imminent danger.

The Secretary may conduct inspections of mines in State plan States, which, in conjunction with reports submitted by the State agency, are to form the basis of a continuing evaluation of the manner in which the State is carrying out its plan. If the Secretary finds, after due notice and hearing, substantial failure to comply with any provision of the plan, he must withdraw the plan and notify the State of his action.

Since the act became effective, eight States have operated under State plans--Arizona, California, Colorado, New Mexico, New York, North Carolina, Utah, and Virginia. California and New York, however, withdrew their plans in February 1975 and April 1976, respectively. California withdrew its plan due to implementation problems between the State and MESA and New York withdrew its plan due to financial difficulties.

Research

Unlike the coal mine act, which specifically directs the Secretary of the Interior and the Secretary of Health, Education, and Welfare to conduct health and safety research, the metal and nonmetallic act does not include research provisions. The Bureau of Mines does conduct health and safety research in support of both acts, both through in-house research and through contracts and grants. The Bureau's research in support of the metal and nonmetallic act is conducted under the broad authority to conduct scientific and technologic investigations relating to improving mine health and safety granted to the Bureau by the act which established it in 1910 (30 U.S.C. 3). Also, in accordance with procedures established in February 1976, MESA is to provide input through participation in the formulation and evaluation of the research program and the transfer of resulting technology to the industry.

STAFFING AND FUNDING

As shown in the following table, MESA's staffing and funding for the administration of both the coal mine and metal and nonmetallic mine health and safety programs have increased over the last 3 fiscal years.

MESA activity	FY 1975		FY 1976		FY 1977	
	Positions	Obligations	Positions	Obligations	Positions	Obligations
Coal mine enforcement	1,864	$39,689,195	1,918	$45,528,235	2,080	$ 52,548,000
Noncoal mine enforcement	475	10,532,204	563	13,735,813	627	17,427,000
Education and training	197	5,759,398	238	8,328,188	291	14,788,140
Technical support	330	9,302,338	356	11,344,670	398	14,205,000
Program administration	74	1,490,309	74	2,222,936	74	2,188,000
Total	2,940	$66,773,444	3,149	$81,159,842	3,470	$101,156,140

The above activities, other than enforcement, provide support to both the coal and noncoal programs. MESA estimates that roughly 75 percent and 25 percent of the efforts of the activities such as education and training are devoted to the coal and noncoal programs, respectively.

MESA estimates that the above resources are applicable to each program as follows:

Program	FY 1975 Positions	FY 1975 Obligations	FY 1976 Positions	FY 1976 Obligations	FY 1977 Positions	FY 1977 Obligations
Coal	2,315	$52,103,228	2,419	$61,950,080	2,652	$ 75,933,855
Metal and nonmetal	625	14,670,216	730	19,209,762	818	25,222,285
Total	2,940	$66,773,444	3,149	$81,159,842	3,470	$101,156,140

During the period July 1, 1969, through September 30, 1976 (fiscal years 1970 through 1976 and the transition quarter), the Bureau of Mines expended about $22 million on health and safety research for metal and nonmetallic mines. As shown on the following table, these expenditures increased steadily during the period and were almost equally divided between research done by the Bureau and research done under contract and grants with others.

Expenditures for Metal and Nonmetal Health and Safety Research

Fiscal year	Inhouse	Contracts and grants	Yearly total
1970	$ 401,000	$ 32,000	$ 433,000
1971	279,300	225,700	505,000
1972	1,338,900	1,591,100	2,930,000
1973	1,551,500	1,395,500	2,947,000
1974	2,036,100	1,963,900	4,000,000
1975	2,105,000	2,515,000	4,620,000
1976(note a)	3,065,200	3,881,800	6,947,000
Total	$10,777,000	$11,605,000	$22,382,000

a/Includes transition quarter.

PROPOSED LEGISLATION

The Congress is currently considering two major bills to revise Federal regulation of mine health and safety. S. 717 was introduced in the Senate in February 1977 and was passed on June 21, 1977. A similar bill, H.R. 4287, was introduced in the House of Representatives in March 1977, and, as of July 11, 1977, was awaiting consideration on the House floor.

The bills provide for a new Federal mine health and safety law which would apply to both the coal and noncoal industries, and which would replace the existing 1966 and 1969 acts. Both bills also provide for transferring primary Federal responsibility for mine health and safety from the Department of the Interior to the Department of Labor.

Although based primarily on the 1969 coal act, S. 717 includes a number of changes which the Senate Committee on Human Resources considers essential for the establishment of a stronger mine health and safety program. We noted that this bill contains a number of provisions which, if enacted, should help correct some of the problems we identified in our review. These provisions of S. 717 and the proposed law are discussed in connection with our recommendations throughout the remainder of our report.

SCOPE OF REVIEW

Our review was conducted primarily at the MESA Rocky Mountain and South Central Districts headquartered in Denver, Colorado, and Dallas, Texas, and at the MESA headquarters office in Arlington, Virginia. We visited a sample of 55 metal and nonmetal mine properties and observed 54 MESA inspections. The mines visited were selected to cover all of the variables suggested to us by MESA officials to obtain adequate coverage of the various types of mining operations covered by the act. These variables were

--open pit mines, underground mines, and mills;

--different underground mining techniques such as room and pillar, block caving, and shrinkage stopes;

--mineral commodities such as limestone, granite, copper, sodium compounds, uranium, and sand and gravel;

--employee size groups; and

--State plan versus non-State plan States.

In addition, we obtained the views of officials of the following organizations on the effectiveness of MESA's metal and nonmetal health and safety program:

--Selected members of the 1975 Metal and Nonmetal Mine Safety Advisory Committee.

--The Bureau of Mines Research Centers and Bureau of Mines headquarters in Washington, D.C.

--The Colorado School of Mines.

--Mine agency officials from the province of Ontario, Canada, and several State mine agency officials.

--U.S. and Canadian mining associations.

--Various labor unions and mine operators.

We also attended a meeting of the Federal Metal and Nonmetal Mine Safety Advisory Committee and interviewed MESA inspectors and other officials regarding the program.

In conducting our review, we:

--Reviewed the metal and nonmetal act along with its legislative history, procedures for implementing the act, and pending legislation which would affect the program.

--Reviewed the standards and procedures of the Department of the Interior and MESA in administering the program.

--Observed the implementation of the program in four of the six MESA districts (Rocky Mountain, South Central, Northeastern, and Southeastern Districts).

--Reviewed pertinent records such as mine inspection reports, accident investigation reports, and related statistics.

--Analyzed MESA injury statistics and reviewed the adequacy of MESA's accident and injury reporting system.

--Identified high-injury operations by type, size, and State for calendar year 1975.

--Reviewed MESA's efforts to enforce health standards and develop accurate statistics on occupational illnesses in metal and nonmetal mines.

--Assessed the adequacy of current enforcement of MESA regulations and the overall effectiveness of the program in terms of accidents and injuries.

--Reviewed the implementation of the metal and nonmetal health and safety research program conducted by the Bureau of Mines.

CHAPTER 2

LIMITED PROGRESS MADE IN REDUCING OCCUPATIONAL INJURIES

The Federal Metal and Nonmetallic Mine Safety Act directs the Secretary to require mine operators to report, at least annually, accidents, injuries, and occupational diseases. The Secretary is required to compile, analyze, and publish this information and to submit annually to the Congress a full report on the administration of his functions under the act. This report is to include findings, comments, and recommendations for legislative action.

Injury statistics compiled in accordance with the above statutory requirement show that little improvement occurred in the industry's safety record from 1966 through 1974. Although the number of fatalities reported since 1974 has been reduced over the level reported during the 1960s, in 1975, for the first time, MESA reported to the Congress that significant progress was made in reducing injuries. Although we found that MESA's injury statistics are not completely accurate (see pp. 24 to 25), they are the only available measurement of the industry's safety record.

We found that a few operations reporting the greatest reductions accounted for a significant part of the overall reduction in injuries reported in 1975. Most of these were underground mines, a category to which MESA has directed an increasing share of its enforcement resources. Although we could not specifically determine the impact of MESA's activities at the operations with the greatest reductions, we did identify other factors which appeared to cause some part of their reported reductions. We also found that much of the reported reduction in the disabling injury frequency rate resulted from reductions in the number of relatively minor injuries reported, while the number of reported severe nonfatal injuries continued to increase.

As discussed in the following chapter, there has been minimal reporting of occupational illnesses because of difficulties in their identification (see pp. 23 to 24). As a result, we were unable to assess whether occupational illnesses are increasing or decreasing.

SUMMARY OF INJURY STATISTICS FOR THE PERIOD 1966 THROUGH 1975

Fatal and nonfatal disabling injuries reported to MESA by the metal and nonmetallic mining industry during calendar years 1966 through 1975 are summarized in the following table.

Calendar years	Hours worked	Fatalities	Nonfatal disabling injuries	Disabling injury (note a) frequency rate
1966	572,479,007	195	12,313	21.85
1967	533,016,031	181	11,205	21.36
1968	528,064,644	182	11,099	21.36
1969	538,798,530	179	11,410	21.51
1970	539,089,286	165	12,348	23.21
1971	517,025,210	164	12,148	23.81
1972	413,902,899	234	9,596	23.75
1973	441,829,410	175	8,273	19.09
1974	467,501,702	158	8,916	19.40
1975	473,407,463	123	8,438	18.07

a/A disabling injury is any work-related injury which results in death, some degree of permanent impairment, or renders the injured person unable to effectively perform his regular duties for a full day beyond the day of the injury. The disabling injury frequency rate is the number of disabling injuries per million staff-hours worked.

As a result of new regulations for reporting employment and injury and illness statistics which became effective on January 1, 1973, injury statistics since 1973 are not comparable to those for previous years. These new regulations required all noncoal mine operators to report nondisabling as well as disabling injuries. Nondisabling injuries are those injuries, except minor first-aid cases, which do not cause a full day's absence from the job. Also, before 1973, employment and disabling injury statistics were reported annually, however, the revised regulations required that operators report employment data quarterly and injuries within 10 days of occurrence. Other changes effected by the 1973 regulations and certain changes in MESA's method of computing frequency rates included the following:

--Actual rather than estimated hours worked had to be reported.

--Employment and injury data relating to office workers was included.

--Injuries reported by operations that did not also report employment data were not included in MESA's computation of injury frequency rates.

MESA, in its calendar year 1975 annual report to the Congress, stated for the first time that significant progress had been made in reducing injuries. Nonfatal disabling injuries decreased from 8,916 in 1974 to 8,438 in 1975 and

nondisabling injuries decreased from 6,222 to 5,675. The disabling injury frequency rate was reduced 7.2 percent; from 19.40 in 1974 to 18.07 in 1975. The nondisabling injury frequency rate was reduced 9.7 percent; from 13.28 in 1974 to 11.99 in 1975. The 123 fatalities reported in 1975 were the lowest on record for the industry, and represented a 22.2 percent reduction from the 158 fatalities in 1974.

MESA also reported that a proportionately larger share of its enforcement effort had been directed to underground mines and that these mines reported the greatest reductions in frequency rates. The disabling injury frequency rate for underground mines was 38.46 in 1975 as compared to 45.09 in 1974 and 45.50 in 1973. The surface sector showed little reduction with a 14.11 rate reported in 1975 as compared to 14.64 in 1974 and 14.43 in 1973. Conversely, the surface sector accounted for most of the reduction in fatalities reported between 1974 and 1975. Fatalities were reduced by 28 in the surface sector as compared to 7 in the underground sector.

FACTORS IN REPORTED REDUCTIONS IN INJURIES BETWEEN 1974 AND 1975

We found that a few operations reporting the greatest reductions accounted for a significant part of the reductions in disabling and nondisabling injuries reported for the industry in 1975. At these few operations, we found that factors other than MESA's activities caused part of the reported reductions. Such factors included:

--Reductions in the number of hours worked.

--Reductions in employment that resulted in a more experienced overall workforce.

--Actions to prevent injuries from becoming reportable.

--Changes in company management and safety programs.

--Failure of some operators to report all injuries.

Decrease in nonfatal disabling injuries

Of the 479 fewer nonfatal disabling injuries reported in 1975 than in 1974, we found that 10 operations reporting the greatest decreases in injuries accounted for a significant part of the overall reduction. These operations included 7 underground and 3 surface mines which reported a reduction of 586 injuries.

Although there was a decrease in both fatal and nonfatal injuries, the number of injuries causing employees to be away from their jobs more than 100 days increased from 626 in 1973 to 725 in 1974 and 834 in 1975. Such injuries accounted for 9.9 percent of the nonfatal disabling injuries reported in 1975 as compared to 7.6 percent in 1973. In fact, much of the reduction shown in the disabling injury frequency rate was caused by reductions in the number of relatively minor injuries. For example, injuries involving only one to five lost workdays accounted for 43 percent of the reduction in disabling injuries between 1974 and 1975. These injuries decreased from 2,824 in 1974 to 2,619 in 1975.

Significant decreases in hours worked

Several of the operations reporting the greatest reductions in injuries also reported that, contrary to the trend in the industry as a whole, they worked significantly fewer hours in 1975 than in 1974. Significant decreases in hours worked usually result in decreased numbers of injuries because there is less worker exposure to possible injury. In such cases, the reduction in the absolute number of injuries usually will not affect the injury frequency rate, which is figured on the basis of the number of injuries per million staff-hours worked. It is therefore significant if the frequency rate of an individual operation or of the industry goes either up or down during periods of reduced or constant employment. An increase may reflect a disaster, as was the case in 1972 when the Sunshine Mine's 91 fatalities pushed the industry's disabling injury frequency rate up, in a year when total staff-hours went down. If the frequency rate goes down during periods of reduced employment, on the other hand, this may reflect the better safety record of a more experienced workforce, or the results of a company's improved safety program, as discussed below. An example of the more usual case was one surface mine reporting 35 fewer injuries in 1975 than in 1974, but with no significant improvement in the operation's disabling injury frequency rate because there was about a 50-percent reduction in the number of hours worked.

More experienced workforce

As noted above, the injury frequency rate may be lowered as a result of a more experienced workforce. This usually occurs during a period of declining employment, when new employees are not hired and the least experienced employees are usually the first laid off. MESA statistics show that these employees with the least experience on their current jobs are more likely to be in accidents than are more experienced workers.

For example, one copper company reported that 1.2 million, or 26 percent, fewer hours were worked at one of its underground mines in 1975 than in 1974. We were told that in 1975, because of low copper prices, the company laid off about 800 miners, most of whom had little mining experience. This meant that there were both fewer hours of worker exposure in 1975 and a higher percentage of experienced workers who were less likely to be involved in accidents. In that year, the underground mine experienced 267 fewer injuries than in 1974--two less fatalities, 110 less nonfatal disabling injuries, and 155 less nondisabling injuries. The disabling injury frequency rate was reduced from 59.89 in 1974 to 48.64 in 1975. As shown below, most of the reduction resulted from a reduction in the number of injuries involving miners with less than 1 year's experience on their regular jobs.

	Injuries involving miners with less than 1 year's job experience at one copper mine			
Calendar years	Fatalities	Nonfatal disabling injuries	Nondisabling injuries	Total
1974	2	116	159	277
1975	0	28	18	46
Difference	- 2	- 88	-141	-231

Just the opposite had occurred at the operation between 1973 and 1974. It reported that 1.1 million more hours were worked in 1974 than in 1973. During 1974 there was an increase of 3 fatal and 139 disabling injuries over the 1973 levels. In addition, the disabling injury frequency rate rose from 37.03 in 1973 to 59.89 in 1974. The number of hours worked and the resultant changes in the composition of the mine's work force were the only significant changes at the operation during the 3-year period.

Actions to prevent injuries from becoming reportable as disabling

At least one of the operations showed a reduction in its injury rate by encouraging injured employees to return to their jobs as soon as possible. In 1974 the underground mine reported 29 disabling injuries and a frequency rate of 84.42. In 1975 the number and frequency of disabling injuries was reduced to 2 and 10.61, respectively. The Safety Director at the mine attributed the reduction to a "work restrictions program" initiated by the company at all of its operations. Under this program, employees receiving minor injuries requiring medical attention are encouraged to return to their jobs before being counted as a disabling injury. The attending doctor, at

his discretion, can return injured employees to their jobs with restrictions on such activities as climbing, lifting, and walking.

Improved management and safety program

One of the operations experienced some reduction in its injuries in 1975 because of changes in its managerial personnel and safety programs. In February 1974 MESA had conducted a survey at this underground mine to identify and recommend ways to improve the operations's safety record. The operation had just completed a change of management and staff personnel at the time of the survey. A new mine superintendent was brought in and one of the underground mine employees was made Safety Director. During a followup survey in September 1974, MESA found that the change in the operation's management had caused a noticeable improvement in the supervisors' and employees' attitudes. In addition, some of MESA's general recommendations had been implemented.

In 1975, when the mine experienced a 33-percent reduction in total staff-hours worked, it reported 80 fewer disabling injuries than in 1974. The mine's disabling injury frequency rate was also lower, and MESA attributed this to improved management and safety programs at the mine. Nevertheless, the reduced injury frequency rate of 129.42 was still considerably higher than the national average (38.46) for underground mines. Therefore, in October 1975, MESA met with the mine's management to offer its assistance in further reducing the frequency rate. MESA outlined a program under which it would observe work procedures and identify the causes of accidents. After studying the results of these observations, MESA was to develop a training program covering areas in which accidents occur most frequently. However, the program was rejected by the mine's management because they were implementing an accident prevention program designed by another corporation. Preliminary statistics compiled by MESA show that the injury frequency rate reported for the underground mine during the first half of 1976 subsequently had fallen to 42.93.

Factors in decrease in nondisabling injuries

There were 547 fewer nondisabling injuries in 1975 than in 1974 in the noncoal industry as reported by MESA. We found that 10 operations reporting the greatest decreases accounted for a significant part of the overall industry reductions. We found that 1 of the 10 mines had a significant decrease in hours worked and another mine failed to report all of its nondisabling injuries to MESA, as shown on the next page.

--A surface mine reported 36 fewer injuries in 1975 than in 1974. However, the injury frequency rate showed only slight improvement because there was a 36-percent reduction in hours worked.

--One operation reported 99 injuries in 1974 and none in 1975. We checked the accident records at the operation and found that the operation actually had 241 injuries requiring doctor's care in 1975 that should have been reported to MESA.

Factors in decreases in fatalities

The factors which may be significant in the reduced number of fatalities are more difficult to assess than the reductions in disabling and nondisabling injuries. As shown in the table below, there were 175 fatalities in 1973, 158 in 1974, and 123 in 1975.

Type of operation	Number of fatalities 1973	1974	1975
Underground	49	50	43
Open pit	17	16	12
Crushed stone	37	30	27
Sand and gravel	40	39	21
Mills	32	23	20
Total	175	158	123

The fatalities which did occur were spread among a wide variety of operations, including operations that reported low as well as high injury frequency rates. Significant numbers of fatalities were occurring at operations that have been inspected by MESA many times. In fact, the sand and gravel and crushed stone operations have shown a much greater decrease in fatalities than have underground mines, even though the latter are inspected more frequently by MESA. Fatalities at sand and gravel and crushed stone operations decreased from 78 in 1973 to 48 in 1975, whereas fatalities at underground mines decreased from 49 to 43. We also found that some of the operations that reported fatalities in 1973 or 1974 but none in 1975 again had fatalities in 1976.

It should be noted that, in contrast to data on injuries, data on fatalities since 1973 is comparable to prior years. According to MESA, fatalities have been tracked by a special system which was not affected by the changes made to the injury reporting system in 1973. In this regard, we noted that fewer fatalities were reported during recent years than were reported during the 1960s.

In contrast to the reductions in fatalities in the noncoal mining industry, the number of fatalities in the coal mining industry has been increasing. The coal mining industry reported 132 fatalities in 1973, 132 in 1974, and 154 in 1975. MESA indicated this was due to increased coal production and employment. According to MESA, the increased employment has resulted in a greater number of inexperienced coal miners who are more likely to suffer on-the-job injuries.

CONCLUSIONS

Overall progress in reducing accidents and injuries since the passage of the 1966 act has not been sufficient. Little reduction was reported by MESA between 1966 to 1974. Although some reductions of injuries and accidents were reported between 1974 and 1975, we found that a few operations reporting the greatest reductions accounted for a significant part of the overall reductions. The reductions at these operations were in part caused by factors other than MESA. Although we cannot quantify the effect of MESA's program on the occurrence of accidents and injuries, we believe that MESA can improve its program. We believe the following aspects of the program should be improved:

--The reporting and analysis of accident, injury, and occupational illness information (see ch. 3).

--Health and safety standards and the process by which they are promulgated (see ch. 4).

--The enforcement of standards (see ch. 5).

--The education and training programs provided to the mining industry (see ch. 6).

--The identification of research needs and transfer of research results to the industry (see ch. 7).

--Special programs designed to place emphasis on high-injury mines (see ch. 8).

AGENCY COMMENTS AND OUR EVALUATION

The Department of the Interior noted that preliminary data, compiled after the completion of our fieldwork, indicates that progress in reducing nonfatal disabling injuries and fatalities continued at an accelerated rate in 1976. According to the Department's data, the industry's disabling injury frequency rate for 1976 dropped to 15.27, as compared to 18.07 for 1975 and fatalities were reduced to 113--a new record low.

The Department also noted that reductions in fatalities and nonfatal disabling injuries reported since 1974 followed increased enforcement activities and inspector training by MESA following the Sunshine Mine disaster in 1972. In this regard, the Department also noted that preliminary results of a MESA statistical analysis of individual mines showed a significant correlation between MESA's enforcement activities and a reduction in the disabling injury frequency rate for 1976.

Because this information was not available before we completed our fieldwork, we cannot comment on its validity.

CHAPTER 3

OPPORTUNITIES TO IMPROVE REPORTING AND ANALYSIS OF ACCIDENTS, INJURIES, AND ILLNESSES

In our study of MESA's system for reporting and analyzing occupational accident, injury, and illness information, we found that:

--Occupational illnesses are difficult to identify and reporting of them has been minimal.

--MESA instructions to mine operators do not prescribe clear criteria for determining which occupational injuries must be reported.

--MESA inspectors are not following established procedures to verify the completeness and accuracy of injury and illness data reported by operators.

--MESA has not used its computerized information system effectively to analyze the detailed injury and illness information reported by operators.

--MESA has no specific criteria for determining which accidents should be investigated, either by MESA or by mine operators.

--Detailed information on accidents which do not involve injuries is not included in MESA's computerized information system, even though it is readily available in MESA or mine operator accident reports.

As a result, MESA's statistics do not fully and accurately reflect the industry's injury and illness experience nor have MESA's efforts to identify specific accident, injury, and illness causes and to develop techniques to reduce them been based on all available information.

REQUIREMENTS AND PURPOSES OF MESA'S REPORTING AND ANALYSIS SYSTEM

The MESA program of reporting and analyzing information on accidents, injuries, and occupational illnesses in the noncoal mining industry should serve several primary purposes. MESA's Health and Safety Analysis Center uses reported injuries to compute injury frequency rates which gauge the industry's injury experience and, in part, measure the success of MESA's safety program. In addition, indepth studies and analyses of reported data can be used to (1) determine the true causes of

accidents, injuries, and illnesses; (2) determine hazardous trends in the industry; and (3) provide recommendations for improvement. They also can provide MESA management with timel information to aid them in improving the enforcement program, adopting appropriate training programs to improve health and safety in the industry, recommending needed research and development, and supporting the need for proposed standards.

MESA mailed instructions to all mine operators requiring reports of all occupational injuries which arise out of and in the course of work, except those requiring only first-aid treatment, such as minor scratches, cuts, burns, or splinters.

The instructions also require reporting of any occupation illness, which is defined as any abnormal condition or disorde other than an occupational injury, caused by exposure to environmental factors associated with work. Several categories of occupational illnesses, with a number of examples of illnes and disorders in each, are also set forth in the instructions.

MESA regulations (30 C.F.R. 58.10-.11) also require mine operators to notify its subdistrict managers immediately of certain types of accidents, even if no injuries are involved. The purpose of this notification is to afford MESA the opportunity to conduct a prompt investigation or to require the operator to investigate the accident and submit a written report to the appropriate subdistrict manager. If required, the operator's investigation must develop sufficient informati to determine the cause of the accident and all contributing factors. The operator's written report must contain specific detailed information, similar to that required when reporting injuries and illnesses to the Center.

REPORTING OF OCCUPATIONAL ILLNESSES MINIMAL

We found that MESA has not collected, published, or analyzed reliable statistics on occupational illnesses, even though its instructions to mine operators require reporting of such illnesses. In 1975, for example, noncoal mine operators reported only nine cases of pneumoconiosis (a lung disease caused by prolonged, continued inhilation of mineral or metall dusts) to MESA.

The low number of reports of occupational illnesses may be explained by the present difficulties of identifying such instances, in spite of research evidence of a cause-and-effect relationship between exposure to a number of substances found in mines and a high rate of cancer and other diseases among the workers exposed. According to MESA, occupational illnesse develop over long periods of time and are often associated with the natural aging process. They stated that it is not

possible to obtain accurate data on occupational illnesses unless careful medical studies are conducted. Few such studies have been made in the noncoal mining industry, however. Under these circumstances, we concentrated our review on the reporting and analysis of mine accidents and injuries.

CRITERIA FOR REPORTING INJURIES NEEDS CLARIFICATION

During our visits to 42 mining properties in MESA's South Central and Rocky Mountain Districts, we requested the operators to provide us with the number of occupational injuries which occurred on their properties during the period 1973 through 1975. Most operators provided us with the number of injuries which required professional medical care; however, a few either refused or said they did not have all of the requested information readily available.

We compared the information we obtained from these operators to MESA's records and found that in each of the 3 years not all of the injuries reported to us, both disabling and nondisabling, were reported to MESA. The following table shows the number of operations which provided us information, the number of injuries requiring professional medical care reported to us, and the number and percent of these injuries reported to MESA.

Calendar year	Number of operations providing data to GAO	Injuries		
		Reported to GAO	Reported to MESA	Percent reported to MESA
Disabling:				
1973	33	403	361	90
1974	34	546	492	90
1975	35	395	372	94
Nondisabling:				
1973	25	1,238	184	15
1974	28	1,612	147	9
1975	29	1,591	52	3

We found that operators of the mines we visited were making various interpretations of MESA's instructions and, as a result, were not reporting all occupational injuries requiring professional medical care to MESA. Some operators told us that the instructions required the reporting of only disabling injuries. Another operator said that only injuries requiring more than one visit to a physician or registered professional for treatment had to be reported. A few operators said that any injury requiring at least one treatment by a physician or registered professional had to be reported. Even one of the MESA inspectors

we accompanied told us he was not sure what type of injuries operators were required to report.

Similar observations were made by personnel of the Health and Safety Analysis Center during a presentation to MESA management officials at a District Managers' Conference in July 1976. The Center personnel were aware of confusion among operators as to the type of injuries the regulations required them to report. They also suspected that, as a result of this confusion, the operators were not reporting completely and accurately. Center officials, therefore, proposed that MESA conduct a field audit of operators' compliance with the reporting regulations. In October 1976, the MESA management officials decided to conduct an audit of a statistical sample of mines. As of June 1977, the audit was complete but a report had not been finalized. MESA advised us, however, that it found indications that 15 to 22 percent of injuries are not reported.

During the July 1976 conference, Center personnel also presented a report which concluded that operators should report all fatal and most nonfatal injuries. The report also recommended changes in the criteria for reportable injuries. The recommended criteria are virtually identical to the standard for "serious injuries" prescribed in the "American National Standard Method of Recording and Measuring Work Injury Experience" (ANSI Z16.1 standard).

According to this standard, serious injury frequency rates may measure safety program effectiveness more adequately than just disabling (lost-time) injury frequency rates. For the purpose of uniformity, the standard recommends that serious injuries include all disabling injuries as well as all nondisabling injuries which (1) require treatment by a physician, (2) require hospitalization for observation, (3) involve loss of consciousness, (4) restrict work or motion, (5) involve eye injuries, (6) involve fractures, or (7) involve assignment to other than one's regularly established job.

In November 1976 MESA drafted proposed revisions to its reporting regulations and instructions to operators based on the Center's presentation and report. As of June 1977 comments on the proposed revisions from various labor unions, industry associations, and the Occupational Safety and Health Administration had been incorporated and the regulations were awaiting review by the Office of Management and Budget. The MESA official in charge of developing the proposed revisions told us, at that time, final issuance of the regulations and instructions is planned for January 1978.

INSPECTORS NOT FOLLOWING ESTABLISHED PROCEDURES TO VERIFY THE COMPLETENESS AND ACCURACY OF INJURY AND ILLNESS DATA REPORTED BY OPERATORS

We noted that MESA had no procedures to verify the completeness and accuracy of occupational injury and illness reports submitted by mine operators. We discussed this matter with MESA district managers and headquarters officials in October 1975, and they agreed that such procedures were needed. We suggested that MESA inspectors review the operator's records during their regular inspections to determine the accuracy and completeness of the operators' reports to MESA.

In November 1975 MESA revised its inspection manual to require inspectors to correlate injury and illness data reported to the Center with mine records during their inspections. The revision also required inspectors to review the operators' quarterly employment reports for content and proper response, and to have the operators complete reports for any missing quarters. These instructions did not clearly explain that the purpose of reviewing the operators' records was to verify the completeness and accuracy of employment, injury, and illness data which the operator reported to MESA. Also specific procedures for reviewing the operators' records were not provided.

Some of the MESA inspectors we accompanied on regular inspections reviewed operators' quarterly employment reports to insure that reports for all previous quarters had been submitted and had been properly filled out. Few inspectors, however, reviewed the operators' records to verify the employment data or that all occupational injuries and illnesses had been reported to MESA. No review of the operators' injury and illness records was made during 30 of the 54 inspections we observed. A spot check of a few injury records was made during 13 inspections; however, only eight of the inspections involved some verification that the operator had accurately reported all required injuries and illnesses to MESA. We could not determine the extent to which inspectors reviewed the operators' records during the remaining three inspections.

One inspector who did not verify the accuracy of injury and illness data reported by the operator said he saw no need to review the operator's records since the company had been reporting some injuries. The operator informed us, however, that he only reported disabling (lost-time) injuries to MESA. He also informed us that 129 nondisabling injuries requiring treatment by a physician occurred on the property during the period 1973 through 1975, none of which were reported to MESA.

We found that even spot checks of the operator's records can be useful in resolving reporting problems. For example, on one inspection which we observed, the MESA inspector had determined before the inspection that the operation had never reported any injuries or illnesses to MESA. A spot check of the operator's records showed that injuries had occurred. The inspector brought this to the operator's attention and was told that the injuries had been erroneously reported to the Occupational Safety and Health Administration rather than MESA. The inspector pointed out the requirement for reporting to MESA and provided the operator with the necessary reporting forms and instructions.

MORE EFFECTIVE USE OF COMPUTERIZED INFORMATION SYSTEM NEEDED TO PROPERLY ANALYZE DATA

MESA collects from mine operators a wealth of data about each injury and illness reported, yielding some 50 variable factors which can be coded and stored in a computer. Through the effective use of such computerized information, analysts can get valuable insights into the causes of mine injuries and illnesses, as well as appropriate remedial steps.

The act itself calls for studies and analyses to serve these purposes, and we believe that the need is further supported by the goals and guidelines of the National Safety Council. The Congress established the National Safety Council in 1953 (36 U.S.C. 461 et. seq.) to further, encourage, and promote methods and procedures leading to increased safety and health among employees and employers in industries and other aspects of public and private life. Among other duties, the Council is to collect, publish, and disseminate educational and informative data and reports relating to safety methods and procedures. In 1975 the Council published guidelines on work accident records and analysis, which included accident investigation and analysis procedures based on American National Standards and information from other relevant sources.

In the Council's 1975 guidelines, it recommends that a number of key facts relating to accidents and injuries, similar to those maintained in MESA's information system, be summarized in as much detail as possible to identify patterns of occurrence which can serve as guides to the principle areas, conditions, and circumstances requiring corrective action. According to the Council, summarizing the information in this manner is essential for analytical purposes.

Before May 1974 MESA's Health and Safety Analysis Center routinely used its computerized data to make detailed analysis of injury statistics for each year and published them as

information reports. According to Center officials, these analyses were used primarily to satisfy special requests for statistics from other MESA groups, such as Enforcement and Education Training, and from outside sources such as the Congress. One of the officials told us that the analyses had been of limited value to management for other purposes, such as supporting the need for new standards or research, because the data was so far out of date by the time the reports were published.

In May 1974 MESA's Office of Internal Affairs recommended to the Administrator that the Center cease publishing the information reports and certain other analyses because it did not feel they were being used sufficiently. As a result, the Center was instructed by the Assistant Administrator for Technical Support to stop preparing the reports at that time. Since the Center had almost completed reports for 1970 and 1971, however, it was given permission to publish them, which it did in 1975. These reports covered the injury experience of various types of mines subject to the act and summarized disabling injuries according to a number of variable factors such as location, source, extent of disability, body part injured, and nature of the injury.

As a result of the halt in the Center's analysis activities, officials were not in a position to provide us with the data necessary for our evaluation of MESA's inspection program. We had asked the Center for summaries which would show the number of injuries and illnesses reported during 1973, 1974, and 1975 in each mine, State, subdistrict, and district according to a number of variable factors. These variables included employee's age, experience, regular job title, and work activity at the time of injury; nature and cause of the injury; and number of days lost from work. They would also show the extent of the injury (fatal, disabling, or nondisabling) separately, as well as national totals for each variable category.

MESA officials said, however, that the Center would have to develop special computer programs to generate the summaries and that they could not complete the project for about 5 months without postponing work which was already scheduled. To avoid this delay, we developed our own computer program and summaries, which did prove to be extremely useful in the overall assessment of the results of the MESA program. (See ch. 2.) Our computer program has since been transferred to the Center for its use.

We found that after its program was halted, the Center continued to get requests for special purpose analyses. Without the computer programs and information reports, however, Center personnel had to prepare these summaries manually.

As a result of the continuing special requests for statistical summaries, the Administrator, in March 1976, approved a recommendation that publication of annual detailed analyses be resumed. The Center has begun preparing analyses of data for the years 1972 through 1976. This effort has run into difficulty, however, because of changes in the Center's computer system which had been made in the interim.

These changes, completed in July 1975, involved a complete redesign of the information system and the transfer of post-1972 data to a new computer using a different computer "language." It was possible for the old programs to be used to summarize 1972 statistics on the old computer, and an information report covering these statistics was published in November 1976. New programs for the redesigned system had to be developed, however, to summarize data for the years 1973 through 1976. In December 1976 Center officials estimated that by April 1977 the programs for 1973 through 1976 would be completed and the summaries run. Publication of information reports covering these years is expected by October 1977. According to center officials, these computer programs will be used in preparing information reports on an annual basis thereafter. They added that our computer program would be useful to MESA, and that, with some modification, it would possibly assist the Center in preparing its information reports for 1973 through 1976.

IMPROVED PROCEDURES NEEDED FOR INVESTIGATING AND ANALYZING POTENTIALLY SERIOUS ACCIDENTS

In addition to reporting each injury and illness, MESA's regulations (30 C.F.R. 58.10-.11) require mine operators to notify MESA subdistrict managers immediately of several types of accidents that occur at mines subject to the act. We found that there are no specific criteria for determining which of these serious or potentially serious accidents MESA will investigate, and which ones it will order the operator to investigate and report on. We found further that under the present system, investigative reports submitted by operators on potentially serious accidents are not included in MESA's informatic system and accident analyses.

The types of accidents for which MESA requires immediate reporting are:

--Any injury, excluding illness, which results in death or may reasonably be expected to result in death.

--Any outbreak of fire that endangers human life or a fire underground which is not brought under control within 30 minutes.

--Any unplanned ignition of dust or strata gas.

--Any unplanned explosion of dust or gas.

--Any unplanned inundation by water or gas that endangers human life.

--Any unplanned initiation of explosives, including blasting agents.

--Any entrapment that endangers human life.

--Any damage to shafts and ventilation facilities that endangers human life.

--Any damage to hoisting or haulage facilities used for the transportation of men when such damage endangers human life.

The purpose of this notification is to afford MESA the opportunity to conduct a prompt investigation, or to require the operator to investigate the accident and submit a written report to MESA.

MESA has no written policy regarding the type of accidents it investigates or the type it requires operators to investigate and report on. According to a MESA headquarters enforcement official, it is an unwritten policy that MESA investigate all fatal accidents. Investigation of nonfatal accidents (including those involving no injuries) is left up to the discretion of MESA's subdistrict managers.

When notified of an accident as required by the regulations, the subdistrict manager is to use his judgement in assessing its seriousness or its potential for causing serious injury. On the basis of his assessment, the subdistrict manager decides either (1) to have MESA investigate and prepare a report, (2) to require the operator to investigate and submit a report, or (3) that no investigation is warranted.

MESA has not provided subdistrict managers with specific criteria regarding the types of accidents that should be investigated because it believes the individual circumstances of similar types of accidents can differ significantly. The detailed information to be included in the accident reports, if required, is quite similar to that which operators must provide when reporting injuries to MESA's Health and Safety Analysis Center.

Center officials informed us that only the injury, illness, and employment data which the regulations require operators

to submit to them are included in the computerized information system and analyzed. The Center also receives copies of all MESA accident investigation reports, but it does not receive accident reports submitted by operators to subdistrict managers. As a result, information relating to noninjury accidents which subdistrict managers considered to be serious enough to warrant investigation by operators is not included in the information system or the Center's analyses, even though the information is readily available in the accident reports.

A MESA enforcement official told us that subdistrict managers are not required to provide copies of operator noninjury accident investigation reports to the Center. He said he was not sure why, but guessed it was because relatively few serious or potentially serious noninjury accidents occur. Our review of MESA's files for the mines we visited, however, showed that MESA had investigated and reported on several accidents which did not involve injuries but which it considered serious. In fact, two serious noninjury accidents occurred while we were on mine properties observing MESA inspections.

One of these involved the cave-in of the entire roof in one working area of an underground mine, during a period when employees were not in the area. The cave-in tore down most of the supporting timbers in the area so that employees could not resume working in the area until it was repaired. (See photograph on p. 32.) The other accident involved a haulage truck driver who fell asleep and drove off the roadway at an open pit mine. The truck sustained an estimated $10 thousand damage, but the driver was not injured. (See photograph on p. 33.)

According to the National Safety Council's guidelines on accident records analysis discussed previously, accident cause analysis requires thorough investigation of at least every accident involving a disabling injury to determine the contributing circumstances. According to the guidelines, accidents that might have caused serious injury are equally important from the safety standpoint and should be investigated. Under MESA's proposed revisions to its regulations, discussed earlier, operators of both coal and noncoal mines would be required to notify MESA district or subdistrict offices immediately of injuries and life-threatening conditions. Under the proposed revisions, operators would also be required to investigate all such accidents and conditions and to report detailed information relating to each incident to the Center. This would be specifically required even if reportable injuries were not involved. As noted previously, the future of the proposed regulations was uncertain as of December 1976.

Fall of roof in a timber-supported working area of an underground mine. Employees were not in the area when the accident accurred.

Haulage truck driven off the road in an open pit mine. No employees were injured. (Photograph courtesy of mine operator.)

CONCLUSIONS

We believe it is essential that MESA have complete and accurate data on occupational injuries and illnesses in order to have a reliable measurement of the noncoal mining industry's injury and illness experience and the success of its own health and safety program. On the basis of the mines we visited and MESA's records, however, not all injuries and few illnesses are reported to MESA by operators as required. Confusion over the type of injuries that must be reported and difficulties in identifying occupational illnesses have been major reasons.

We believe MESA could improve the completeness and accuracy of mine operators' reporting by providing them with simple and clear criteria for determining reportable injuries. In our view the criteria for serious injuries prescribed by the American National Standard Method would be less subject to interpretation by operators than those prescribed by MESA. Also, based on our observations of individual MESA inspectors, many are not verifying the completeness and accuracy of reported employment, injury, and illness data during inspections as required by MESA procedures. We believe such verifications would be a useful means of identifying and correcting instances of inaccurate reporting by mine operators.

We believe MESA could determine more effectively the causes of occupational injuries and illnesses, and the means of reducing them, through more thorough and detailed analyses of information reported by mine operators. In our view MESA could make such analyses more efficiently through more extensive use of its computerized information system to summarize the data according to the necessary variable factors. We believe such analyses would also be of greater assistance to MESA management in improving the enforcement program, adopting appropriate industry training programs, identifying and recommending research needs and supporting the need for new standards.

We believe that MESA should establish criteria for determining which mine accidents should be investigated, either by MESA or by mine operators. Because accidents which do not involve reportable injuries can be potentially serious, we believe that information relating to such accidents should be included in MESA's computerized information system. By including such information in the system, MESA's Health and Safety Analysis Center could broaden the base of statistical data which it uses to determine trends in accident causes. We believe that any accident meeting the criteria which require MESA notification, as specified in the regulations, would, by definition, be potentially serious. Also, at a minimum, all such accidents should be investigated and all relevant information should be included in the information system.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

To improve the completeness and accuracy of accident, injury, and illness information relating to the noncoal mining industry, we recommend that the Secretary of the Interior instruct the Administrator, MESA, to:

--Take appropriate action to determine the nature and extent of occupational illnesses.

--Revise reporting instructions to mine operators to require reporting of injuries which meet the criteria for serious injuries prescribed by the American Nationa Standard method.

--Reemphasize to inspectors the purpose and importance of MESA's procedures for verifying the completeness and accuracy of reported data during their inspections ana periodically spot check inspectors to insure they are implementing the procedures properly.

--Establish criteria for determining which accidents should be investigated, either by MESA or by mine operators.

--Establish procedures which provide for reports on all potentially serious accidents not involving injuries and for the inclusion of this information in MESA's computerized information system and analyses to determine trends in accident causes.

Also, to insure the future effectiveness and efficiency of MES analyses of injury and illness information, we recommend that the Administrator periodically evaluate the activities of the Health and Safety Analysis Center to insure that maximum use is made of its computerized system to summarize reported infor tion and that analyses are prepared in sufficient detail to determine the causes of injuries and illnesses and means of reducing them.

We noted that legislation pending in the Congress (S. 717 contains provisions consistent with the intent of these recommendations. If enacted, this legislation would:

--Require that appropriate health standards include provisions requiring that mine operators provide medica examinations for their workers to determine the adverse effects of their exposure to applicable contaminants (S. 717, sec. 201; proposed sec. 102(a)(6)).

--Require the compiling of accurate statistics on work injuries and illnesses occurring in mines (S. 717, sec. 303(a)(7); proposed sec. 501(h)).

--Require mine operators to investigate all accidents, whether or not they involve injuries, to determine their causes and means to prevent reoccurrence (S. 717, sec. 201; proposed sec. 104(c)(4)).

--Require mine operators to keep records of their accident investigations and actions to prevent reoccurrences and to make these records available to appropriate Federal and State officials (S. 717, sec. 201; proposed sec. 104(c)(4)).

AGENCY COMMENTS

The Department of the Interior agreed with our recommendations. It stated its belief that MESA should make greater use of its computerized information system and that MESA's noncoal program had reached the stage when more detailed information on injuries can be used more effectively to improve working conditions and reduce injuries. The Department stated that during 1976 MESA initiated a series of actions designed to strengthen its statistical analysis capabilities, such as the addition of staff and initiation of more sophisticated studies. The Department expects that MESA's actions will provide more definitive information on accidents, illnesses, and their causes.

Regarding our other recommendations relating to the reporting of accidents, injuries, and illnesses, the Department said that a number of actions designed specifically to improve these areas had either been implemented or were in the process of being implemented. In subsequent discussions, MESA advised us that these actions include:

--Revising mine operator's instructions for reporting accident, injury, and illness information.

--Reemphasizing to its inspectors the importance of verifying the completeness and accuracy of reported data during their inspections.

--Briefing inspectors on MESA's reporting requirements and preparing a pamphlet explaining the requirements which was given to inspectors for distribution to mine operators.

To determine the adequacy of MESA's mandatory standards and assess the need for additional mandatory standards, we solicited the views of MESA enforcement personnel, State enforcement personnel, mine operators and union officials. We also reviewed mine inspection reports, research conducted for the Bureau of Mines, and the Occupational Safety and Health Administration's standards that MESA had identified as potentially applicable in noncoal mines. These various sources identified literally hundreds of hazards which are not covered adequately by MESA's existing mandatory standards. Although it was not feasible for us to evaluate the appropriateness of each of these suggestions, we discussed this matter as well as the need for selected proposals with MESA enforcement officials in Washington and the field. The MESA officials agreed that there are many serious hazards which are not adequately covered by MESA's current standards and noted that MESA had initiated action to promulgate many necessary mandatory standards. For example, the following are several specific hazards not covered by standards which we discussed with MESA Headquarters' officials.

--Protruding objects in haulageways presenting hazards to passing mobile equipment operators.

--Lack of adequate maintenance procedures on mobile equipment.

--Use of unsuitable equipment for towing vehicles in underground mines.

The MESA officials agreed that these hazards should be covered more adequately and advised us that mandatory standards addressing these hazards are in the process of being promulgated. More specifically, the proposed standards will require that:

--haulageways be kept clear of all protruding objects,

--mine operators develop a maintenance inspection checklist for each piece of mobile equipment to be performed at the beginning of each shift and keep records of these inspections and the disposition of any deficiencies for inspection by MESA, and

--adequate towing equipment be used underground.

We reviewed standards which MESA had proposed and found that a huge backlog of needed mandatory standards and definitions have accumulated in the promulgation process. Between October 1973 and August 1976 at least 417 separate standards and definitions had been proposed by MESA. As of April 1977 only 57 of these had been actually promulgated. Excluding

one standard which was subsequently withdrawn by MESA, the remaining 359 standards and definitions were still in various stages of the promulgation process as of that time. However, 133 of these were published in the Federal Register as proposed rules for public comment on January 28, 1977. We found that this huge backlog of needed standards has accumulated because, in most cases, it takes years to process a standard through all of the various promulgation steps.

PROMULGATION TAKES YEARS

As authorized by the Federal Metal and Nonmetallic Mine Safety Act, an Advisory Committee, established by the Secretary of the Interior and composed of representatives from industry, labor, and State mine agencies, is charged with the responsibility of reviewing and recommending health and safety standards for enforcement in metal and nonmetal mines. Although any interested party may suggest standards for promulgation through established rulemaking procedures, including the Advisory Committee itself, most of the standards are initiated by one of MESA's 15 standards development committees.

Standards initiated and drafted by the standards development committees, along with justification for the standards, are reviewed by the Office of the Assistant Administrator, Metal and Nonmetal Mine Health and Safety, and by the Office of the Solicitor before they are placed on an agenda for consideration by the Advisory Committee. After each Advisory Committee meeting, a draft report of actions is prepared.

Normally, the draft report is ratified by the Advisory Committee at its next meeting and becomes the Committee's recommended Report of Actions to the Secretary through the Assistant Secretary, Energy and Minerals. Assessments of economic impact, environmental impact, and impact on other Federal agencies are prepared and, with the applicable proposed standards, form the proposed rulemaking documents for submission to the Secretary for consideration, approval, and subsequent publication in the Federal Register. Standards may also be proposed and promulgated by the Secretary of the Interior without the Advisory Committee's recommendation. However, these standards are subject to public hearings according to the Administrative Procedure Act if written objections are received. Standards recommended by the Advisory Committee are not subject to public hearing.

Undue delay in administrative proceedings, such as rulemaking, is one of seven problems involving Federal regulatory agencies which the Senate Committee on Government Operations has undertaken to study and prepare recommendations on under S. Res. 71, 94th Cong., 1st Sess., 121 Cong. Rec. S. 13805 (daily ed. 1975). MESA was requested to provide information

on the problems they encounter in promulgating health and safety standards. Therefore, we did not make a detailed, comprehensive analysis to determine all unnecessary delays or what could be done to expedite the promulgation process. We did, however, make an analysis of the time taken to complete each of the major promulgation steps and identified several opportunities to expedite the process significantly.

To assess the timeliness of the promulgation process, we prepared the following analysis showing the weighted-average calendar days required to process standards through each of the major promulgation steps during the period October 1973 through September 1976.

ANALYSIS OF TIME REQUIRED FOR MESA'S STANDARD PROMULGATION PROCESS

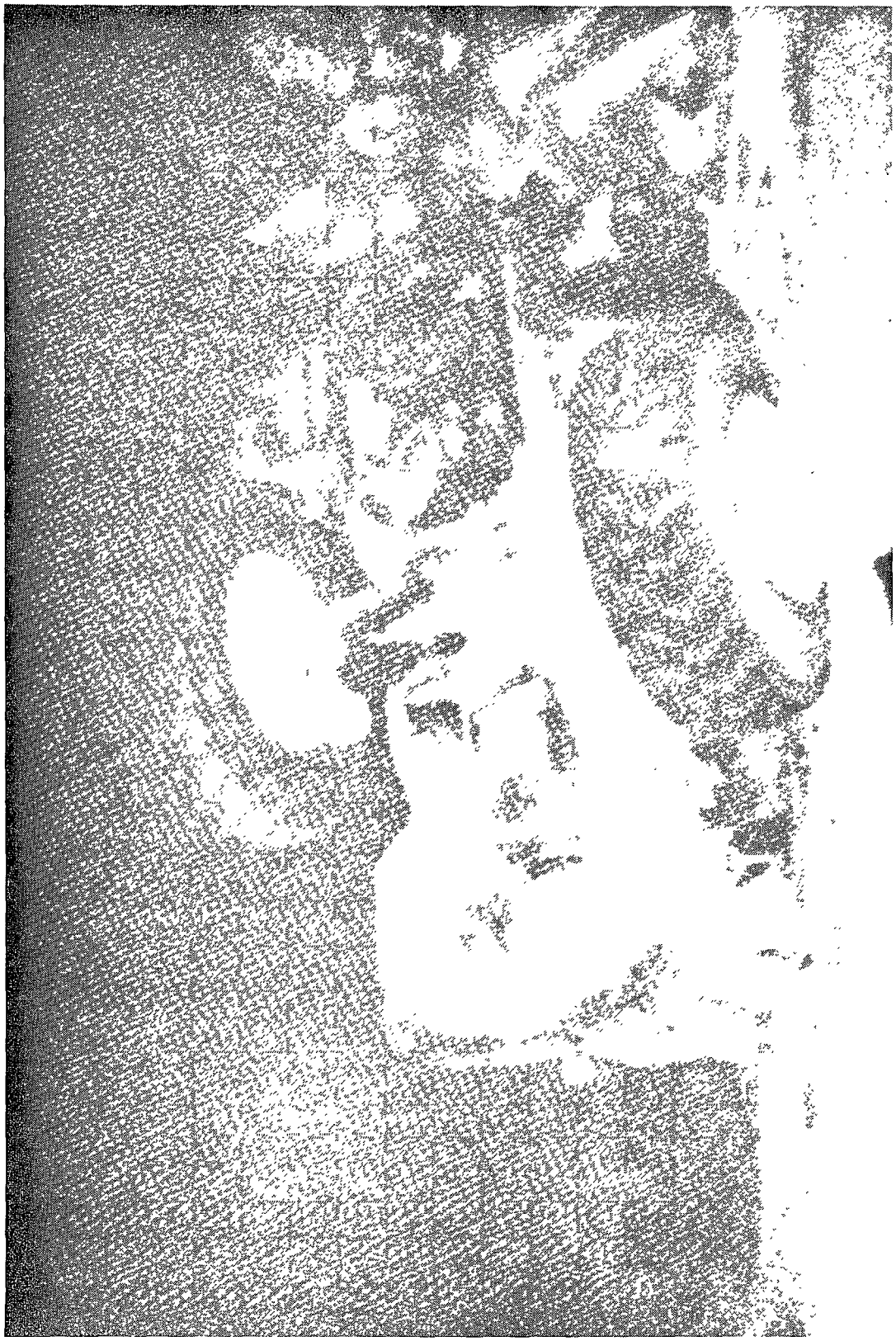
Major processing steps	Standards recommended by Advisory Committee	Standards not recommended by Advisory Committee
1. Development of proposed standards by MESA committees	95	95
2. Holding Advisory Committee meeting to consider merits of proposed standards, receipt of meeting transcript and preparation of report on committee's recommended action	92	92
3. Legal review of proposed standards; assessment of potential environmental impact (required by National Environmental Policy Act); assessment of inflationary impact (required by Executive Order 11821); and coordination with other Federal agencies (required by Office of Management and Budget). These actions are normally performed concurrently	277	277
4. Drafting of proposed rulemaking document, review by the Assistant Secretary of the Interior-Energy and Minerals, and publication of the document in the Federal Register	273	273

Major processing steps	Standards recommended by Advisory Committee	Standards not recommended by Advisory Committee
5. Receipt and consideration of public comments and publication of standards as Federal regulations	285	(See step 6.)
6. Receipt and consideration of public comments and requests for public hearings. (To date, public hearings have been requested on all standards not recommended by the Advisory Committee.)	a/	270
7. Holding public hearings; receipt and evaluation of Hearing Judge's recommended decision by the Secretary of the Interior, and publication of the Secretary's final decision as Federal regulations.	a/	300
Total time required	1,022	1,307

a/Does not apply to standards recommended by Advisory Committee.

As shown in our analysis, it takes an average of over 1,000 calendar days to produce a standard even in cases where the Advisory Committee recommended adoption, thereby eliminating the possibility of a public hearing. The promulgation process takes considerably longer in cases where the Advisory Committee does not recommend adoption and public hearings are required. Even in those instances where the Secretary accepts the Hearing Judge's recommended decision, promulgation takes more than 1,300 calendar days. If the Secretary does not accept the Judge's recommendation, the process stretches out even longer. For example, promulgation took almost five years in the case of a mandatory standard requiring rollover protection for mobile equipment that was first proposed in March 1972, but not promulgated until February 1977.

The purpose of this standard was to provide operators of mobile equipment protection from injury due to accidental overturning of their equipment. The effects of equipment rollovers are illustrated in the photograph on page 43 taken by MESA during its investigation of a fatal accident which occurred in July 1976.



The delay in promulgating the rollover protection standard is particularly disturbing since everyone agreed on the need for rollover protection. The delay primarily centered around disagreements between MESA, the Advisory Committee, and several industry associations as to whether certain types of equipment should be exempted from the standard and the specific wording of certain sections. Although the Advisory Committee recommended adoption of a mandatory rollover protection standard, it did not recommend the specific language of the standard which MESA had proposed. MESA, however, published its version of the standard as proposed rulemaking in October 1974 and public hearings were requested by several industry associations. The hearings were held in June 1975 and, upon conclusion, interested parties were given until August 1975 to file written statements of facts and arguments in support of their positions. In April 1976 the Hearing Judge submitted to the Secretary of the Interior his recommended decision, which added a provision exempting certain equipment. The Secretary rejected the Judge's recommended decision on the basis that it seriously weakened the standard and that rollover protection standards promulgated several years before under the Federal Coal Mine Health and Safety Act of 1969 and the Occupational Safety and Health Act of 1970, did not contain such limitations. The Secretary's final decision was published as Federal regulations on February 4, 1977.

Our analysis of the time required to promulgate standards also showed that the processing steps which occur after proposed standards are developed by MESA and acted on by the Advisory Committee are the most time consuming. Most of this time is spent by MESA and the Department of the Interior executing the administrative procedures generally required in Federal rulemaking processes. On the average, MESA's Standard Development Committees and the Advisory Committee each take 3 months to act. After that, however, 9 months go into MESA's concurrent legal review, assessment of environmental and inflationary impacts, and interagency coordination; 9 months elapse before publication of the standard as proposed rulemaking; 9 months are taken up obtaining and considering public comments and requests for public hearings; and, when required, 10 months are taken up by the Department of the Interior holding public hearings and reaching a final decision.

We also found that the manner in which MESA processed standards through the various administrative steps was contributing to delays. Since MESA had no system for tracking the status of individual standards, it processed standards through the system in large groups so as not to lose track of any. As a result, if some standards in the group were delayed for any reason, the entire group was held up.

We discussed the timeliness of the promulgation process with MESA headquarters officials who agreed that promulgation of standards had been delayed unnecessarily by the time it had taken MESA to perform the various administrative duties required by the process. They informed us that a system of tracking individual standards had been established in early 1977, which will enable MESA to discontinue its former practice of processing standards as a large group. They said that in the future, MESA will not have to delay a whole group of standards because of delays associated with only a few standards in the group.

The MESA officials also advised us that unwarranted delays have resulted from the inadequate amount of staff time which has been devoted to the promulgation process. According to the officials, about 17.5 staff-years are devoted to the promulgation of standards each year. Responsibility for processing standards through the system and performing the bulk of the required administrative duties rests with MESA's Division of Safety and Division of Health in Washington, which are also responsible for managing MESA's enforcement activities. According to the MESA officials, however, these groups have only about 5.5 staff-years available for performing their standards promulgation duties. The remaining 12 staff-years are expended by other groups involved in the process as follows:

MESA Standard Development Committees - 7.3 staff-years

Advisory Committee and Staff - - - - - 3.2 staff-years

Interior Solicitor's Office- - - - - - 1.5 staff-years

The MESA officials advised us that additional staff would be assigned to the promulgation of standards. As of April 1977, they said they were in the process of recruiting the needed personnel from MESA's enforcement staff in the field. The officials estimated that the additional staff and discontinuance of the former practice of processing standards in large groups will reduce the average time required to promulgate standards by at least 30 to 40 percent. They also pointed out, however, that even with these improvements, standards promulgation will continue to be time-consuming due to the nature of the process which is required.

MOST ADVISORY STANDARDS SHOULD BE MADE MANDATORY

The 1966 act has fostered two sets of standards--mandatory and advisory. While the act does not mention advisory standards, it states that notices of violation can be issued only upon "a failure to comply with a mandatory standard." No provision was

made for the enforcement of a standard not designated as mandatory. Such unenforceable standards became known as "advisory" because the mine operator was not required to comply with them.

MESA can upgrade existing advisory standards to mandatory status, but this requires the same procedures as promulgating an entirely new mandatory standard. For example, of the 66 standards which MESA promulgated in June 1976, 52 were upgradings of existing advisory standards. In fact, 100 of the 145 mandatory standards added since the initial group became effective in July 1970 were formerly advisory standards.

As of April 1977, there was a total of 282 individual advisory standards (not counting duplications between the three separate groups of standards applicable to underground, surface, and sand and gravel mines, respectively). To assess the need for making these standards mandatory, we obtained the views of the 54 MESA inspectors we accompanied during our review and cognizant headquarters enforcement officials. These personnel unanimously agreed that most advisory standards should be made mandatory. The general consensus of those MESA enforcement personnel we talked with was that advisory standards should be eliminated by upgrading those which are needed to mandatory status and abolishing the rest. Their rationale for this view was generally that if a standard is worthwhile, compliance with it should be required and enforceable.

Several MESA inspectors whom we observed advised us that they rarely bother to make recommendations based on advisory standards because operators generally do not comply. Despite this problem, however, we noted that MESA inspectors felt strongly enough about the hazards covered by advisory standards to cite them over 5,400 times during calendar year 1975 alone. The advisory standards cited most frequently during that year were:

1. Standard .14-12--Providing rollover protection on industrial vehicles such as forklifts, front-end loaders, and bulldozers. (Rollover protection became mandatory February 4, 1977.)

2. Standard .20-3--Practicing good housekeeping in and around a mine.

3. Standard .4-27--Providing fire extinguishers on self-propelled mobile equipment with enclosed cabs.

4. Standard .18-1--Establishing a definite, effective, and continually functioning company

safety program with active participation by employees.

5. Standard .4-12--Preventing combustible materials, grease, lubricants, or flammable liquids from accumulating where they can create a fire hazard.

6. Standard .9-4--Equipping powered mobile haulage equipment with audible backup warning devices.

In April 1977 MESA headquarters officials advised us that they had recently decided to initiate a special effort to eliminate advisory standards. The officials said that, as of that date, they were in the process of compiling a list of all advisory standards which they would then review to select those which should be upgraded to mandatory status. Those advisory standards which are not selected will be revoked. The officials anticipated, however, that MESA will attempt to make virtually all of the existing advisory standards mandatory. According to the officials, this effort had not been initiated previously because they considered it to have a lower priority than the promulgation of other mandatory standards.

CONCLUSIONS

The purpose of MESA's noncoal mine standards is to prescribe methods of eliminating hazards in order to protect life, promote health and safety, and prevent accidents in the industry. Standards with which mine operators must comply are designated as mandatory standards, and these standards are enforced by MESA inspectors. Standards with which mine operators are not required to comply are designated as advisory standards, and compliance with these standards can only be recommended by MESA inspectors.

We believe that elimination of all significant hazards should be required by appropriate mandatory standards if MESA's standards are to be most effective in preventing accidents, injuries, and occupational illnesses in the noncoal mining industry. We found, however, that literally hundreds of significant hazards are not adequately covered by MESA's existing mandatory standards. We believe, and MESA agrees, that additional mandatory standards covering these hazards are needed.

Mandatory standards covering these hazards have been proposed by MESA but have not yet been promulgated because, in most instances, the development and eventual promulgation of standards takes years. We found that at least 359 proposed

standards and definitions are backlogged in various stages of the promulgation process.

The 1966 act sets forth step-by-step procedures for the development and promulgation of standards which are designed to protect the rights and interests of mine operators and their employees. In addition, there are other procedures, inherent to Federal rulemaking, which must be followed. Execution of these procedures, at best, is a tedious and time-consuming process.

We found, however, that the promulgation of standards has been delayed unnecessarily because of the manner in which MESA has processed standards through the various promulgation steps. Since MESA had no system for tracking the status of individual standards until recently, it processed standards through the system in large groups so as not to lose track of any. As a result, the whole group was held up if a few standards in the group were delayed for any reason. MESA also advised us that inadequate staffing assigned to the promulgation of standards has resulted in unwarranted delays.

MESA advised us that it has recently established a system of tracking the status of individual standards; therefore, it plans to discontinue processing standards in large groups. We were also advised that MESA is attempting to recruit additional personnel from the field for assignment to the promulgation process. MESA estimates that these actions will reduce the average time required to promulgate standards by at least 30 to 40 percent. We believe that these actions should expedite the promulgation of needed standards significantly and that they should be fully implemented as soon as possible.

There are also hundreds of other significant hazards which are covered only by advisory standards with which mine operators are not required to comply. We believe, and MESA agrees, that most of these standards should be replaced by appropriate mandatory standards. We believe a complete evaluation of all existing advisory standards should be made. Action should then be initiated to replace those advisory standards determined to have merit with appropriate mandatory standards. Although MESA has not undertaken this effort to date, it believes it is necessary and plans to initiate action in this regard in the near future.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

To expedite the promulgation of mandatory standards which MESA has proposed to prevent accidents, injuries, and illnesses in the noncoal mining industry, we recommend that the Secretary of the Interior instruct MESA to implement its plans for (1)

discontinuing the processing of standards in large groups and (2) assigning sufficient staff to the standards promulgation process as soon as possible.

Also, to help eliminate other significant hazards, we recommend that the Secretary instruct MESA to initiate action as soon as possible to evaluate the merits of all existing advisory standards and upgrade them to mandatory status as appropriate.

We noted that legislation pending in the Congress (S. 71 contains provisions consistent with the intent of the first of these recommendations. If enacted, this legislation would

--Set specific time limits for executing many of the steps required for the promulgation of standards (S. 717, sec. 201; proposed sec. 102(a)(1)-(4)).

--Grant authority to issue emergency temporary standards in situations involving grave danger to miners. Such standards could be issued without first going through normal rulemaking procedures. Also, after an emergenc temporary standard is issued, action must be initiated to promulgate it as a permanent standard in accordance with normal procedures (S. 717, sec. 201; proposed sec. 102(b)).

The proposed legislation also contains a provision simil to our second recommendation. If enacted, this provision wou require that existing advisory standards be studied to determine those which should be promulgated as new mandatory stand ards. An abbreviated rulemaking procedure for this purpose would also be provided (S. 717, section 301(b)(2)).

AGENCY COMMENTS

The Department of the Interior agreed with our recommend tions. It stated that new and improved standards are needed, in part, because new techniques and processes are being intro duced continuously into the mining industry. The Department also noted that coverage of certain hazards needs to be made clearer and more specific in order to improve mine operator's compliance and enforcement by less-experienced inspectors.

CHAPTER 5

IMPROVEMENTS NEEDED IN MESA ENFORCEMENT AUTHORITY AND ACTIVITIES

Based on the MESA inspections we observed, we found that:

--MESA's enforcement authority has not been effective in permanently reducing health and safety hazards in the noncoal industry.

--MESA inspectors vary in the degree to which they cover all aspects of a mining operation and in their ability to identify and evaluate the severity of similar hazards.

--MESA has not placed sufficient emphasis on enforcement of health and training standards.

ADDITIONAL ENFORCEMENT AUTHORITY NEEDED TO REDUCE HAZARDS MORE EFFECTIVELY

MESA inspectors have been delegated the responsibility of enforcing mandatory health and safety standards which was assigned to the Secretary in the 1966 act. In accordance with the enforcement authority granted by the act, the violation notice, noncompliance closure order, and imminent danger closure order are the only tools available to MESA inspectors for forcing compliance.

We found that although these tools have been generally effective in getting identified hazards corrected on a temporary basis, they have not been effective in preventing the reoccurrence of hazards.

The following table shows that a large percentage of violation notices and closure orders were abated during the year they were issued.

Calendar year	Violation notices			Closure orders		
	Issued	Abated (note a)	Percent abated	Issued	Abated	Percent abated
1973	62,749	59,357	94.6	965	790	81.9
1974	71,440	68,982	96.6	1,938	1,646	84.9
1975	87,793	86,715	98.8	3,217	2,857	88.8
Total	221,982	215,054	96.9	6,120	5,293	86.5

a/Includes a limited number of abatements of citations issued in prior years.

Since no penalties are associated with violation notices, the threat of lost production which would result from a noncompliance closure order apparently strongly motivates operators to take corrective action.

In addition, an analysis of all closure orders and violation notices issued during the period 1971 through 1975 indicates that, in general, they have been successful in reducing hazards at mining operations subject to the act. As shown in the following table, although the number of orders and notices issued has increased steadily each year, the rate at which hazards occurred (violations per inspection) has decreased each year.

	1971	1972	1973	1974	1975
Inspections	8,457	13,021	16,562	21,841	31,002
Closure orders	56	216	965	1,938	3,217
Violation notices	45,562	54,812	62,749	71,440	87,793
Total violations	45,618	55,028	63,714	73,378	91,010
Violations per inspection	5.4	4.2	3.8	3.4	2.9

Lack of permanent improvement

Despite the above evidence of progress in the enforcement of the act, our analysis of the inspection histories of 52 of the mines we visited showed that

--most were cited repeatedly for the same type of hazards;

--there was little correlation between the use of noncompliance closure orders and reductions in the rate at which hazards occurred; and

--when noncompliance orders reduced the rate at which hazards occurred, the improvement was almost always temporary.

Those mines experiencing a high instance of repeat violations included mines where net decreases in the violation per inspection rate occurred between 1973 and 1976. For example, one underground mine was cited 251 times for failing to take down or adequately support loose ground in work areas during the period January 1, 1971, through June 30, 1976. The violation-per-inspection rate at this mine decreased from 10.3 in 1973 to 9.7 in 1976. At another surface operation, the

violation-per-inspection rate decreased from 79.5 in 1973 to 19.0 in 1976. Examples of repeat violations at this mine during the period January 1, 1973, through June 30, 1976, are shown in the following table and in the photographs on page 53.

Violation	Number of citations: Closure orders	Number of citations: Violation notices
Unsafe access to working places (See figure 1, page 53.)	2	45
Inadequate handrails on stairs and elevated walkways	11	99
Unprotected openings near travelways through which men or material could fall	11	93
Unguarded moving machine parts (See figure 2, page 53.)	6	61

At the 52 operations we also found that in some cases, the violation-per-inspection rate showed a significant decrease following the issuance of noncompliance orders. For example, 32 noncompliance orders were issued at one operation in 1974 and its violation-per-inspection rate decreased from 24.2 in 1974 to 11.2 in 1975. At another operation 12 noncompliance orders were issued in 1974 and its violation-per-inspection rate decreased from 28.6 in 1974 to 7.0 in 1975. Other operations, however, showed similar reductions in the violation-per-inspection rate when they received no noncompliance orders. For example, one surface operation received no noncompliance orders in 1974 and its violation-per-inspection rate decreased from 11.5 in 1974 to 0.6 in 1975.

The following table provides a yearly summary of the 52 operations, showing how many received noncompliance closure orders and how many did not. The number and percent of operations in each category that experienced a decrease in the violation-per-inspection rate the following year are also shown.

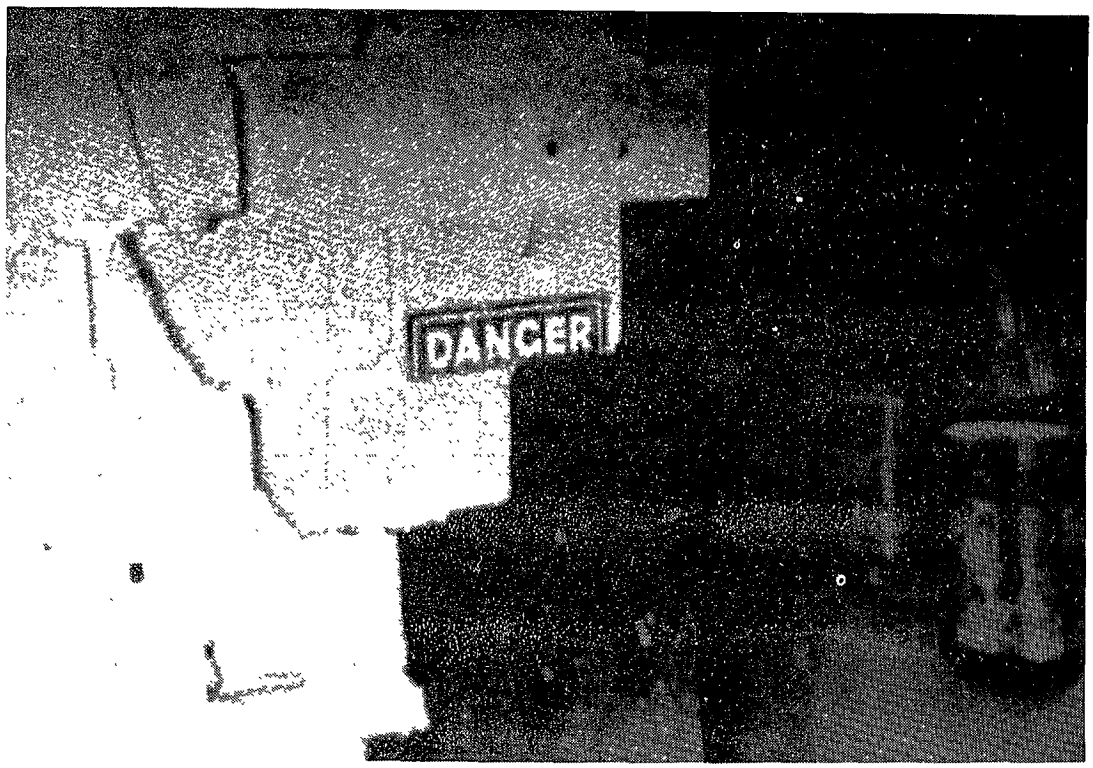


Figure 1. High voltage area damaged by front-end loader causing unsafe access.

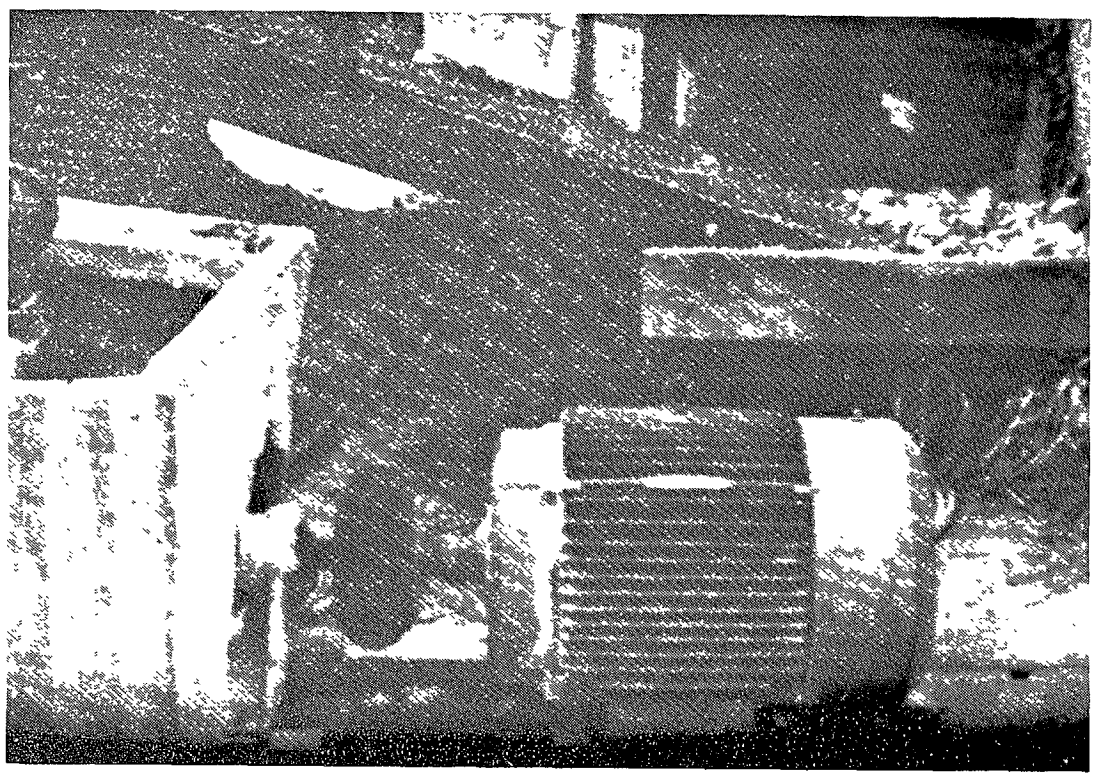


Figure 2. Unguarded moving machine part.

Year	Operations receiving orders: Total	Number with decrease	Percent with decrease	Operations not receiving orders: Total	Number with decrease	Percent with decrease
1973 (note a)	5	3	60	41	18	44
1974 (note b)	6	5	83	45	23	51
1975	0	0	0	52	17	33
Total	11	8	73	138	58	42

a/Six of the 52 operations were not inspected during 1973.

b/One of the 52 operations was not inspected during 1974.

We found, however, that in most of the 8 cases showing improvement in the violation-per-inspection rate following receipt of noncompliance orders, the improvement was only temporary. As shown in the following table, the violation-per-inspection rate at 6 of the 8 mines comprising these cases subsequently increased by the first 6 months of 1976.

Mine	Violation per inspection rate: 1973	1974	1975	1976
1	24.6	11.1	7.3	19.0
2	79.5	24.2	11.2	19.0
3	67.5	4.2	3.0	8.3
4	(a)	4.0	3.0	3.7
5	29.0	8.2	7.5	6.8
6	(a)	5.6	1.0	2.7
7	54.2	15.6	11.0	2.6
8	0.0	28.6	7.0	11.5

a/Mine not inspected during 1973.

NEED TO IMPROVE THE QUALITY OF MESA'S SAFETY INSPECTIONS

MESA's policy for regular inspections is to visit all active working places, haulageways, escapeways, and associated

surface and maintenance facilities. Mine inspectors are expected to identify all hazards affecting health or safety practices or conditions, evaluate every hazard, and set compliance dates commensurate with the hazard and realistic to correct the violation. Because of the special problems involved in health inspections, these are discussed separately on pp. 73 to 77. We found, however, a wide variance in the degree to which inspectors covered all areas of the operation and identified and evaluated the severity of similar hazards. We believe these inconsistencies, to a large part, were caused by MESA's lack of sufficient guidance to inspectors.

Guidance on standards varies

Inspectors are furnished an inspection manual which deals primarily with administrative procedures such as the preparation of violation notices, closure orders, and inspection reports. They are also provided with limited information on the application of Federal standards to assist them in determining compliance. In a very few cases, MESA has supplemented this application information with more specific instructions on how to determine compliance with standards, such as those which require mine operators to systematically inspect, test, and maintain man-hoisting equipment and to maintain current escape and evacuation plans.

We reviewed MESA's guidance on application of standards and found it to be of limited value. The information was taken from a July 1972 Bureau of Mines publication. At that time the Bureau was responsible for mine inspections and the standards had been enforceable for 2 years. This information has not been revised or updated since that time despite the fact that MESA was created as an independent enforcement agency in May 1973 and the two agencies have over 6 years of combined experience in enforcing the standards.

When applications are given they sometimes are of little use in determining compliance or identifying hazardous conditions, as illustrated in the following examples.

1. Standard .3-20: Ground support shall be used if the operating experience of the mine, or any particular area of the mine, indicates that it is required. If it is required, support, including timbering, rock bolting, or other methods shall be consistent with the nature of the ground and the mining method used.

Application: If, in the inspector's judgement, ground control is inadequate, he shall call for additional ground support. If the inspector finds a difficult problem, it should be brought to the attention of his supervisor for consideration of further evaluation by the Technical Support Group.

2. Standard .19-120: A systematic procedure of inspection, testing, and maintenance of shaft and hoisting equipment shall be developed and followed. If it is found or suspected that any part is not functioning properly, the hoist shall not be used until the malfunction has been located and repaired or adjustments have been made.

Application: The inspection shall include examination and measurements, especially on ropes and head sheaves.

3. Standard .13-21: Except where automatic shutoff valves are used, safety chains or other suitable locking devices shall be used at connections to machines of high-pressure hose lines of 3/4-inch inside diameter or larger and between high-pressure hose lines of 3/4-inch inside diameter or larger, where a connection failure would create a hazard. (See figure 1, p. 57.)

Application: "High pressure" is that pressure sufficient to whip an unrestrained hose.

On the other hand, applications provided for some standards give additional information which is obviously more useful to inspectors in identifying hazards, as illustrated in the following:

Standard .9-22: Berms or guards shall be provided on the outer bank of elevated roadways. (See figure 2, p. 57.)

Application: "Roadways" means active roadways. "Elevated" means those roadways which have a dropoff on one side or both sides.

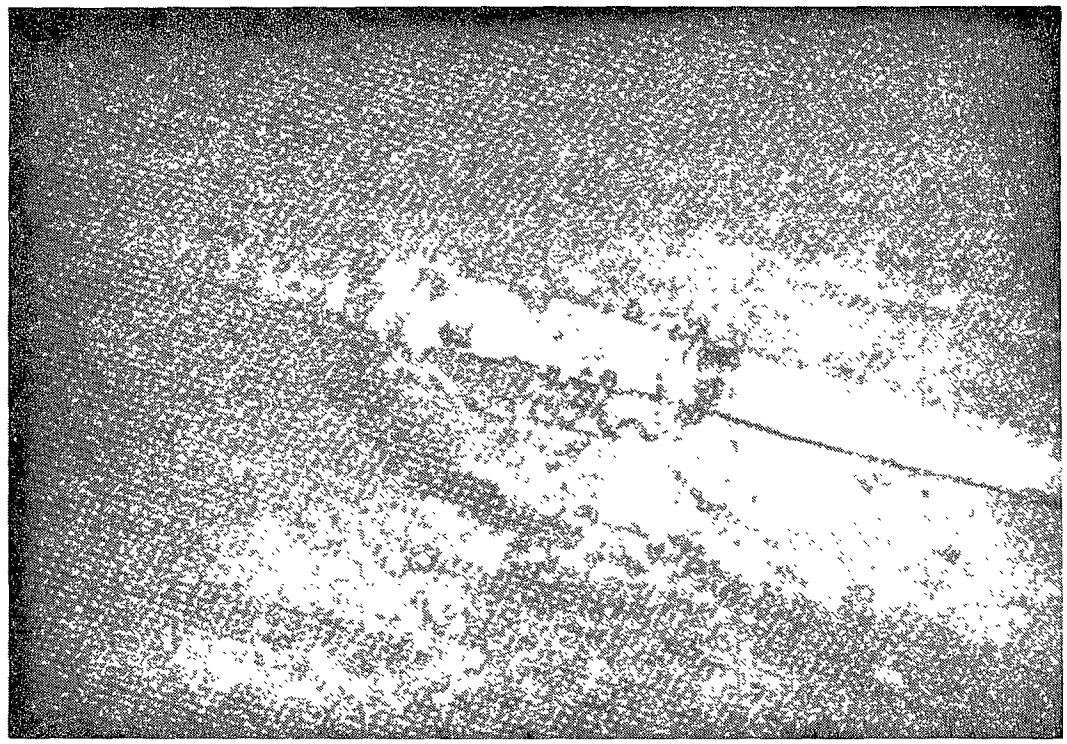


Figure 1. High pressure air hose connection with proper safety chain.

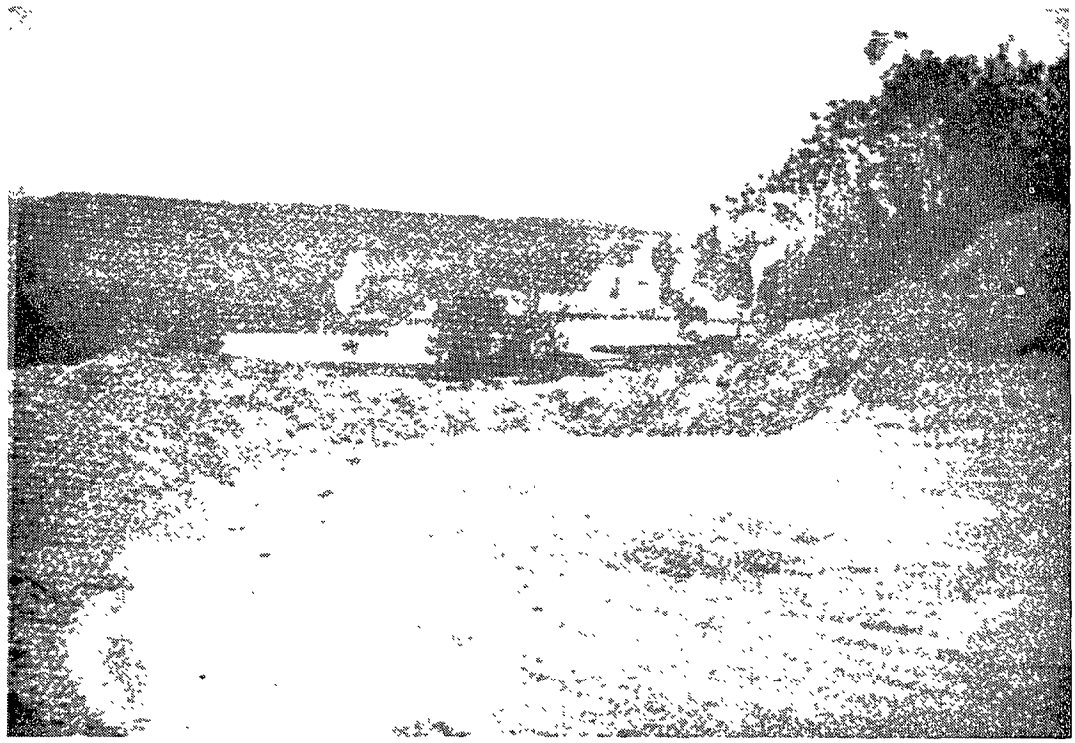


Figure 2. Roadway in quarry with proper berm to restrain vehicles from dropping down hazardous embankments.

> The purpose of berms or guardrails is to restrain vehicles from dropping down hazardous embankments. Berms shall be at least as high as the midaxle height of the largest vehicle using the roadway. They need not be continuous where drainage and snow removal may constitute a problem. Guards of posts and railings shall be substantially equivalent as a restraining medium as berms of earth or waste rock.

We also found that no applications are provided for many of the mandatory standards, including some of the more nonspecific ones. For example, no applications are provided for the following standards, which are among the most frequently cited by inspectors:

--Standard .11-1: "Safe means of access shall be provided and maintained to all working places."

--Standard .9-2: "Equipment defects affecting safety shall be corrected before the equipment is used." (Refers to loading, hauling, and dumping equipment.)

--Standard .12-30: "When a potentially dangerous condition is found it shall be corrected before equipment or wiring is energized."

--Standard .14-26: "Unsafe equipment or machinery shall be removed from service immediately."

--Standard .9-5: "Operators shall be certain, by signal or other means, that all persons are clear before starting or moving equipment." (Refers to loading, hauling, and dumping equipment.)

Experienced inspectors cite more violations

Lacking specific guidance, a determination as to what conditions constitute a hazard under such standards is left largely to the interpretation and judgement of individual inspectors. Accordingly, the degree to which inspectors are able to identify hazards appears to largely depend on their inspection experience. We noted that as of September 1976, about 40 percent of MESA's inspectors had less than 2 years experience. We analyzed the violations which the 54 MESA inspectors we accompanied cited during the period January 1, 1972, through June 30, 1976, and found that the more experienced inspectors tended to cite violations of a greater number of mandatory standards, as shown in the following table.

Months as a MESA inspector	Number of inspectors	Average number of standards cited
12 and under	11	47
13 to 24	17	70
25 to 36	14	87
37 and over	12	107

Excluding inspectors who operate primarily in State plan States where they do not have the authority to issue violation notices, the standards cited by these inspectors ranged from 32 by an inspector with 8 months experience to 155 by an inspector with 22 months of MESA experience. The latter inspector, however, had 8 years of experience as a State mine inspector before joining MESA.

Inconsistent quality of inspection

We accompanied 54 MESA inspectors on regular inspections at 54 mine properties during the period January through June 1976. Fifteen of these properties were located in States under State plan agreements where primary responsibility for enforcement of Federal standards rest with State inspectors. (See p. 8.) During these inspections we found a wide variance in the degree to which inspectors covered all areas of the operation and identified and evaluated the severity of hazards. The following are examples of some of the inconsistencies we noted.

Haulage

Although standards in many categories such as electrical, use of equipment, and fire prevention and control are applied to haulage equipment, standards covering haulage are primarily grouped under the category of loading, hauling, and dumping. These standards apply to a wide range of equipment such as locomotives, trucks, dozers, power shovels, front-end loaders, and conveyors. Many of these standards prohibit specific defects, such as inadequate brakes, or unsafe operating procedures, such as men riding outside of the cabs. Other standards require specific safety devices, such as audible alarms for warning persons that a conveyor will be started when the entire length of the belt is not visible from the start-up switch. Many others, however, are much less specific, such as the standard which requires that equipment defects affecting safety be corrected before the equipment is used.

At the 54 mine properties, we noted that the inspectors usually did not have a listing of the mine operator's major

equipment. Most inspectors either relied on the operator to show them the equipment or they examined whatever equipment they saw during the course of the inspection. In either case, the inspector usually inspected only the equipment actually being used at the time of the inspection. At one large open pit, a union official told us that the mine operator removed one equipment item before the inspector visited the pit because the equipment had known defects. The official said the item was returned to service shortly after the inspector left the pit area.

Some inspectors performed a more thorough inspection of haulage equipment than others. The following shows the contrast in mobile equipment inspections at two similar open pit mines where enforcement was primarily the responsibility of State inspectors under State plan agreements:

--At Mine A the MESA inspector dominated the inspection by examining 14 of the 26 haulage trucks and all other operating mobile equipment. His inspection also included riding with a few truck drivers. The State inspector examined only a few vehicles and did not ride in any trucks. In total, 36 violation notices were issued under loading, hauling, and dumping standards, including 23 violations on haulage trucks.

--At Mine B the MESA and State inspectors did not examine or ride in any of the haulage trucks they encountered while we were present, but examined all other operating mobile equipment they encountered such as dozers, drills, and power shovels. Only one violation notice was issued under loading, hauling, and dumping standards for a broken window on a dozer.

Our analysis of injury information recorded by MESA's Health and Safety Analysis Center (see pp. 7 and 22) for these two mines revealed a large difference in the number of haulage-related injuries. The following table compares the number of haulage-related fatalities and disabling injuries recorded for these mines during the last 4 years (as of November 1976).

Year	Fatalities		Disabling injuries	
	Mine A	Mine B	Mine A	Mine B
1973	0	0	2	3
1974	0	1	0	3
1975	0	2	1	4
1976	0	0	1	4
Total	0	3	4	14

We also noted that the 3 fatalities and 14 disabling injuries relating to haulage represented 60 percent and 36 percent, respectively, of all fatalities and disabling injuries recorded for Mine B during this period.

We observed that inspectors used different methods to identify brake hazards. Brakes on mobile equipment is covered by a specific mandatory standard with applications as follows:

Standard .9-3: Powered mobile equipment shall be provided with adequate brakes.

Application: "Adequate brakes" means brakes capable of stopping and holding a fully loaded vehicle on the maximum grade traveled.

We observed inspectors generally determined the adequacy of brakes on mobile equipment by observing the vehicles stopping. Some observed the vehicles stopping from a distance, while others specifically requested the driver to make a sudden stop. When requesting a sudden stop, some inspectors had the driver stop the vehicle on a slight grade while other inspectors considered this procedure to be dangerous should the brakes fail and had the vehicle stop on a level surface. Also, some vehicles were stopped when fully loaded, while others were stopped empty. In addition to observing vehicles, some inspectors also used some combination of (1) crawling under the vehicle to observe the actuation of the brakes (see photograph on p. 62), (2) checking for proper air pressure and operable pressure guages on the braking system, (3) inspecting disc brake pads for excessive wear, (4) observing how far the brake pedal went down when pressed by the driver, and (5) asking the driver if the brakes were working properly.

We noted that the thoroughness of brake inspection procedures can significantly affect the number of violations which are identified. For example, one inspector who limited his brake inspection to observing vehicles from a distance has cited only 3 brake violations in 13 months as a MESA inspector. Another inspector who requested a sudden stop, checked air pressure gauges, and talked with the drivers, however, has cited 9 violation notices and issued 44 closure orders for inadequate brakes in his 22 months as a MESA inspector.

We also observed that inspectors made different evaluations of the hazards associated with backing up vehicles. One inspector required that vehicles be equipped with both rearview mirrors and audible backup alarms, which sound automatically when the vehicle is put in reverse. Other inspectors considered it to be sufficient if the vehicle were equipped with either rearview mirrors or an audible alarm. Although audible warning

MESA inspector observing actuation of brakes on a front-end loader.

devices on mobile haulage equipment are recommended in an advisory standard, the above inspectors differed as to whether rearview mirrors and/or backup alarms were required by the following mandatory standards:

Standard .9-2: "Equipment defects affecting safety shall be corrected before the equipment is used."

Standard .9-5: "Operators shall be certain, by signal or other means, that all persons are clear before starting or moving equipment."

As noted previously, MESA has not provided inspectors with application statements or other guidance regarding either of these standards.

Electrical

We also observed that inspectors differed in the identification and evaluation of electrical hazards, such as unguarded light bulbs and inadequately grounded electrical hand tools and trouble lights. We were told by one inspector that mandatory Standard .12-30 can be used for requiring guards on light bulbs. Other inspectors did not have this view and said that guards on light bulbs could not be required; they could only be recommended under advisory Standard .12-34. Standard .12-30 is not specific on guards in that it requires that any potentially dangerous condition shall be corrected before equipment or wiring is energized; the advisory standard specifically recommends that lights which may present a shock or burn hazard should be guarded. No applications or other guidance regarding either of these standards is available to inspectors.

We observed instances in which inspectors cited unguarded light bulbs using either the mandatory or the advisory standard and another case where the inspector did not cite them at all. This contrast is illustrated in the following examples which we observed during inspections at three similar mills.

--One inspector, using mandatory Standard .12-30, required guards on all light bulbs which were located where they could reasonably be contacted by persons. (See photograph on p. 65.) He said that in his district, inspectors were instructed by the District Manager to emphasize citing unguarded light bulbs because of a recent fatality caused by this hazardous condition.

--A second inspector, using advisory Standard .12-34, recommended guards on light bulbs. He said that he recommended guards on light bulbs located less than 7 feet from the floor or surface, but he wasn't sure who gave him this instruction.

--A third inspector observed unguarded light bulbs but he did not make any citation or recommendation. He was aware of the advisory standard but did not recommend the bulbs be guarded. As for mandatory Standard .12-30, the inspector said his District Manager had instructed him not to cite any violations under that standard, except closure orders for situations involving imminent danger.

Another example of inconsistent electrical inspections we noted concerned grounding of electrical equipment required by mandatory Standard .12-25, which states:

"All metal enclosing or encasing electrical circuits shall be grounded or provided with equivalent protection. This requirement does not apply to battery-operated equipment.

No further application is provided.

We observed inconsistencies in the degree to which inspectors applied this standard to certain equipment such as electrical hand tools and trouble lights. For example:

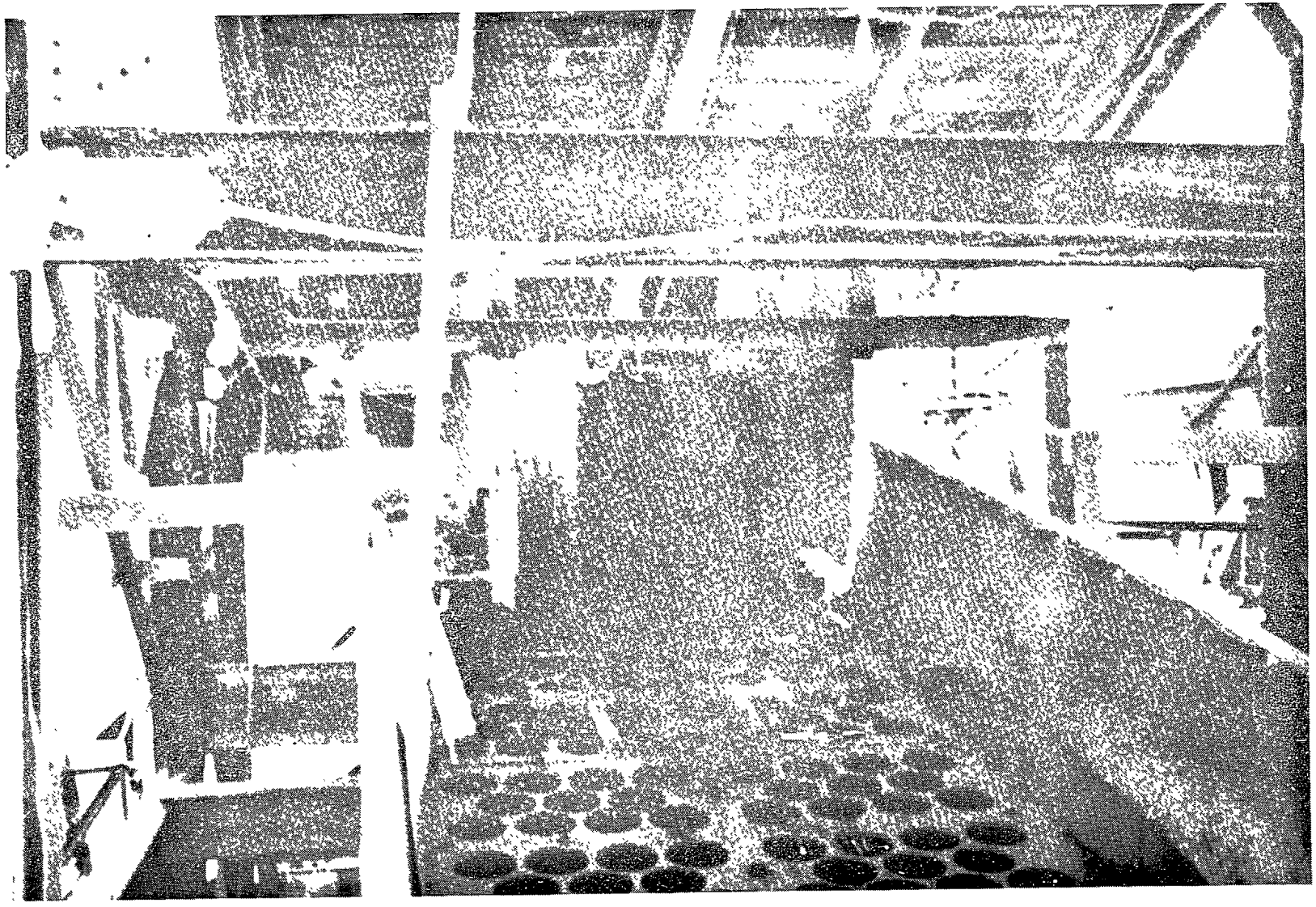
--Some inspectors issued violation notices requiring grounding on portable trouble lights and power hand tools.

--One inspector issued violation notices requiring grounding on portable trouble lights, then withdrew the notices on the basis that the standard did not apply to such equipment.

--One inspector did not examine hand tools for grounding until we pointed out one which was not grounded properly.

We also noted that only a few inspectors actually tested the adequacy of grounding systems. These tests are made with a small device which can be plugged into ordinary electrical outlets to instantly identify a number of electrical deficiencies, including improper grounding and reversed polarity. Many inspectors we observed did not use the device, apparently because MESA does not routinely furnish them.

We found a wide variance in the number of grounding violations cited by these inspectors. For example, one inspector who checked for grounding on power hand tools and tested the adequacy of grounding systems has cited 111 grounding violations in 30 months as a MESA inspector; another inspector who did not follow these procedures has never issued a grounding violation in 26 months as a MESA inspector.



Unguarded light bulb cited by MESA inspector using mandatory Standard 12-30.

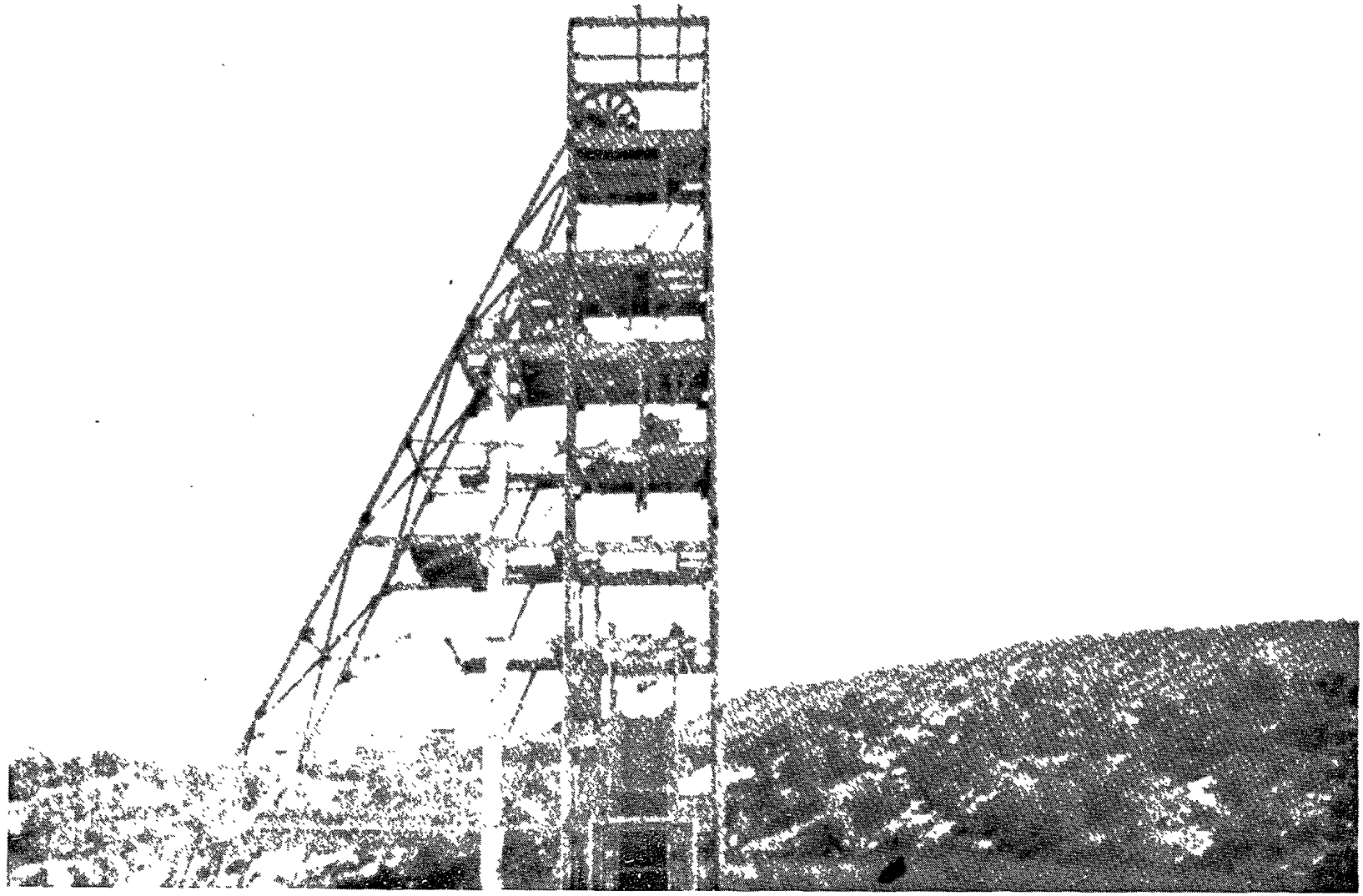
Man hoisting

MESA has 43 mandatory and 48 advisory standards covering hoists and related equipment such as wire rope and conveyances, hoisting and signaling procedures, hoist structures such as shafts and headframes (see photograph on p. 67), and the inspection and maintenance of hoisting equipment and related structures. These standards apply primarily to hoists and structures used to transport persons, but they are also applicable to hoists used solely for materials in situations where such hoists could endanger persons.

As previously noted MESA has provided inspectors with virtually no guidance on the application of these standards or the minimum inspection procedures required to determine compliance. In fact, MESA's only official guidance on hoist inspection procedures instructs inspectors to observe the hoist operator making tests of certain safety devices such as brakes, position indicators, and automatic controls which prevent overspeed and overtravel of the cage. A MESA hoist expert, however, provided us with detailed hoist inspection procedures which he had written, but which have never been officially adopted by MESA or disseminated to inspectors.

In the absence of specific inspection procedures, the thoroughness and quality of hoist inspections appears to depend primarily on the personal expertise and experience of individual inspectors. A MESA official told us, however, that because many inspectors lack hoisting expertise and experience, MESA has tried to assign inspectors with hoisting expertise to those geographic areas with the largest number of mines with manhoisting operations. Due to the small number of these specialists, however, it is impossible for them to attend all regular inspections. As a result, much of the responsibility for inspecting hoists remains with the inspector who regularly inspects the rest of the mine.

The thoroughness of the hoist inspections which we observed varied considerably. In general, the inspectors with less hoisting expertise and inspection experience conducted less thorough inspections than more experienced inspectors. For example, at one mine we observed that the inspector gave the hoist a very superficial examination during which he failed even to request that the operator test the hoisting controls and safety devices, as required by the MESA procedures. Upon discussing this with the inspector, he told us that he had received only 8 hours of training in hoist inspections and did not feel he had sufficient expertise to inspect the hoist adequately. He said an inspector with more hoisting experience would examine the hoist during the next inspection. We noted



Headframe for underground mine hoist under construction.

that this inspector has issued only one closure order and one violation notice based on the hoisting standards in 22 months as a MESA inspector.

A supervisory inspector at another mine examined the hoist and said he was not sure if certain of the safety devices were functioning properly. At his request, another inspector, specializing in hoists, returned to the mine 4 times during a 6-month period and cited 18 hoisting violations, 1 of which was an imminent danger closure order. The inspector specializing in hoists has issued 63 violation notices and closure orders based on the hoisting standards in 54 months as a MESA inspector.

Better monitoring of inspection activities needed

In addition to the computerized information system for injury and illness statistics discussed in chapter 3, MESA maintains a computerized system for recording inspection data called the Management Control System. The wide range of information in this system, if fully utilized, could improve MESA's assessment of both its own and State plan inspection activities.

Information available in the Management Control System includes the following data reported by inspectors:

--Number, location, and types of inspections conducted.

--Amount of time spent on each regular and spot inspection.

--Number of closure orders, violation notices, and advisory standard recommendations with reference to the specific standard violated.

--Length of time allowed for abatement and the number and time length of extensions for abatement of each violation notice.

All of this information can be summarized to provide nationwide totals for periodic and annual reports and to evaluate each mine, inspector, State, subdistrict, and district within MESA's jurisdiction. One purpose of the system is to provide MESA with information for assessing how effectively field organizations execute their enforcement and State plan monitoring functions.

We noted, however, that some information is not summarized in sufficient detail to identify certain possible inspection problems. For example, one summary to identify the standards most frequently cited by inspectors was done only on a nation-

wide basis. This summary showed that in 1975 59 percent of the closures were based on only 10 standards and that four of these standards, plus 6 more, were the basis for 53 percent of the violations notices issued. The two tables below show which of the 421 mandatory standards in effect at that time were cited most frequently in 1975.

Standards Cited Most Frequently in Closure Orders During 1975

Standard numbers	Standards cited	Total closure orders issued	Orders as a percent of total issued
14-1	Providing guards on exposed moving machine parts	549	17
9-3	Providing adequate brakes on powered mobile equipment	297	9
11-1	Providing safe access to work places	220	7
3-22	Examining and testing ground conditions	201	6
11-2	Providing safe crossovers, stairways, elevated ramps, etc.	170	5
3-5	Working near or under dangerous banks	134	4
9-2	Correcting defective equipment before use	118	4
12-30	Correcting dangerous conditions before equipment or wiring is energized	106	3
11-12	Protecting openings above, below, or near travelways	65	2
12-16	De-energizing electrical equipment before work is done on it	58	2
Total		1,918	59

Standards Cited Most Frequently in Violation Notices During 1975

Standard numbers	Standards cited	Total notices issued	Notices as a percent of total issued
14-1	Providing guards on exposed moving machine parts	18,643	21
11-2	Providing safe cross-overs, stairways, elevated ramps, etc.	4,545	5
11-1	Providing safe access to working areas	3,984	5
12-32	Using secured inspection and cover plates on electrical equipment and junction boxes	3,518	4
11-12	Protecting openings above, below, or near travelways	3,421	4
9-22	Providing berms or guards on elevated roadways	3,404	4
4-2	Posting no smoking signs near fire hazards	3,009	3
12-25	Grounding metal enclosed or encased electrical circuits	2,841	3
16-5	Securing compressed and liquid gas cylinders	1,908	2
5-50	Limiting exposure to noise to permissible levels	1,885	2
Total		47,158	53

No further summaries were made to determine if these results were due to an unusual concentration on a few standards by certain inspectors, States, subdistricts, or districts. We found, however, that such information is useful in identifying potential problems in the enforcement of standards at these various levels.

At our request, MESA modified their computer program to summarize this data for each MESA inspector and for each State plan State. These summaries provided data on each standard and major standard category; the number of notices and orders issued, abated, extended, and withdrawn; as well as the frequency with which notices were cited. The summaries for each inspector included all violations cited from January 1, 1972, through June 30, 1976. For those becoming inspectors after January 1, 1972, all violations they had cited were included. Violations cited before January 1, 1972, are not recorded in the system. The summaries for each State plan State included all violations which State inspectors cited during the same period or from the effective date of those agreements made after January 1, 1972.

By comparing these statistical summaries of individual inspectors with our own conclusions from on-the-spot observations, we found that such summaries provide a useful tool for evaluating the performance of inspectors. We found, for example, that the frequency with which inspectors cite a given standard can indicate (1) the thoroughness of the inspection procedures which they used to determine compliance and (2) differences in their interpretations of what is required to comply with the standard.

We also found that the frequency with which inspectors cite more technical categories of standards, such as hoisting, can indicate the lack of experience or expertise necessary to adequately identify violations. In addition, we found that a major factor in an inspector's ability to identify hazards appears to be the amount of inspection experience he has had as evidenced by the fact that more experienced inspectors tend to cite a greater number of standards than do less experienced inspectors.

We also analyzed the summaries which MESA provided at our request for the 5 States which were operating under State plan agreements at the conclusion of our mine visits in June 1976. Although we did not specifically evaluate the enforcement programs of these States, our analyses indicate that they may also be experiencing some of the same enforcement problems as those which we found in MESA. For example, we found that these States also used few standards as the basis for a large percentage of the violation notices they issued during the 4.5 year period. Ten standards were the basis for about 44 percent of their violation notices and 19 standards were the basis for about 57 percent. These same standards were the basis for about 47 percent and 62 percent, respectively, of the violation notices issued nationwide during 1975.

A further analysis of these summaries also revealed that the five States varied significantly in the frequency with which they cited certain of these standards. For example, Standard .14-1, providing guards on exposed moving machine parts, was the basis for about 28 percent of the violation notices issued by Virginia, but only about 11 percent of those issued by Utah. Standard .12-25, grounding metal enclosed or encased electrical circuits, was the basis for about 3 percent of New Mexico's violation notices, but less than 0.5 percent of Arizona's.

We also noted that MESA has recognized the need for other inspection statistics to better monitor and evaluate State plan enforcement activities. In October 1976 it announced the implementation of new procedures designed to provide a more objective means of evaluating the performance of State inspection agencies through the analysis of certain inspection data reported to MESA and maintained in its Management Control System.

Under these procedures, the Management Control System periodically generates five separate reports to assist MESA district managers in measuring the State's inspection activity and determining how well they are carrying out the intent of their State plan agreements. These reports show the following for each State plan State.

1. Unabated violation notices and closure orders for each mine including the standard violated, date issued, last compliance date specified, and number of extensions granted.

2. Date of last State regular inspection, spot inspection, and special survey; number of each type of State inspections conducted; and number of joint MESA/State inspections conducted at each mine.

3. Number of State regular inspections conducted each quarter at each mine, grouped according to type of mine.

4. Comparison of average number of violation notices cited per inspection with and without the presence of MESA inspectors.

5. Comparison of the number of regular and spot inspections conducted at each mine by MESA and the State, as well as the number of unabated violation notices and closure orders issued by each.

GREATER EMPHASIS NEEDED ON ENFORCING CERTAIN TYPES OF STANDARDS

During our review we found that MESA has put little emphasis on enforcing mandatory standards relating to health or training of workers. Despite substantial increases in the number of mines sampled for hazardous levels of health contaminants during 1975, only a small percentage of the operations subject to the act were sampled that year. We also found that MESA had not sampled certain contaminants, such as dust and noise, between 1973 and 1975 at many of the operations we visited. Also, most of the inspectors we observed did not verify whether operators had provided the training which MESA's regulations require.

Enforcement of health standards

As discussed in chapter 3, MESA does not have reliable statistics on the number of occupational illnesses in the metal and nonmetallic mining industry (see pp. 23 to 24). Often, neither the miner nor his doctor realizes the possible relationship between an illness and the miner's occupation. Studies on this subject which have been made, however, indicate that serious health problems exist in the industry.

A study by the Bureau of Mines and the U.S. Public Health Service reported that among metal and nonmetal workers about 3.4 percent (8,500 persons) have some form of silicosis. According to the same study, excessive noise had created a hearing impairment in at least 25 percent (about 60,000 persons) of the workforce. It was estimated that this figure will increase to 65 percent by the time workers reach the age of 65. The study also stated that uranium miners have a non-violent death rate of 232 per 100,000 above the normally expected rate of 586 per 100,000 persons per year.

Another study conducted by the U.S. Public Health Service on underground metal miners indicated that accidents accounted for 31 deaths per 100,000 persons per year above the normally expected rate of 224, while illnesses accounted for 1,244 deaths per 100,000 persons per year above the normally expected rate of 2,056. Furthermore, past and recent studies have shown that underground miners have a lung cancer rate that is 2 or 3 times that normally expected. Although the exact cause of lung cancer has not yet been discovered, several different agents are suspected.

According to MESA, certain categories of mines have health hazards which are recognized as being potentially serious. These include asbestos mines, uranium mines, talc

mines (which have asbestos contaminants), and mines where the dust contains a large fraction of free silica. In addition, many additional toxic chemicals are now being introduced into mining processes for concentration, cleaning, and other purposes.

The basic purpose of MESA's health inspections is to determine compliance with mandatory health standards. Since 1974, MESA's mandatory standards have required, among other things, that employees' exposure to a number of airborne contaminants (such as dust, gases, mists, and fumes), noise, and radiation (applies only to underground mines) not exceed specified maximum limits. According to MESA, every mine must be inspected at least once annually to achieve the act's objective of reducing accidents and occupational illnesses. In addition, frequent health inspections at certain types of operations are necessary to insure compliance with applicable permissible exposure limits. Such operations include (1) those where airborne dust contains a large percentage of silica or asbestos, (2) those found to be grossly in violation of permissible noise exposure limits, and (3) those with radiation contaminants. Noise control is just being introduced to the industry, however, and noise measurements are still being made for the first time at some operations.

During 1975, the number of MESA inspections during which contaminant samples were taken increased substantially over 1974. For example, 1,825 inspections involved dust sampling and 1,957 noise sampling--an increase of more than 150 percent and 200 percent, respectively. Despite these increases, however, only a small percentage of the 14,357 operations subject to the act in 1975 were sampled during that year. The number and percent of operations at which one or more personal exposure samples were collected is shown in the following table.

Contaminant	Mines sampled	
	Number	Percent
Dust	902	6
Noise	883	6
Other (note a)	121	1

a/Includes a number of less frequently encountered air contaminants such as arsenic, asbestos, lead, and welding fumes.

We analyzed MESA's inspection records for the 55 mines we visited and found that MESA had not sampled for certain

contaminants at many of them during the period 1973 through 1975. The extent of MESA's health sampling activities at these 55 operations during the 3-year period is summarized in the following table.

Contaminant	Mines sampled	Mines not sampled	Mines with overexposures	Number of overexposures cited
Dust	28	27	23	95
Noise	23	32	21	91
Radiation (note a)	16	9	2	12
Arsenic	3	52	0	0
Welding fumes	0	55	0	0

a/Exposure limits for radiation apply only to underground mines (25 of the 55 operations we visited). Of these, only 2 were uranium mines, and they were the 2 with overexposures.

We also asked the operators of these 55 properties to provide us with information on the extent of their company contaminant sampling. Forty-six of them provided us with the information, but nine declined. We found that many of the 46 operations did not routinely sample for noise and dust contaminants and that MESA had not sampled many of these operations either. The number of operations which did not sample routinely, and the number of such operations which MESA had not sampled during the period 1973 through 1975, is shown in the following table.

Contaminant	Operations without company sampling	Operations with neither company nor MESA sampling
Dust	25	15
Noise	24	17

Operators of 19 of the 25 underground mines we visited provided us with information on their company sampling. Although 14 of the 19 said they did not routinely sample for radiation, we found that MESA had sampled all but 6 of them at least once during the period 1973 through 1975 and had found no overexposures. Also, both of the underground uranium mines we visited said they routinely sampled for radiation.

In its fiscal year 1977 budget justification, MESA reported to the Congress that its health program was still in a developmental stage and that available resources did not permit a health inspection program which assured compliance with existing regulations. According to MESA, its current program is limited primarily to sampling for exposure to hazardous levels of dust, noise, and radiation. Also, through 1975, about 100 inspectors (about one-third of the inspection force) had been trained in the basic understanding of industrial hygiene and sampling methods. MESA also reported that, without additional personnel and funding, increases in its health inspection activities could not be made without adversely affecting its safety inspection efforts.

During our mine visits, we noted that inspectors were using from 3 to 10 battery-operated air pumps for dust sampling and from 2 to 10 dosimeters for noise sampling. Some of those inspectors told us that the number of inspections involving health sampling is limited by the equipment that is available in their subdistrict or field offices. One inspector said his office had 5 air pumps and 5 dosimeters for use by 5 inspectors. An inspector we accompanied at another mine could not take samples to determine abatement of 5 outstanding noise violations because the equipment assigned to his office was being used by another inspector.

To upgrade its health inspection activities, MESA requested additional funds for fiscal year 1977 to institute a pilot comprehensive health inspection program at about 600 of 4,000 operations targeted as being most likely to be in violation of promulgated standards. Under the proposed program, selected mines would be inspected to determine quantities of all known toxic substances to which miners are exposed, and a larger proportion of workers would be sampled to better identify high-risk individuals. According to MESA, the proposed program would provide workers at these operations with at least a reasonable degree of protection against occupational illness.

Enforcement of training standards

Seven mandatory standards that require training for workers in the noncoal mining industry have been promulgated. The mandatory training includes first aid, use of self-rescuer equipment, mine emergency and rescue procedures, and indoctrination of new employees. There are no mandatory standards requiring accident prevention training except for the indoctrination of new employees. Even that standard provides no specific requirements on the length of time or subject matter to be covered during the indoctrination. As shown on the next page, MESA enforcement personnel issued 1,748 violations for noncompliance with the standards in 1974 and 1,310 violations in 1975.

Standard numbers	Number of violations cited					
	1974			1975		
	Notices	Orders	Total	Notices	Orders	Total
18-10	1,333	1	1,334	1,037	10	1,047
18-28 (note a)	126	1	127	68	0	68
4-74 (note a)	35	0	35	12	0	12
4-73 (note a)	74	2	76	62	0	62
4-70 (note a)	16	0	16	11	0	11
4-48 (note b)	135	1	136	85	0	85
18-6	24	0	24	25	0	25
Total	1,743	5	1,748	1,300	10	1,310

a/Applies to underground operations only.

b/Applies to surface operations only.

Between September 1974 and February 1975, MESA's Office of Internal Affairs conducted an internal review of the education and training activity. It reported that the enforcement of the training standards was haphazard at best and that the coordination between the enforcement and the education and training activities was all but nonexistent. It recommended that the enforcement group should immediately assume responsibility for coordinating with the education and training activity and that it take more aggressive action to insure operators' compliance with the mandatory training standards. In December 1975 the Acting Assistant Administrator, Education and Training, instructed all training center chiefs to immediately start meeting regularly with enforcement group district managers to discuss enforcement of mandatory training regulations and mines not in compliance.

Between January and June 1976, we accompanied MESA's inspectors on their regular inspections at 54 mining properties, including 25 underground mines. We found that most of the inspectors were still not verifying whether the operators were providing the required training. Although several inspectors asked operators if they had provided required training, we observed only two instances where the inspectors reviewed the operators' training records to determine what training had been provided.

Only one inspector wrote violation notices for noncompliance with the training standards. In that instance, the operator

told the inspector that no mine emergency or first-aid training had been given for years. The inspector wrote three violation notices requiring the operator to provide (1) instruction on the use of self-rescuers as required, (2) mine rescue training as required, and (3) first-aid training for selected supervisors and interested employees. In another instance, we visited an operation which had 69 employees. The operator told us that none of the employees had received first-aid training. The inspector did not make any inquiries as to whether the required training had been provided.

Only one standard requires the operators to submit their training records to MESA. Under this standard the operators are required to give all of their underground employees annual training in the use of self-rescuers and mine rescue procedures. We reviewed the training records submitted by 21 of the underground operations we visited. We found that only 5 of the 21 operations reported completion of the required training during both calendar years 1974 and 1975. A violation notice was issued by MESA at only 1 of the 16 operations that did not report the required training.

In November 1976 MESA made a similar analysis for all noncoal underground operations. They found that 59 percent of the active underground operations had not yet reported completion of one or both of the courses for 1976. The results of MESA's analysis for each training center is shown below.

	Number of active underground operations		
Training centers	Total	Not reporting training	Percent not reporting training
Beckley	9	4	44
Lexington	23	13	56
Pittsburgh	39	20	51
Norton	6	5	83
Birmingham	33	18	54
Chicago	104	39	38
Dallas	65	21	32
Denver	156	123	79
Boulder City	60	47	78
Albany	21	13	62
Total	516	303	59

MESA subsequently had its field offices check with all underground mines which had not reported completion of the two courses to determine if the courses had been provided. They found that at many of these operations employees had received the training but the training had either not been

reported to MESA as required or had not been entered into MESA's computer. Although MESA developed a special program to monitor compliance with the standard requiring these two courses, it advised us as of June 1977 that it was not sure if these recordkeeping problems had been resolved. At that time, MESA was also considering establishing a new procedure to assure that all underground workers receive the two courses and that the training records are entered into MESA's computer.

CONCLUSIONS

We believe that hazards must be identified and corrected on a continuous basis if they are to be permanently reduced. Since MESA inspectors cannot be at a mine every day, it is essential that mine operators assume this responsibility. We found that most of the operations we visited, however, continued to be cited repeatedly for the same type of hazards and that violation notices and noncompliance closure orders were virtually useless in preventing this from happening. Except in imminent danger situations, closure orders cannot be issued unless the operator fails to correct a cited hazard within the allotted time. As long as this is done, an operator can violate the same standard again and MESA can do nothing more than require correction by issuing another violation notice. Obviously, this process can be continued indefinitely with little or no disruptive effect on the operation.

It seems reasonable to expect that, after a considerable number of inspections and citations, the operator should be aware of the types of hazards present at his operation and should take action to correct such hazards as they occur, rather than wait for MESA to identify them and require correction. We believe MESA needs additional authority to require operators to assume this responsibility. Although we cannot say with certainty what type of enforcement method would be most effective, we noted that MESA does not now have authority to issue closure orders for repeated violations or to assess monetary penalties.

We believe the wide variance we observed in the thoroughness of inspections and in the number and severity of identified hazards was caused, to a large degree, by the lack of sufficient guidance to inspectors. In the absence of adequate guidance, an inspector's ability to identify and evaluate hazards appears to depend largely on his personal expertise and prior inspection experience. Further, we believe MESA could improve the assessment of its inspection activities and those of State plan States through more comprehensive and detailed analysis of inspection statistics maintained in its computerized Management Control System.

In addition, we believe the level of MESA's enforcement activities related to health and training standards has not been adequate to assure compliance with existing mandatory standards and to provide workers with at least reasonable protection against occupational illnesses.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

To improve the effectiveness of MESA's enforcement activities, we recommend that the Secretary of the Interior instruct the Administrator, MESA, to:

--Provide inspectors with guidance on at least the minimum procedures which are necessary to insure thorough coverage of all aspects of a mining operation, and adequate identification and evaluation of all safety hazards.

--Place greater emphasis on enforcement of mandatory health and training standards.

--At least annually, assess the quality of the enforcement activities of inspectors, subdistricts, districts, and State plan States through analysis of appropriate inspection statistics available in the Management Control System.

RECOMMENDATION TO THE CONGRESS

To improve the effectiveness of MESA's inspections and to help require that mine operators reduce hazards on a more permanent basis, we recommend that the Congress amend the Federal Metal and Nonmetallic Mine Safety Act to give MESA authority to levy appropriate penalties, such as on-the-spot closure orders and/or monetary fines, in cases where mine operators repeatedly violate the same standards.

We noted that legislation pending in the Congress (S.717) contains provisions which would implement this recommendation. If enacted, this legislation would:

--Require issuance of closure orders in cases where mine operators have established a pattern of significant and substantial violations (S.717, sec. 201; proposed sec. 105(d)).

--Authorize District Courts to prescribe appropriate remedies, including injunctions, in cases where mine operators are engaged in a pattern of violations which

constitutes a continuing hazard to their employees (S.717, sec. 201; proposed sec. 109(a)(2)).

According to the report of the Senate Committee on Human Resources accompanying the bill, this provision is intended to provide an enforcement sanction to insure continued compliance after violations cited by the inspector have been abated.

--Require the assessment of appropriate civil penalties of up to $10,000 for each violation of any standard (S. 717, sec. 201; proposed sec. 111(a)).

AGENCY COMMENTS

The Department of the Interior agreed with our recommendations. It noted that it has endorsed many of the features in the legislation pending in the Congress which would provide more effective authority for eliminating hazards permanently. The Department also stated that the need to upgrade the overall quality of its inspection force has long been recognized. Although it doubted whether inspectors could ever become equally proficient in dealing with every hazard, the Department agreed that written guidance to inspectors regarding adequate inspection procedures should improve MESA's enforcement activities and augment its established policies, such as headquarters staff monitoring of mine inspections and annual, 2-week training sessions for all inspectors.

CHAPTER 6

MORE ACCIDENT PREVENTION TRAINING NEEDED

The 1966 act directs the Secretary of the Interior to develop education and training programs designed to assist the noncoal mining industry in the recognition and prevention of accidents and unsafe or unhealthy working conditions. Research conducted for the Bureau of Mines has shown that accident prevention training is the most effective type of training for reducing injury frequency rates, especially when it is directed towards specific hazards and individual jobs. Although recommended by an advisory standard, accident prevention training for the noncoal industry is not required by MESA's mandatory standards.

We found that the vast majority of MESA-sponsored training in the noncoal industry involves courses which are mandated by MESA's standards--first aid, use of the self-rescuer (emergency breathing apparatus for use in underground mine fires), and mine emergency and rescue procedures. Although important, this type of training addresses problems resulting from accidents rather than problems that cause accidents.

Little emphasis is put on accident prevention training because cooperative instructors (industry personnel certified to teach MESA courses) conduct the vast majority of MESA-sponsored courses, but they rarely teach accident prevention courses because they are not required by MESA's mandatory standards. As a result, MESA must provide most accident prevention training, but its instructional staff is severely limited.

MESA should promulgate appropriate standards requiring accident prevention training for all noncoal mine workers. Although MESA has proposed such standards, it appears that it will be some time before they become effective. In the interim, MESA should put special emphasis on encouraging accident prevention training on a voluntary basis.

ACCIDENT PREVENTION TRAINING CAN BE EFFECTIVE

In June 1975 a private firm under a research contract with the Bureau of Mines completed a study and evaluation of all available education and training programs in both the coal and noncoal mining industries. The study, released by the Bureau in January 1976, concluded that accident prevention training is the most effective type of training for reducing injury frequency rates. It also found that accident prevention training directed to specific hazards and jobs tended

to reduce accidents more effectively than accident prevention training of a general nature. According to the study, this view was also shared by MESA and mining company training officials. The study therefore recommended that more training be given in (1) techniques of identifying and eliminating hazards and (2) prevention of specific job-related accidents.

The experience of one high-injury underground mine and mill illustrates the potential effectiveness of specific, job-related accident prevention training. During 1973, 1974, and 1975, this operation experienced disabling injury frequency rates of 65.15, 89.10, and 60.30, respectively. These rates were far higher than the national averages for all mines during these years of 19.09, 19.40, and 18.08, respectively. In late 1975, the mine management instituted a training program whereby first-line foremen provided job-related accident prevention training to men working for them, with MESA providing training in certain specialized areas in which the foremen lacked expertise. The operation's disabling injury frequency rate subsequently dropped from 60.30 for 1975 to 18.92 for the first nine months of 1976.

GREATER EMPHASIS ON ACCIDENT PREVENTION TRAINING NEEDED

According to MESA's records, almost 265,000 noncoal mine employees attended training courses taught by either MESA or cooperative instructors (industry personnel certified to teach MESA's courses) during the period January 1973 through June 1976. However, since an employee is counted in the statistics each time he attends the same or a different course, this does not mean that 265,000 different employees were trained. MESA does not compile this information.

We found that most of the attendance during these years involved courses required by MESA's standards. According to the 1975 research study sponsored by the Bureau of Mines, discussed previously, these courses are taught more frequently because they are required, readily available from several sources, and easy to carry out. As shown in the following table, a relatively small percentage of the total attendance involved voluntary courses such as accident prevention. In fact, the attendance at accident prevention courses during the 3.5-year period of 31,126 represented less than 12 percent of the total attendance at MESA-sponsored courses during that period. Even if these were 31,126 different persons, it would mean that more than 87 percent of the roughly 248,000 employees in the noncoal industry received no MESA-sponsored accident prevention training at all during the 3.5 years.

ATTENDANCE AT MESA-SPONSORED NONCOAL TRAINING COURSES

	1973		1974		1975		1976 (note a)	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Mandatory courses:								
Use of self-rescuer	17,122	34.3	29,437	33.8	22,860	28.1	11,993	25.7
Mine rescue and emergency procedures	13,401	26.9	26,286	30.2	22,123	27.2	11,341	24.3
First aid	11,494	23.0	18,981	21.8	21,365	26.3	15,168	32.6
Subtotal	42,017	84.2	74,704	85.8	66,348	81.6	38,502	82.6
Voluntary courses:								
Accident prevention	4,099	8.2	8,429	9.7	11,924	14.6	6,674	14.3
Occupational health hazards	127	.3	216	.3	190	.2	27	.1
Testing for oxygen deficiency	3,654	7.3	3,674	4.2	2,892	3.6	1,386	3.0
Subtotal	7,880	15.8	12,319	14.2	15,006	18.4	8,087	17.4
Total	49,897	100.0	87,023	100.0	81,354	100.0	46,589	100.0

a/January 1, 1976, through June 30, 1976.

We also found that there was a similar lack of emphasis on accident prevention training at high-injury operations. We reviewed MESA's training records for 55 operations selected at random from those that have consistently reported injury frequency rates above the national average since 1973. We found that during the period January 1, 1973, through June 30, 1976, only about four percent of the employees attending MESA-sponsored courses at these 55 operations received accident prevention training. Attendance at the various types of courses at these operations for the 3.5-year period is shown in the following table. Together, these 55 operations reported 23 fatalities and about

2,500 nonfatal disabling injuries to MESA during calendar years 1973 through 1975--619 fatal and nonfatal disabling injuries in 1973, 906 in 1974, and 976 in 1975.

ATTENDANCE AT MESA-SPONSORED TRAINING COURSES AT 55 SELECTED HIGH-INJURY NONCOAL OPERATIONS--1973 THROUGH JUNE 1976

Course	Number attending	Percent of total
Accident prevention	852	4.1
Occupational health hazards	38	.2
Testing for oxygen deficiency	1,424	6.8
Use of self-rescuer	9,439	45.0
Mine rescue and emergency procedures	7,989	38.1
First aid	1,214	5.8
Total	20,956	100.0

We found that little emphasis has been put on accident prevention training in the noncoal industry because MESA, with its limited instructional staff, must rely primarily on industry cooperative instructors to conduct its courses. These instructors, however, rarely teach accident prevention courses because the courses are not required.

During fiscal year 1976, MESA had only 75 instructors to provide training courses for both the coal and noncoal industries. These instructors were located at 10 MESA training centers and 24 field offices throughout the country. MESA estimated, however, that during the year these instructors had an average of less than 15 percent of their time available for noncoal training. This equates to less than 12 full-time instructors to provide training for an industry which consists of well over 12,000 active operations employing about 248,000 persons.

MESA, however, uses cooperative instructors to supplement its own resources in the training of miners. Cooperative instructors are individuals from the mining industry who have been trained and authorized to teach MESA-approved courses

and to use MESA's computer system to issue certificates of attendance. In addition to supplementing MESA's training resources, the cooperative instructor program gives mining operations the flexibility of conducting MESA courses at their convenience to avoid interference with production schedules.

Before an individual can become a cooperative instructor, he must:

--Receive instruction from MESA on course content, teaching methods, training records, available MESA training aids, reference material, and audio-visual supplements.

--Practice teaching assigned topics before the class members and MESA's training instructor.

--Teach a class within 1 year after completing MESA's instructor training course.

As of January 1976 MESA had a total of 6,067 cooperative instructors in both the coal and noncoal industries. We could not determine how many of the cooperative instructors were in the noncoal industry because MESA does not maintain this information. MESA's Assistant Administrator for Education and Training advised us, however, that there is actually a surplus of cooperative instructors at many large mining operations but a shortage among small operations. According to this official, cooperative instructors teach over 90 percent of MESA-sponsored courses, yet many of those who are certified do not teach any courses at all. In this regard, we found that about one-third of MESA's cooperative instructors (about 2,000 of about 6,000) did not teach any courses during calendar year 1975. According to the Assistant Administrator, a surplus at many large operations exists because MESA has made it easy for mining companies to get personnel certified as cooperative instructors by training and certifying them at no cost. As a result, he believes many companies have had "reserve" instructors certified.

We found, however, that cooperative instructors rarely conduct accident prevention courses. We reviewed MESA's training records for the 55 operations which we visited during our review and found that a total of 1,067 employees at these operations attended MESA-sponsored accident prevention courses during the period 1973 through June 1976. Less than 10 percent of these employees (104), however, were trained by cooperative instructors. The remaining 90 percent (963 employees) were trained by MESA instructors.

We discussed this matter with MESA's Assistant Administrator for Education and Training who advised us that cooperative instructors generally conduct little accident prevention training because it is not required by MESA's mandatory standards. As a result, the primary responsibility for such training has rested with MESA. As previously discussed, however, MESA has only limited instructional staff available to conduct noncoal training courses.

The ultimate solution to this situation is, in our view, to make accident prevention training mandatory. According to MESA, this would force cooperative instructors to provide the training because mine operators are responsible for providing mandatory training and MESA regulations specify that instructors who provide mandatory courses must be trained and certified by MESA. In this regard, MESA headquarters officials advised us in April 1977 that they were in the process of promulgating mandatory standards which would require noncoal mine operators to provide accident prevention training tailored to each specific job at their operation. The proposed standards would require that this training be provided to every employee before he begins working at a new job, regardless of his prior mining experience. As of that date, the proposed standards were in the early stages of development and had not been presented to the Advisory Committee for consideration. The MESA officials estimated that it will be at least 2 to 3 years before the standards are actually promulgated.

Considering its importance, we believe MESA should actively encourage accident prevention training on a voluntary basis pending promulgation of the mandatory standards. One means of accomplishing this would be to have MESA inspectors formally recommend accident prevention training by citing the appropriate MESA advisory standard during their inspections. In this regard, we noted that this advisory standard was cited only 106 times during all of calendar year 1975. MESA could also make a special appeal to cooperative instructors stressing the importance of accident prevention training and encouraging them to conduct such courses at their operations. MESA's Assistant Administrator for Education and Training advised us that MESA stresses the importance of accident prevention training to cooperative instructors primarily through their training to qualify as cooperative instructors. He said, however, that he doubted whether any additional encouragement would be effective or worthwhile.

CONCLUSIONS

Research has shown, and MESA and the mining industry agree, that accident prevention training can be an effective

tool for reducing accidents and injuries. Although the 1966 act directs that this type of training be developed, MESA has not promulgated standards which require that it be provided. Cooperative instructors, who provide the vast majority of MESA training courses, have provided little accident prevention training voluntarily. Rather, they have concentrated heavily on required courses which, although important, are not designed to correct conditions which cause accidents. As a result, the primary responsibility for accident prevention training has fallen to MESA; but its ability to provide training has been severely limited due to its small instructional staff.

In our opinion, a strong emphasis on accident prevention training in the noncoal industry is needed if training is to make a significant contribution towards reducing accidents and injuries. We believe the achievement of the necessary emphasis on accident prevention training will require that MESA make such training mandatory for all of those working in the industry through the promulgation of appropriate mandatory standards. This course of action would also eliminate the need for MESA to substantially increase its instructional staff to provide the necessary emphasis by making mine operators responsible for providing the training to their employees.

MESA is in the process of promulgating such standards, but it will be quite some time before they will become effective. In light of the importance of this training, we believe that in the interim MESA should make every effort to encourage accident prevention training on a voluntary basis.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

To help make training more effective in reducing accidents and injuries in the noncoal mining industry, we recommend that the Secretary of the Interior instruct MESA to:

--Promulgate appropriate mandatory standards requiring mine operators to provide accident prevention training to all their employees.

--Put special emphasis on encouraging accident prevention training on a voluntary basis until such time that the appropriate mandatory standards become effective.

We noted that legislation pending in the Congress (S. 717) contains provisions generally consistent with these recommendations. If enacted, this legislation would:

--Require each mine operator to have an approved safety training program for new miners and miners reassigned to a new task. Such programs must include training in hazard recognition and the health and safety aspects of the particular job to which a miner is assigned (S. 717, sec. 201; proposed sec. 116(a)).

--Require mine operators to certify each miner receiving training and keep a copy of the certification available for inspection (S. 717, sec. 201; proposed sec. 116(c)).

--Authorize inspectors to order removed from a mine any miner found to be at work who has not received the training required under the operator's approved plan (S. 717, sec. 201; proposed sec. 105(f)).

AGENCY COMMENTS

The Department agreed with our recommendations. It made no comments on our conclusions or factual information included in this chapter.

CHAPTER 7

ROLE OF RESEARCH IN MINE HEALTH AND SAFETY

The Bureau of Mines is the Federal Government's primary research arm in the mineral field. The Bureau's overall mission is to develop new technology, improve existing technology, and disseminate information related to mineral resources and industries. We found, however, that the Bureau's noncoal health and safety research program has not achieved its objectives because of:

--Lack of coordination and cooperation between the Bureau and MESA in establishing project priorities, monitoring progress of projects, and transferring resulting technology to the industry.

--Low funding and budget priority.

PURPOSE OF NONCOAL HEALTH AND SAFETY RESEARCH

Health and safety research for the noncoal industry is one of several subactivities of the Bureau's mining research program. Mining research and that related to metallurgy and helium comprise the three major research programs conducted by the Bureau. The mining research program is subdivided into two primary categories of (1) advancing mining technology and (2) mine health and safety. The former category is directed towards developing improved methods of mining coal, metals and nonmetallic minerals, and oil shale while the later is directed toward improving health and safety in both the coal and noncoal industries.

Mine health and safety research was authorized in the Bureau of Mines Act of 1910 (30 U.S.C. 3) which also directed the Bureau to disseminate information concerning its research activities in this area. Neither the 1910 act nor the 1966 act contain provisions which specify the types or purposes of the noncoal mine health and safety research that is to be performed. Conversely, with the enactment of the Federal Coal Mine Health and Safety Act of 1969, specific types and purposes of health and safety research activities for coal mines became law. The 1969 act also authorized annual funding levels for these research activities not to exceed $20 million in fiscal year 1970, $25 million in fiscal year 1971, and $30 million in each subsequent fiscal year.

Specifically, the 1969 act directed the Secretary of the Interior to:

--Immediately initiate studies, investigations, and research to further upgrade the interim mandatory safety standards established by the act.

--Conduct research to develop and promulgate promptly new standards that would provide increased protection to miners.

--Work with the Secretary of Health, Education, and Welfare in conducting additional studies and research to improve health and safety conditions in coal mines.

We discussed this matter with a Bureau research official who stated that the Bureau had administratively established the purpose and intent of the noncoal health and safety research program to be the same as that for the coal program. He stated that the objective of the Bureau's noncoal research program is to achieve the highest degree of safety protection for miners. This aim is to be accomplished through the development of mine health and safety technology to serve as the basis for establishing health and safety regulations for the protection of life and prevention of injuries in the mining industry.

The primary intended uses of the Bureau's research findings are to:

--Provide the technical basis for the development of new health and safety standards (regulations), and updating of existing standards.

--Assist MESA in the enforcement of standards by developing improved techniques and devices that inspectors can use to determine compliance.

--Facilitate mine operator's compliance with standards by developing improved techniques for eliminating hazards.

ASSESSMENT OF NONCOAL RESEARCH RESULTS

During the period July 1969 through September 1976 (fiscal years 1970 through 1976 and transition quarter), the Bureau spent about $22.4 million on 159 noncoal health and safety research projects. These projects were directed toward a number of general areas of health and safety hazards. Total expenditures in each of these areas for the 7 fiscal years are summarized in the following table.

NONCOAL HEALTH AND SAFETY RESEARCH

ACTUAL EXPENDITURES

FISCAL YEARS 1970 THROUGH 1976
(note a)

Research area	Expenditures (thousands)	Percent of total
Health:		
Radiation	$ 4,872.5	21.8
Respirable dust	2,251.8	10.1
Noise	365.9	1.6
Other industrial hygiene problems	1,524.6	6.8
Ventilation	676.5	3.0
Subtotal	$ 9,691.3	43.3
Safety:		
Fire and explosion prevention	b/$ 3,520.5	15.7
Ground control	4,351.1	19.4
Industrial-type hazards	3,219.1	14.4
Systems engineering	150.7	.7
Survival and rescue	982.3	4.4
Sunshine mine program	c/ 466.9	2.1
Subtotal	$12,690.6	56.7
Total	$22,381.9	100.0

a/Includes Transition Quarter--July 1 through September 30, 1976.

b/Includes $32,000 of funds from a Bureau nonresearch program expended in fiscal year 1970.

c/Excludes $125,000 of MESA funds expended on this program in fiscal year 1976.

We found, however, that these projects

--had not led to the enactment of any standards,

--had assisted MESA only slightly in enforcing standards, and

--had assisted mine operators only slightly in complying with standards.

Bureau and MESA officials indicated, however, that some of the research conducted to date might well lead to standards promulgation and better means of enforcing and complying with standards in the future. They also anticipate that projects undertaken in the future will provide more useful results.

We asked the Bureau and MESA to make a joint assessment of the usefulness of each of the 159 projects initiated during the period July 1969 through September 1976. At the end of that period, 72 projects had been completed, excluding 10 "projects" which were contracts for the leasing and operation of a mine in Colorado used as a test facility for radiation measuring devices being developed under other projects. According to the agencies' assessment, none of these projects had actually led to the promulgation of a standard. Only 4 of the projects had actually resulted in improved devices or methods for complying with standards or determining compliance. Based on the agencies' assessment of the possible future usefulness of the Bureau's research projects for these purposes, we prepared the following summary table.

ASSESSMENT OF FUTURE USEFULNESS

OF NONCOAL HEALTH AND SAFETY RESEARCH PROJECTS

Likelihood of future use	Purpose: Standards promulgation — Number of projects	Standards promulgation — Cost (000 omitted)	Purpose: Standards compliance or enforcement — Number of projects	Standards compliance or enforcement — Cost (000 omitted)
Completed projects:				
Definite	8	$ 901	3	$ 384.2
Possible	10	802	8	871.8
Remote	54	4,030	57	3,999.4
Subtotal	72	$ 5,733	68	$ 5,255.4
Ongoing projects:				
Definite	15	$ 2,442	27	$ 6,169.5
Possible	26	4,459	23	3,205.0
Remote	36	6,046	27	3,572.5
Subtotal	77	$12,947	77	$12,947.0
Total (note a)	149	$18,680	145	$18,202.4

a/Does not include 10 projects at a cost of $522,000 for leasing and operating a test mine. Costs also do not include administrative costs of about $3.1 million which cannot be allocated to individual projects.

Radiation research, which has received the largest share of funds to date (about $4.9 million or almost 22 percent), illustrates the overall lack of useful research results. During the period July 1969 through September 1976, the Bureau initiated a total of 34 radiation projects. Of these, 13 projects were designed to develop various devices for measuring radiation exposure levels. At the end of this period, 3 of the 13 projects had been completed but had not produced a usable product. Of the remaining 10 ongoing projects, the Bureau and MESA anticipate that 2 could likely lead to the promulgation of standards requiring use of such measuring devices in uranium mines. If developed successfully, these devices could also assist in compliance with, and enforcement of, the resulting standards, as well as existing standards limiting radiation exposure levels. According to the agencies, the potential usefulness of the other 8 ongoing projects is doubtful.

Another 10 radiation projects were initiated to develop a means of controlling exposure to radiation. As of September 1976, six of these projects had been completed without usable results; and the agencies foresee little possibility that they will be useful in the future for standards promulgation, compliance, or enforcement. Regarding the four ongoing projects, the Bureau and MESA anticipate that three could possibly assist in complying with standards, but they do not anticipate that any of the four will be useful in promulgating or enforcing standards.

The remaining 11 radiation projects consisted of the 10 contracts for leasing and operating the test mine and 1 project completed in 1973 which was designed to study ways of improving respirators to protect against radiation exposure. The latter project had no usable results and no future use is anticipated.

Despite the general lack of usable results to date, research could help solve noncoal mine health and safety problems. According to the Bureau, technological inadequacies are the root cause of many injuries and fatalities. For example, a private research firm under contract with the Bureau made an extensive study of the causes of accidents and occupational illnesses in noncoal mines. Its report, completed in 1974, identified the major hazards causing accidents and illnesses in the industry between 1961 and 1972; and the report recommended a number of technological improvements which would help to reduce accidents and illnesses caused by many of the hazards.

Similar conclusions were also reached by the Department of the Interior in its investigation of the 1972 Sunshine Mine disaster which claimed 91 lives. According to the

Department's final report issued in March 1976, the lack of technology needed to cope with a number of hazardous conditions contributed to the magnitude of the disaster.

The 4 Bureau noncoal research projects that have assisted in compliance with health and safety standards and/or MESA's enforcement of these standards cost a total of $477,800. These projects were directed towards hazards in the respirable dust and ground control areas. One of the respirable dust projects demonstrated the applicability of available dust control techniques--such as water sprays, foam and enclosures (see photograph on p. 96)--while the other project in this area provided guidelines for the use of water and steam in controlling mine dust. The two ground control projects developed improved techniques for forecasting and preventing rock bursts.

LACK OF COORDINATION AND COOPERATION

Before MESA's creation in 1973, the Bureau was totally responsible for administering both the 1966 noncoal act and the 1969 coal act. Enforcement and research functions, however, were carried out by separate administrative units within the Bureau. This organizational alignment was continued when the Secretary created MESA and assigned to it all mine health and safety responsibilities except those relating to research, which were retained by the Bureau.

The enforcement and research functions are directed toward the common goal of improving health and safety conditions in mines; however, MESA and the Bureau have often differed on how they were to "interface" in carrying out their respective functions. MESA repeatedly alleged that the Bureau's health and safety research had not been effective and that it was not responsive to MESA's needs. The Bureau, on the other hand, contended that MESA was being overly critical of its research results because it wanted control of the mine health and safety research program.

MESA also expressed concern over the extent of its participation in the planning and monitoring of the program. According to MESA, the Bureau did not permit it to participate actively in planning of the program and only coordinated superficially with MESA. MESA contended that its limited role in the planning process and the lack of meaningful coordination were the major reasons why the Bureau's research had not been productive or responsive to MESA's needs.

In March 1975, a departmental study of the matter was completed. The study, conducted by an outside consultant, concluded that the Bureau's research program would be more

Booth for operator of rock crusher helps reduce exposure to dust and noise.

effective and efficient if MESA participated to a greater degree in (1) planning the program and establishing project priorities, (2) monitoring the progress of projects, and (3) technology transfer--the dissemination of information on research results to industry and labor, encouragement of rapid and widespread application in mines, and assistance with its application. The study also concluded that the Bureau needed to be more responsive to MESA's needs and that better methods of communicating those needs should be established. The study recommended that the Assistant Secretary for Energy and Minerals take strong administrative action to insure that the agencies worked cooperatively on mine health and safety research.

In June 1975, the Assistant Secretary took decisive action to resolve the interagency conflict. He directed the Bureau and MESA to develop and implement new policies and procedures to insure improved coordination on mine health and safety research.

At about the same time, in July 1975, the Committee on Appropriations of the House of Representatives expressed concern over the situation and called for prompt corrective action. The Committee's report on the Department of the Interior's fiscal year 1976 appropriations bill states the following.

> "The committee is aware of the serious dispute between the Bureau of Mines and the Mining Enforcement and Safety Administration regarding the research program for mine health and safety. Such bureaucratic feuds injure the public purpose of the agencies, handicapping the Nation's miners and wasting the public's tax funds. The committee is sympathetic to the need to make the research program more responsive to the needs of health and safety as perceived by the enforcement personnel in MESA and understands and appreciates the technological expertise which exists in the Bureau of Mines. This intolerable situation must be corrected promptly. The committee expects to be kept fully informed."

As a result of the Assistant Secretary's directive, the Bureau and MESA signed a memorandum of understanding in February 1976 designed to clarify their respective roles in mine health and safety research matters. By doing so, the agencies agreed that:

--The Bureau will conduct research and manage the program.

--MESA will participate and provide advice in the planning, programming, monitoring, and evaluation of research projects.

--The Bureau and MESA will jointly evaluate proposed projects and select those to be performed according to procedures and evaluation criteria specified in the agreement.

The new procedures for project selection were first used to develop the current fiscal year 1977 research program. Accordingly, it is too early for us to determine whether the new procedures will result in a more effective research program. In general, however, both the Bureau and MESA consider the new procedures to be an improvement over the former ones.

The February 1976 memorandum of understanding between the Bureau and MESA also established the framework for MESA to play a more active role in the Bureau's technology transfer process. The agreement called for the Bureau to manage the program and coordinate with MESA in the:

> "Joint development of strategies for utilization of research results by delineating requirements for field testing and demonstration to validate new technology; disseminating potential use information to the mining community and/or developing rules and regulations for its use."

We found, however, that as of April 1977 no effort had been devoted to the development of the joint strategies for the technology transfer process called for in the agreement. The two agencies had not discussed how MESA will assist in the Bureau's technology transfer program. No strategies had been developed on (1) what mechanism should be developed for an effective program, (2) how the two agencies are going to coordinate, (3) when such coordination will take place, (4) who the principle agents will be, or (5) what each agency's responsibility will be in carrying out the technology transfer program.

A MESA official told us that informal discussions had been held with the Bureau's health and safety research staff regarding some specific projects and that agreements had been reached on technology transfer related to these projects. However, the official stated that MESA has not developed overall strategies for the transfer program because they have not had sufficient staff available.

We discussed this matter with Bureau technology transfer officials in December 1976 and again in April 1977. On both occasions we were advised that no action had been taken to develop the joint strategies for technology transfer which were called for in the February 1976 memorandum of understanding. The officials could offer no reasons for the lack of action.

MORE FUNDING NEEDED

Noncoal mine health and safety research has been given the lowest funding priority of any of the Bureau's mining research programs. Funds for this program averaged only six percent of the total funds expended on mining research during fiscal year 1974 through 1977--the lowest percentage of all programs. Funds expended on each of the programs during the 4 fiscal years are shown in the following table.

FUNDS EXPENDED ON MINING RESEARCH PROGRAMS

Program	Fiscal year 1974	1975	1976 (note a)	1977 (note b)	Total
			(millions)		
Health and Safety:					
Noncoal	$ 4.0	$ 4.6	$ 6.9	$ 5.7	$ 21.2
Coal	27.1	27.5	36.7	29.4	120.7
Advancing Mining Technology:					
Noncoal	5.3	5.3	5.9	6.0	22.5
Coal	7.7	46.5	69.9	59.8	183.9
Oil Shale	5.6	5.6	7.0	5.6	23.8
Total	$49.7	$89.5	$126.4	$106.5	$372.1

a/Includes Transition Quarter of July 1 through September 30, 1976.

b/Budget estimates.

Bureau health and safety research officials view the lack of funding as the most significant problem in the noncoal health and safety research program. According to the Bureau, past funding levels have not been sufficient to accomplish recognized priority program needs. In response to questions posed by the House Committee on Appropriations regarding the adequacy of the Bureau's fiscal year 1977 budget request of $5.7 million for noncoal health and safety research, the Director testified that an additional $3 million would permit research directed toward solving a number of priority problems. The additional projects which the increase would allow, listed in order of priority, were as follows.

1. Develop better means of controlling noise in processing plants and underground working places.

2. Acceleration of efforts to develop a reliable means of detecting unstable ground prior to mining and calculating requirements for needed support.

3. Improve driver visibility and techniques for controlling new ore-haulage vehicles whose sizes have reached mammoth proportions.

4. Acceleration of efforts to develop more effective means of controlling respirable dust.

5. Develop effective means of ventilating large, underground mine openings adequately.

6. Determine hazards of diesel exhaust fumes from haulage vehicles in underground mines and develop interim means of minimizing this hazard pending development of effective emission controls.

7. Study the more severe and complex radiation hazards being encountered as underground uranium mines go deeper.

8. Develop and test more effective health and safety education and training techniques.

9. Determine technological advances critical to implementation of new standards planned for the next 3- to 5-year period.

The Bureau has attempted repeatedly to increase the level of funding for the noncoal program. As early as 1970 and 1971, Bureau health and safety research officials were unsuccessfully advocating an annual program budget of between $9 and $15 million for fiscal years 1973 through 1977. In July 1975, these officials sent an issue paper to Bureau planners which documented their past attempts to increase the program's funding and which recommended a budget of $15 million for fiscal year 1977. The issue paper justified this level of funding on the basis of virtually unchanged accident rates since passage of the 1966 act and predictions of significant increases in metal and mineral production which would increase workers' exposure to accidents.

Since at least fiscal year 1974, the Bureau has been requesting approval for additional funding for noncoal health and safety research from the Department of the Interior, but the Bureau's proposed budgets for the noncoal program have been reduced by the Department. In this regard, we also noted

that substantially more funds have been committed to the coal program than to the noncoal program, and that the Department has approved funding levels for the coal program which are considerably closer to the Bureau's budget requests than has been the case with the noncoal program. (See the following table.)

COMPARISON OF COAL AND NONCOAL HEALTH AND SAFETY RESEARCH FUNDING REQUESTED BY THE BUREAU AND APPROVED BY THE DEPARTMENT OF THE INTERIOR

Fiscal year	Coal research		Noncoal research	
	Requested	Approved	Requested	Approved
	(millions)			
1974	$28.0	$26.8	$ 8.0	$4.1
1975	26.0	27.6	5.0	4.6
1976 (note a)	30.3	29.4	9.1	5.7
1977	30.3	29.4	15.1	5.7

a/Does not include Transition Quarter of July 1 through September 30, 1976.

In each of the years, the Congress also approved the funding levels recommended by the Department.

According to a Department budget official, noncoal mine health and safety research has a low funding priority because there is no specific legislative mandate and funding ceiling for this research as is the case with coal health and safety research. As previously discussed, the 1969 coal act authorized specific types of health and safety research and established an annual maximum funding level for research of $30 million. According to the budget official, legislative funding limits of this type are generally viewed as expressions of intent regarding the level of funding the Congress feels is appropriate. In his opinion, the noncoal health and safety research budget has suffered because legislative funding limits have not been prescribed.

MESA officials said that the current level of funding for the program ($5.7 million in fiscal year 1977) poses severe limitations, and it recently recommended to the Bureau that increases in the noncoal program be given priority over increases in the coal program. Also, the Department of the Interior has requested, in its fiscal year 1978 budget sub-

mitted to the Office of Management and Budget, that the program's funding be increased to $10 million.

CONCLUSIONS

Although the Bureau of Mines and MESA have separate responsibilities in the noncoal mine health and safety program, they share a common goal--achieving the greatest possible degree of protection for miners. To achieve this goal, MESA develops standards, enforces them, and provides technical assistance to mine operators to help them comply with standards; while the Bureau conducts a research program to develop technology which is intended to assist in the performance of each of these activities.

We believe close coordination and cooperation between the two agencies is essential if they are to perform their respective functions most effectively. In our view, the conflicts between the two agencies contributed to the research program's failure to produce desired results.

By signing a memorandum of understanding in February 1976, the two agencies agreed on specific procedures for coordinating program planning and project prioritization. Since the procedures were first used in formulating the research program for the current fiscal year (1977), it is too early to assess what effect they will have on research results. Under the new procedures, both agencies agree on the projects included in this year's program. As of April 1977, however, no action had been taken to develop procedures for coordination of the technology transfer aspects of the research program as called for in the agreement.

The Bureau and MESA agree that the level of funding for the noncoal health and safety research program has posed severe limitations and has not permitted the accomplishment of recognized priority needs. Repeated attempts by responsible Bureau officials to substantially increase funding for the program were rejected by the Department of the Interior until recently because the program was considered to have low priority. Although the Department has proposed to almost double funding for the program in fiscal year 1978, the $10 million it has proposed would be only about two-thirds of the amount the Bureau feels is essential and only about one-third of the amount allotted to coal mine health and safety research.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

To help insure that the Bureau and MESA cooperate and coordinate effectively in the future on the noncoal mine

health and safety research program, we recommend that the Secretary of the Interior:

--Instruct the Director, Bureau of Mines, and the Administrator, MESA, to formulate and implement procedures for the coordination of technology transfer matters, as called for in the February 1976 memorandum of understanding between the two agencies.

--Monitor the agencies' implementation of the memorandum of understanding.

We also recommend that the Secretary of the Interior continue the Department's recent efforts to increase the funding of the Bureau's noncoal mine health and safety research program to a level which is sufficient to accomplish recognized needs.

RECOMMENDATION TO THE CONGRESS

To clarify the intended scope of the Federal noncoal mine health and safety research efforts, we recommend that the Congress enact legislation specifically authorizing the types of research and the level of funding it deems appropriate.

We noted that legislation pending in the Congress (S. 717) contains provisions which would implement this recommendation. If enacted, this legislation would apply the research provisions of the current Federal Coal Mine Health and Safety Act of 1969 to noncoal mines and would increase the research appropriation authority to $60 million annually to reflect the increased scope of the research activity (S. 717, sections 303(a)(1) and (a)(6); proposed sections 501(a) and (e)).

AGENCY COMMENTS AND OUR EVALUATION

The Department of the Interior agreed with our recommendations, but questioned whether a closer working relationship between MESA and the Bureau of Mines would have produced more successful research results. The information the agencies gave us during our review clearly showed that the dispute between the two agencies reached intense proportions and that considerable time and effort was expended by the agencies writing voluminous charges and rebuttals and conducting various studies of the problem. In our opinion, these efforts obviously distracted personnel assigned to the program from their normal duties and thus adversely affected the program's results. We did not believe it would be appropriate to elaborate on this matter in our report because the dispute apparently had been resolved by the time we conducted our review.

The Department also questioned our use of such specific goals as standards development, enforcement of standards and compliance with standards as the measures of the usefulness of research projects. As discussed in our report (see pp. 90 to 91), these were provided to us by a responsible Bureau of Mines official as the intended uses of noncoal research which the Bureau established administratively. Lacking any legislative guidance on the purpose of noncoal research, we believe use of these criteria is entirely appropriate.

The Department stated that while many projects may not produce desired results immediately, they may be extremely useful in providing a basis for further research. It also stated that the percentage of immediately useful research projects is generally very low and that the results tabulated in our report (see p. 93) may well be within the range of what is generally accepted as a successful program. It should be noted that the tabulation of "results" to which the Department referred is a summary of a joint assessment of possible future usefulness of research projects made by the Bureau of Mines and MESA. As stated in our report, actual results have been far less. According to the agencies' own assessment as of September 1976, no projects had actually led to the promulgation of a standard and only four projects had actually resulted in improved devices or methods for complying with standards or determining compliance. (See p. 93.) While we recognize that some projects might well have provided a basis for further research, we do not believe the actual results to date provide an adequate basis for concluding that the program has successfully met its objective of achieving the highest degree of safety protection for noncoal mines.

The Department also stated that, although no specific format has been established for the technology transfer process, every effort has been made for close coordination between the Bureau and MESA on a case-by-case basis. We believe our report gives adequate recognition to this effort (see p. 98), but this does not alter the fact that the agencies have not formulated a mutually agreeable system for more effective and coordinated technology transfer, as they agreed to do. Considering past relations between the agencies, we believe establishing systematic procedures for coordination of the technology transfer process is necessary to insure against future disagreements which could adversely affect the tranfer of technology to the mining industry for application.

CHAPTER 8

MESA'S PROGRAM TO IMPROVE THE INDUSTRY'S HEALTH AND SAFETY RECORD

In 1975, MESA established a Special Accident Prevention Program (retitled the Program in Accident Reduction in 1977). This program recognizes that a relatively small number of operations account for most of the injuries reported to MESA. For example, one percent of the active operations accounted for about one-half of the disabling injuries reported in 1975. Effective accident prevention programs to identify and correct causes of accident and injuries at these operations could significantly improve the industry's disabling injury record. MESA's Program in Accident Reduction is designed to provide a coordinated approach to reducing injuries at operations which have significant safety problems.

We reviewed the results of MESA's program through the first 9 months of 1976. Although additional experience under the program is needed before a complete assessment can be made of its impact on reducing injuries, the results so far have been mixed. Eleven of the 30 operations in the program reported no reduction in their injury rates; 5 reported marginal reductions; but the remaining 14 reported significant and, in some cases, dramatic reductions.

We have identified areas in which we believe MESA could improve its program. We found that

--under the current selection criteria, some operations with a high potential for accidents or health-related problems may not be included in the program, and

--there were considerable differences in the techniques used by MESA personnel making safety reviews.

IMPLEMENTATION OF MESA'S SPECIAL PROGRAM

In July 1975, MESA initiated a special accident prevention program which has the potential for improving the noncoal industry's injury record significantly by putting special emphasis on a relatively small number of operations. MESA estimates that there were 12,639 active mining operations as of September 1976 employing about 248,000 persons under its jurisdiction. Of this number, 130 operations accounted for 4,000 disabling injuries in 1975--roughly one-half of the number reported by the entire industry.

In initiating the program, MESA recognized that its routine inspections, checking for compliance with standards, and issuing violation notices have not resulted in a significant improvement in the industry's safety record. Under the new program, emphasis is placed on analyzing overall injury statistics, reviewing the operators safety program, analyzing work procedures and habits, and discussing safety with the workers. According to MESA, this approach is needed to reduce the industry's injury rate to an "acceptable level."

Guidelines for implementing the program include:

--Analyzing the operation's accident reports to identify trends, pinpointing areas or job classifications with comparatively high injury frequency rates, determining whether unsafe conditions exist, and defining any specific or unusual circumstances.

--Determining if the accident reports comply with MESA's reporting requirements.

--Reviewing the operation's safety program and organizational structures to identify any problem areas or any procedures or policies that are producing beneficial results.

--Avoiding the issuance of violation notices for specific Federal or State standards since the emphasis is on studying and analyzing procedure patterns and work habits related to the types of injuries that have been occurring. However, closure orders are to be issued if an imminent danger situation is observed.

--Conducting followup visits and surveys to observe and measure any program changes that may have been initiated as a result of this special program effort.

Because of limited budget and staff resources, MESA decided that it could select only 30 operations for the program. These 30 operations accounted for 1,518 (18 percent) of all disabling injuries reported in 1975 even though they represent only about 0.2 percent of the active operations. For calendar year 1977, the number of operations in the program has been increased from 30 to 48. MESA plans to continually monitor the injury rates at these mines and to expand the program to additional high-injury operations as additional funds and staffing become available.

Although the program was initiated in July 1975, it was not until September 1975 that actual program activities began. The number of injuries reported by most of the operations

during the period July through December 1975 showed no improvement over the injuries reported during the previous 6-month period. On December 1, 1975, MESA's Acting Assistant Administrator for Metal and Nonmetal Mine Health and Safety sent a memorandum to District and Subdistrict Managers, reminding them of the program's importance. The memorandum stated that:

> "The success of this Special Accident Prevention Program is vitally critical to our entire metal and nonmetal mine safety program. To date, our safety program has been justified on the basis that we can reduce injuries through inspection and standards enforcement activities. Furthermore, we have always claimed that we need more inspectors and more frequent inspections to accomplish a significant reduction of injuries in the industry.
>
> "The Special Accident Prevention Program is based on a greatly increased inspection presence in a small number of mines doing whatever is necessary to reduce injuries in these mines. Its failure will serve to prove--to ourselves, the Department, and OMB--that increased inspection and related enforcement activities, such as this program, are not effective in achieving a reduction of injuries. It is, therefore, of critical importance that we do everything possible to assure the success of our program."

PRELIMINARY RESULTS OF THE SPECIAL PROGRAM

Through September 1976, the program had been operational at the 30 mines for 9 months. Additional experience is needed before a reliable assessment of its overall effectiveness can be made. The impact of the program cannot be conclusively determined because MESA has not yet verified the injury reports which these mines submitted.

We discussed this with MESA officials and were advised that some verification of operators' injury reports had been made, but MESA had not reviewed the reports by checking them against other mine records, such as company accident reports and insurance or workman's compensation claims. This was not done because, according to MESA, it is a time-consuming process and MESA felt its staff resources could be better spent in identifying and eliminating safety problems. MESA field personnel had been instructed to independently determine the number of injuries at the mining operations each month, but specific procedures for making this determination were not issued. MESA field reports were, however, compared to injury reports submitted by the operators to MESA's Health and Safety Analysis Center (MESA's centralized reporting point

for injuries). According to MESA, these procedures provide reasonable assurance that operators of mines under the program have not grossly under-reported their injuries or changed their criteria for reporting.

We compared the disabling injury frequency rates reported by the 30 operations for the first 9 months of 1976 with the rates they reported for calendar year 1975. We found that the rates of 11 of the operations showed no improvement, and that there was only marginal improvement at another five operations. Collectively, these 16 operations reported a disabling injury frequency rate of 58.02 for the first 9 months of 1976 as compared to 51.63 for 1975. MESA officials said the management at 10 of the 16 operations have been reluctant or have refused to cooperate in the program. For the remaining 14 operations, significant improvement in injury rates were reported. Collectively, these operations reported a disabling injury frequency rate of 26.31 for the first 9 months of 1976 as compared to 52.28 for 1975. As shown below, the improvement reported at some of these operations has been dramatic.

REPORTED REDUCTIONS IN DISABLING INJURY FREQUENCY RATES AT MINES IN MESA'S PROGRAM IN ACCIDENT REDUCTION

Mine	1975	First 9 months of 1976	Reduction
1	138.75	71.14	67.61
2	69.43	7.76	61.67
3	60.35	13.12	47.23
4	109.86	66.57	43.29
5	60.30	18.92	41.38
6	51.15	20.82	30.33
7	63.03	33.65	29.38
8	75.95	52.53	23.42
9	52.30	32.30	20.00
10	47.80	31.63	16.17
11	59.55	44.00	15.55
12	48.09	36.51	11.58

Mine	1975	First 9 months of 1976	Reduction
13	23.87	16.30	7.57
14	21.27	14.38	6.89

We were told that a number of the operators failed to cooperate with MESA and that in these cases the improvement in accident/injury rates has been less than significant. We discussed the lack of cooperation by some operators with the MESA coordinator for the program. He advised us that this problem was not anticipated when selecting the mines, but that letters had been sent to operators who had refused to cooperate, restating MESA's intent to implement the program. He also stated that, as of June 1977, Interior's Solicitor's Office had determined that MESA has authority to conduct the program and was in the process of taking legal action against operators denying MESA this authority.

As mentioned earlier, the full impact of MESA's program in reducing accidents cannot at this time be ascertained because of the limited information; however, we noted several indications that the program may be helping to reduce accidents and injuries.

For example, at one operation MESA conducted a safety survey in October 1975 to determine the reasons for the high injury rate. MESA found that the operation had not established an effective safety program. Specifically, they found that

--there was little accident prevention training for supervisors and employees,

--the operation's safety rules had not been updated and were not being distributed to the employees,

--the orientation and safety training program for new employees was inadequate, and

--there was little followup to determine causes of accidents and ways to prevent similar accidents in the future.

During a followup survey in December 1975, MESA found that the operation made significant progress in all areas of its safety program. In addition, the operation requested MESA to provide accident prevention training for its supervisors and employees. The disabling injury frequency rate at this operation dropped from 52.30 in 1975 to 32.30 during the first 9 months of 1976.

At another operation, MESA found the need for improvements in the safety program. They found that there was a need to

--appoint a safety director,

--conduct departmental safety meetings,

--establish a preventive maintenance program,

--provide accident prevention training for all employees,

--hold joint company and union safety inspections, and

--conduct a more thorough indoctrination of safety rules and safe work procedures for new employees.

MESA discussed these matters with the operator and union officials. Subsequently, several changes were made which included the following.

--Employees were more indoctrinated in safety rules and safe work procedures.

--Employees were required to wear personal protective equipment.

--Safety meetings were held between company officials and the union safety committee.

Subsequently, the operation's disabling injury frequency rate dropped from 109.86 for 1975 to 66.57 for the first 9 months of 1976.

POTENTIAL MEANS TO INCREASE THE SPECIAL PROGRAM'S EFFECTIVENESS

MESA's program is still in its early stages and improved approaches and techniques will be developed with increased experience. Based on our review, two areas appeared to warrant special attention. They are:

--Developing better criteria for selecting the operations included in the program.

--Providing guidance and training for MESA personnel who conduct health and safety analyses.

Improved Selection Criteria Needed

Mine operations included in the program are selected solely on the basis of the number of disabling injuries re-

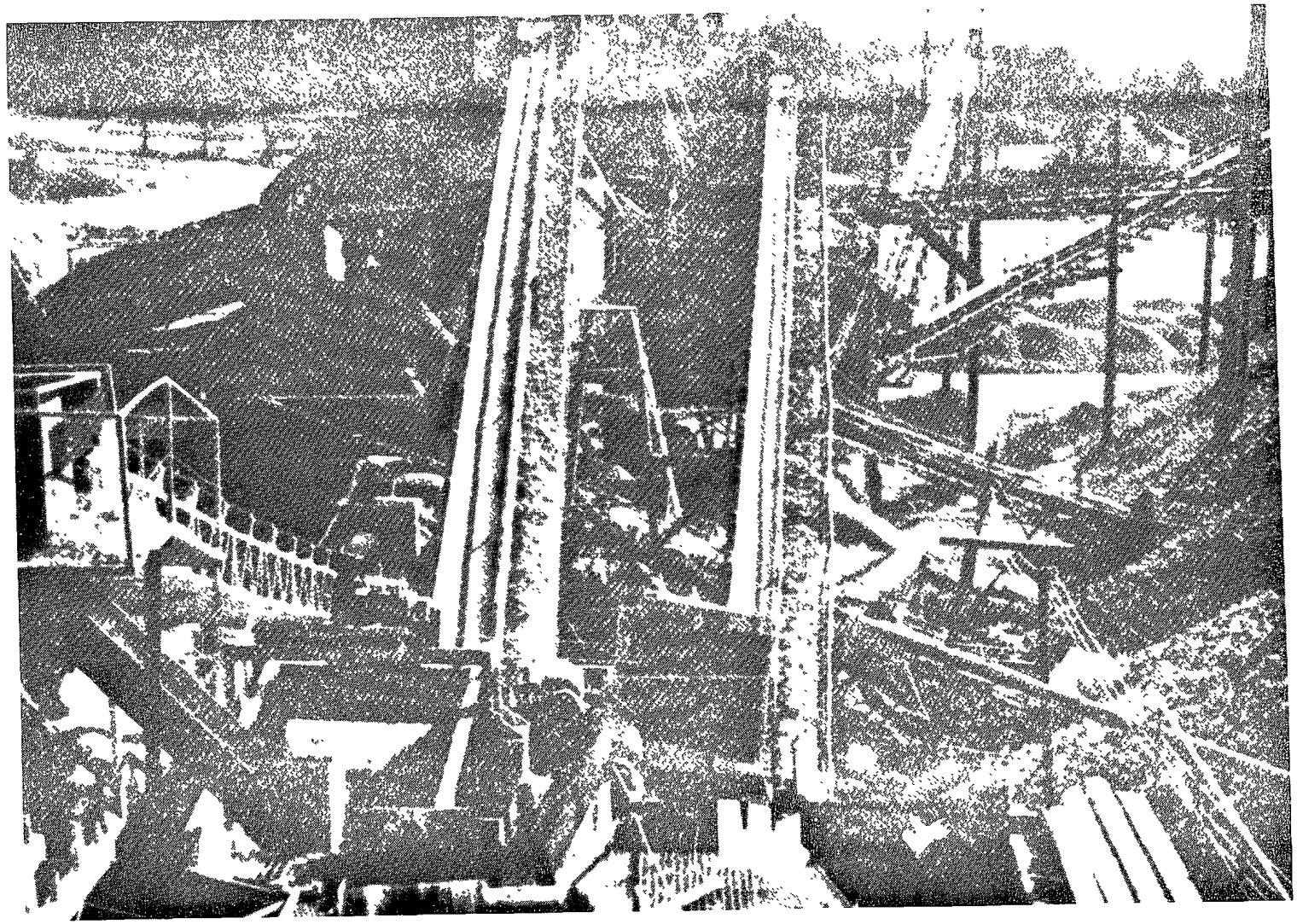
ported compared to similar operations in the industry at large. When the program was initiated, MESA selected operations reporting 15 or more disabling injuries above the rate reported by similar-type operations. For fiscal year 1977, MESA decided to include operations reporting 12 or more disabling injuries above the rate reported by similar-type operations.

Obviously, disabling injuries are an important indicator of mines requiring special attention. By selecting mines solely on this basis, mine operators may be encouraged not to report all disabling injuries. Also, under current selection criteria, consideration is not given to (1) operations with significant health hazards or (2) particularly hazardous operations that have the potential for a large number of injuries.

In our opinion, some of these operations should be considered for inclusion in the program. These operations can be added if the selection criteria included (1) operations at which MESA continues to find significant numbers of health and/or safety hazards during its regular inspection activities and (2) operations known by MESA to have "weak" health and safety programs.

For example, we observed a MESA inspection of one limestone quarry and mill at which MESA historically cited a large number of violations. During the period January 1973 through December 1975, this operation averaged 32.9 violations per MESA inspection as compared to an industry average of 3.3 for the same period. Although MESA had issued eight violation notices for hazardous levels of dust 7 months before, the hazards remained unabated at the time of our visit. According to the MESA inspector, a major hazard at this operation is its antiquated equipment which is not adequate to handle its high rate of production safely. (See photo on p. 112.) The inspector also advised us that the company's internal safety program needs to be upgraded.

The Vice President and General Manager of the operation informed us that the company's safety program consists primarily of safety meetings conducted three or four times annually. He advised us that the company (1) has no safety staff, (2) conducts no regularly scheduled safety inspections or safety audits, (3) provides no formal job skill, safety, or accident prevention training, and (4) does not routinely sample for hazardous levels of dust, noise, and other health contaminants. He advised us further that MESA could be of greater assistance at his operation by providing assistance in accident prevention techniques and designing an internal company safety program.



Equipment at mine visited by GAO which MESA inspector said was too antiquated to handle the operation's high rate of production safely.

We found, however, that his operation has had remarkably few disabling injuries during recent years. According to data supplied to us by the operator, only one disabling injury occurred during the period 1973 through 1975. In 1970, however, the operation experienced 16 disabling injuries which resulted in a disabling injury frequency rate of 84.36.

MESA's coal enforcement group recently initiated a new system for selecting problem mines in the coal mining industry requiring special attention. Under this system, called the Mine Profile Rating System, operations are selected not only on the basis of their disabling injuries, but also on the basis of their compliance with Federal health and safety standards, and management capabilities and programs to deal with health and safety problems. The operations are rated on a scale of 1,000 points--up to 200 points for the disabling injury rate, 300 for the degree of compliance with Federal regulations, and 500 for health and safety programs. MESA then concentrates its efforts on the coal mines having the lowest overall ratings. Under such a system, problems encountered in the reliability of accident, injury, and illness statistics have less of an impact because other factors are also considered which have a greater weight in the rating. As a result, there would be less likelihood of excluding unsafe operations reporting artificially low injury rates. Also, by including an evaluation of an operation's compliance with health standards and programs for controlling health hazards, the selection system identifies operations with high potential for health-related problems. This would be important for the noncoal industry because statistics on occupational illnesses are virtually nonexistent.

We discussed this matter with MESA officials who stated that MESA is aware that the present selection criteria for the noncoal industry need to be improved. They advised us that MESA is currently trying to develop a better selection process, but that implementation is not likely until 1978. They added that the system used by MESA's coal enforcement group is under consideration, but that they are trying to generate new ideas.

Guidance and training needed for MESA personnel conducting the program

According to MESA, a thorough understanding of enforcement, technical support, and training principles and techniques is needed to recommend means of reducing accidents and accident potential at mining operations. We found, however, that little guidance has been given to individuals responsible for conducting MESA's activities at the operations under the program. The original guidelines discussed on p. 106 were the only assistance provided, and no formal training was provided to MESA employees. One MESA District Manager summarized the situation in his monthly progress report to the Assistant Administrator by saying:

"We need to train more people in the techniques and procedures for conducting special accident prevention studies. It takes a special person to get the type of cooperation and results we are seeking of top management and labor representatives."

The degree of cooperation achieved, approaches and techniques used, and the depth of analysis at the operations varied among MESA's district offices and the individuals assigned to the program. For example, significant differences were noted among MESA personnel in the extent to which they document the scope and types of analyses made, the major problem areas identified, and the actions to be taken by the operation and MESA to overcome the problems. In one of MESA's subdistricts, no memorandums or reports have been submitted on MESA's activities and findings at the three operations under the program in its jurisdiction. At other operations, the reports were limited to one- or two-page memorandums listing such general findings as the need to issue warning slips to employees violating safety regulations. At the other extreme were a few operations where obviously more thorough and complete reports have been prepared that set forth and explain the problems encountered and MESA's recommendations for improvement.

In April 1977, MESA's Assistant Administrator for Education and Training advised us that a plan for providing special training to inspectors involved in the Program in Accident Reduction had been agreed upon by MESA's Education and Training and Noncoal Enforcement groups. According to this official, inspectors are currently able to identify specific safety hazards, but they are deficient in their ability to analyze an operation's overall health and safety activities and explain to the operator what actions are needed to strengthen the activities. Although the specific curriculum was still being developed at that time, we were advised that instruction in various skills and techniques necessary to identify and correct accident causes would be provided by MESA's Education and Training group, Technical Support group, Mine Health and Safety Academy, and experienced enforcement personnel.

MESA's coordinator for the program also advised us in April 1977 that MESA was aware of the wide variance in the manner in which the program had been implemented by the various Districts. He said that MESA was in the process of developing comprehensive guidelines for field personnel which should result in uniform implementation of the program.

CONCLUSIONS

MESA's program is still in its infancy and improved approaches and techniques will be developed with increased experience. We agree with MESA that the program represents

a crucial test of whether it can fulfill its mandate to significantly improve the health and safety of noncoal workers.

Although early results of the program were mixed, we noted some encouraging indications that MESA's new efforts can be effective. In our opinion, implementation of improved guidance and training for those conducting the program is needed before the effectiveness of this new approach can be effectively assessed.

Should the new approach prove to be effective once these improvements have been made, we believe the program should be expanded to include operations with significant potential for accidents and occupational illnesses. This could be done by broadening the selection criteria to take into account factors in addition to disabling injury statistics, as in the coal program's Mine Profile Rating System. In our view, this would reduce the possibility of excluding operations reporting artificially low injury rates, and help insure the long-term success of the program by allowing MESA to work towards eliminating significant health and safety hazards before they result in physical harm.

RECOMMENDATIONS TO THE SECRETARY OF THE INTERIOR

We recommend that the Secretary of the Interior direct MESA to implement its plans for providing improved training and guidance for its personnel in the techniques and procedures for conducting special accident prevention studies. If preliminary indications prove to be correct and MESA finds that this approach definitely results in a substantial reduction of accidents and injuries in mining operations currently included in the Program in Accident Reduction, we recommend that the Secretary of the Interior direct MESA to broaden the selection criteria to include not only disabling injury records, but also ratings of compliance with standards and management capabilities of the operations.

AGENCY COMMENTS

The Department agreed with our recommendations. It made no comments on our conclusions or factual information included in this chapter.

APPENDIX I

United States Senate

COMMITTEE ON
LABOR AND PUBLIC WELFARE
WASHINGTON, D.C. 20510

B-166582

July 24, 1975

The Honorable Elmer B. Staats
Comptroller General of the United States
441 G. Street, N.W.
Washington, D.C. 20548

Dear Mr. Staats:

In September 1966, the Congress established a Federal program to promote health and safety in noncoal mines by enacting the Federal Metal and Nonmetallic Mine Safety Act (Public Law 89-577). Among other things, the Act authorizes the Secretary of the Interior to promulgate health and safety standards, inspect mines for compliance, and issue orders closing mines or sections thereof in which health and/or safety hazards exist. Since 1971, these responsibilities have been carried out by the Department of the Interior's Mining Enforcement and Safety Administration (MESA).

During recent weeks much publicity has been given to the fact that of about 3,300 closure orders issued by MESA under the Act only one has ever been appealed by a mine operator. We are concerned that the lack of appeals could indicate that MESA's enforcement of health and safety in noncoal mines has been lax. We understand further that many of MESA's closure orders involve nothing more than minor violations, making the large number of orders issued somewhat misleading. We request that your Office review a sufficient number of the orders and the related MESA procedures being followed as is appropriate to ascertain whether the closure orders do, in fact, involve mostly minor violations. We would appreciate it if you could provide this information to us informally so that it could be used during the Committee on Labor and Public Welfare hearings on mine health and safety tenatively scheduled for fall of 1975.

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In addition, we have noted that there were 154 fatalities in the Nation's noncoal mines during 1974. Although this is an improvement over the 175 fatalities in 1973, we believe that this number of fatalities is not only still unacceptably high but is somewhat misleading since, during the same period, there was an increase in the overall injury frequency rate (number of injuries per million man-hours of exposure). In our view, these statistics raise serious doubt as to how effectively the Department of Interior has administered the Federal metal and nonmetallic mine health and safety program.

As you know, legislation has been introduced to transfer the responsibility of administering the Federal mine health and safety program from the Department of the Interior to the Department of Labor. We believe it would be very useful to the Congress in considering this legislation to have your Office's views on the effectiveness of the Department of the Interior's administration of this program. We understand that a review of this matter will most likely not be completed prior to the hearings or consideration of the legislation. However, if the legislation is passed before the completion of your review, we believe your findings should be extremely helpful to the Department of Labor in making needed program changes.

Accordingly, we request that your Office make a comprehensive review and report on the effectiveness of Interior's administration of the Federal Metal and Nonmetallic Mine Safety Act. Special emphasis should be placed on evaluating the effectiveness of Interior's:

--health and safety standards;
--procedures for inspecting mines and issuing violations notices and closure orders;
--mine health and safety education and training programs for miners and mine operators;
--oversight of State plans for mine health and safety; and
--closure order appeals process.

APPENDIX I

You may inform the parties involved that you are conducting this review for the Committee on Labor and Public Welfare. We look forward to the continued excellect assistance and cooperation which your Office has always provided us.

Sincerely,

Jacob K. Javits
Ranking Minority

Harrison A. Williams, Jr.
Chairman

APPENDIX II

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

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Mr. Henry Eschwege
Director, Community and
Economic Development Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We have reviewed your proposed report to the Chairman, Senate Committee on Human Resources entitled, "After Years of Federal Effort, Accident Rates Still Unacceptably High at Noncoal Mines."

We agree with your report on the areas where improvements are needed to make the metal and nonmetal mine health and safety program more effective. We also agree with your recommendations, some of which have already been implemented by Interior agencies responsible for the program.

However, we question the validity of some of the analyses presented in your report and, consequently, the conclusions derived therefrom. Because of the limited time that we have to make our response, we will limit our comments to the more pertinent areas.

[See GAO note, p. 122.]

preliminary data indicates that the progress in the reduction of disabling injuries in 1975 continued at an accelerated rate in 1976, dropping to 15.27 injuries per million man-hours as compared to the 18.07 rate in the previous year. The reduction in fatalities also continued, down to 113 as compared to 123 in 1975, establishing a record low for the second year in a row. It is also significant to note the absence of disasters in the noncoal industry in the last five years.

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Although the Federal Metal and Nonmetallic Mine Safety Act was passed in 1966, mandatory standards did not become enforceable until mid-1970. Thereafter came a period of staffing and training of inspectors, especially after the Sunshine Mine disaster in 1972. Thus, the reductions in both fatalities and nonfatal disabling injuries since 1974 followed increased enforcement activities by the Mining Enforcement and Safety Administration. In this connection, preliminary results of a statistical analysis conducted on a mine-by-mine basis by MESA's Health and Safety Analysis Center showed a significant correlation between MESA's enforcement activities and the reduction of the disabling injury rate in 1976.

We agree that in its efforts to improve working conditions and reduce injuries MESA should make greater use of its computerized information on injuries reported by the industry. However, increased use of this information by MESA requires the availability of inspector resources to do more than the basic inspection for compliance with standards. With the expansion of enforcement staff in the last two years, increased use has been made of mine-by-mine injury reports prepared by the Health and Safety Analysis Center.

However, we believe that MESA's metal and nonmetal mine program has reached the stage when more detailed information on injuries can be used more effectively. During 1976, MESA initiated a series of actions designed to strengthen its statistical analysis capabilities. New staff has been added, and more sophisticated studies are currently underway which are expected to provide more definitive information on accidents and illnesses and the causal relationships for their occurrence.

Several other areas for potential improvement involving reporting of accidents, injuries, and illnesses were also discussed in your report. These include criteria for reporting and the requirement for accident reporting. A number of actions, either implemented or in the process for implementation, have been designed specifically for improvements in these areas.

Department personnel involved in mine health and safety agree that new and improved standards are needed. [See GAO note, p. 122.] Part of the need for new or improved standards is related to new techniques or processes being introduced into the mining industry on a continuing basis. Another reason is to clarify and make more explicit the coverage of certain hazards, which would improve the mine operator's recognition of the hazardous conditions and requirements for compliance and also aid a less experienced inspector to meet his enforcement responsibilities.

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On matters related to enforcement activities, we agree that more effective authority is needed to eliminate hazards in the noncoal mining industry on a more permanent basis. The Department has endorsed many of the features in the legislation currently being considered by Congress, which would provide this authority.

The need to upgrade the overall quality of our inspection force has long been recognized. However, because of the diverse conditions, processes, techniques, equipment, and machinery encountered in the mining industry, it is not possible for an inspector to be equally proficient in dealing with every potential hazard. Nevertheless, a number of established policies are aimed directly at this problem, including the field monitoring of mine inspections by headquarters staff and a two-week training for every inspector on an annual basis. Written guidelines on minimum procedures for the type of inspections cited in your report should be another means to improve the overall enforcement activities.

With regard to mine health and safety research, the February 1976 Memorandum of Understanding between the Bureau of Mines and MESA has provided the basis for close coordination and cooperation between the two agencies. As pointed out in your report, both agencies agreed on the projects included in this year's research program. On the other hand, the development of useful results from research depends on many factors. It would be difficult to determine if a closer working relationship at the beginning would have produced more successful results.

We also find it difficult to accept the use of such specific goals as standards development, enforcement of standards, and compliance with standards as the only measures of the usefulness of research projects. While many projects may not produce the desired results immediately, they may be extremely important in providing a basis for further research. In any event, the percentage of immediately useful projects produced in a research program is generally very low. The results tabulated on page 133 of your proposed report may well be within the range of what is generally accepted as a successful program.

On the question of technology transfer, although there is no specific format, every effort has been made for close coordination between the Bureau of Mines and MESA. Strategies to achieve maximum benefit may be designed more effectively for specific technologic results on a case-by-case basis. For example, MESA recently sponsored a series of seminars on mine illumination, with participation by Bureau of Mines personnel. A joint MESA-BOM review of selected research projects is scheduled for mid-July. Another example is the cooperation on technology transfer related to Bureau's contract development of fire suppression systems for use in mine shafts and on large haulage trucks.

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As indicated earlier, our comments have been limited to the more pertinent areas. It is the understanding of this office that our respective program staffs have agreed to jointly resolve minor issues or discrepancies in the report on an informal basis.

We appreciate the opportunity to review and comment on your report. The study conducted by your agency has already served as the basis for improvements in our noncoal mine health and safety program, especially in the enforcement area. Your final report should be of considerable value to the program in the future.

Sincerely,

Deputy Assistant Secretary--Policy,
Budget and Administration

GAO note: Agency comments deleted on the basis of revisions made to report.

PRINCIPAL DEPARTMENT OF THE INTERIOR OFFICIALS

RESPONSIBLE FOR ADMINISTERING

ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
SECRETARY OF THE INTERIOR:		
Cecil D. Andrus	Jan. 1977	Present
Thomas S. Kleppe	Oct. 1975	Jan. 1977
Kent Frizzell (acting)	July 1975	Oct. 1975
Stanley K. Hathaway	June 1975	July 1975
Kent Frizzell (acting)	May 1975	June 1975
Rogers C. B. Morton	Jan. 1971	May 1975
ASSISTANT SECRETARY OF THE INTERIOR--ENERGY AND MINERALS:		
Joan M. Davenport	Mar. 1977	Present
William L. Fisher	Mar. 1976	Feb. 1977
Jack W. Carlson	Aug. 1974	Feb. 1976
C. King Mallory	May 1974	July 1974
Stephen A. Wakefield	Mar. 1973	Apr. 1974
John B. Rigg (note a)	Jan. 1973	Mar. 1973
Hollis M. Dole	Mar. 1969	Jan. 1973
ADMINISTRATOR, MINING ENFORCEMENT AND SAFETY ADMINISTRATION:		
Robert E. Barrett	Dec. 1975	Present
Arthur P. Nelson (acting)	July 1975	Nov. 1975
James M. Day	Sept. 1973	July 1975
DIRECTOR, BUREAU OF MINES:		
John D. Morgan (acting)	Jan. 1977	Present
Thomas V. Falkie	Mar. 1974	Jan. 1977
John D. Morgan (acting)	Sept. 1973	Mar. 1974
Elburt F. Osborn	Mar. 1970	Sept. 1973

a/Deputy Assistant Secretary-in-Charge