THE IMPACT OF A PART 48 TRAINING PROGRAM
ON THE HEALTH AND SAFETY KNOWLEDGE LEVEL
OF NEWLY EMPLOYED INEXPERIENCED MINERS

DISSERTATION

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By

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The impact of a mandatory Part 48 training program on the health and safety knowledge level of newly employed inexperienced miners in Texas was studied. Part 48 training was defined by compliance with Mine Safety and Health Administration's (MSHA) mandatory health and safety training requirements.

A two-group pretest, posttest research design was utilized. Group one individuals were newly employed inexperienced persons who received mandatory Part 48 training in accordance with MSHA guidelines. Group two subjects were newly employed inexperienced persons who worked for companies that were exempt from conducting a Part 48 training program. MSHA's health and safety knowledge inventory was utilized.

A significant difference was found in the health and safety training program when compared with individuals who did not receive the training. A significant difference was also found in the posttest scores for eight of the ten subject areas of the MSHA health and safety knowledge inventory for persons who completed a Part 48 training program when compared to persons who did not receive the training. Analysis of gain scores resulted in significant differences in the same subject areas indicated by posttest scores.
It was concluded that MSHA Part 48 did have a significant impact on the health and safety knowledge level of newly employed inexperienced miners. Additional implications noted relate to the impact of a Part 48 training program on accidents, productivity, absenteeism, turnover, job satisfaction and management styles; role of MSHA in miner training; development of new training materials; methods of training; and the evaluation of health and safety training programs.
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CHAPTER I

INTRODUCTION

On March 3, 1978, Congress passed the Federal Mine Health and Safety Act. Section 115 of the Act mandated that the Secretary of Labor promulgate health and safety training standards for the mining industry. These regulations which are officially referred to as Part 48 - Health and Safety Training and Retraining of Miners (Appendix A) became mandatory on October 13, 1978. Included in Part 48 are requirements for in-depth training in the following areas: newly-employed inexperienced miner training, newly-employed experienced miner training, annual refresher training, task training and hazard training. This training must be conducted by the mine operator for all persons who fall under the definition of a miner or are exposed to hazards within the work environment (24, p. 47454).

Prior to the passage of Part 48, federal regulations governing the mining industry provided for only one mandatory training requirement. This was that selected supervisors be trained in first aid (8). The conducting of all other types of training including new employee orientation and indoctrination, job skills and health and safety were left to the discretion of the company.

The major question posed by the mining industry in relationship to Part 48 is the degree to which these requirements improve the health and safety competencies of miners (25, p. 79). The study researched the impact of training on the health and safety knowledge level of newly employed inexperienced miners.
Statement of the Problem

The problem of this study was the impact of mandatory Part 48 health and safety training on the health and safety knowledge level of newly employed inexperienced miners.

Purpose of the Study

The purpose of this study was to determine how Part 48 training impacted the health and safety knowledge of newly employed inexperienced miners.

Research Question

In relationship to the impact of mandatory health and safety training on the competencies of newly employed inexperienced miners, the following research question was identified: Does Part 48 health and safety training increase the health and safety knowledge level of newly employed inexperienced miners?

Background and Significance of the Study

The significance of this problem is important for numerous reasons:

1. The numbers of miners and mining operations impacted by the regulations.
2. The respective roles of industry and government in providing a safe and healthful working environment.
4. The impact of training programs on accidents.
5. The financial impact of the training requirements.
6. The time factor involved in conducting the training.
7. The effect of non-compliance of the training regulations.
8. The lack of related research on mandatory health and safety training.

Scope of Part 48 on the Mining Community

The number of miners and companies impacted by Part 48 training requirements is significant. According to the latest statistics compiled by the Health and Safety Statistical Analysis Center of the Mine Safety and Health Administration (MSHA), approximately 23,641 mines are active in the United States (20). Employed at these operations are approximately 497,436 miners (22). In addition to training their own employees, mine operators are responsible for providing health and safety training for any other persons who are exposed to hazards within the work environment. This means that any contractor, customer hauler, manufacturer's representative, service worker, or vendor who comes on the mine property must be advised of mine hazards by the mine operator. In some cases companies may have several hundred contract haulage truck drivers on mine property each day. The Part 48 coverage of persons not employed by the operator greatly increases the number of persons impacted by the regulations (23, p. 2). In short, Part 48 affects tremendous number of people and companies (26, pp. 104-120).
Mining in Texas

Mining has long played an important role in this nation's economy. This country has always been rich in a wide range of mineral resources. Texas, too, has its share of these natural resources. But the mining industry in Texas is different than what traditionally comes to mind when one thinks of mining. Texas does not have the underground coal mines found in the eastern part of the United States or the deep metal mines of the west. The majority of Texas mining is small open pit surface operations.

There are 529 mining operations in the state of Texas that mine and mill dozens of different types of mineral ores (20). All mining in Texas can be divided into six different classifications: crushed stone, dredging, milling, open pit, solution mining, and underground mining. Crushed stone mining involves the excavation, crushing and sizing of various types of rock for utilization in construction or road base. The only products dredged in Texas are sand, gravel and oyster shell. Numerous products including aluminum, barite, brick, cement, clay, graphite, gypsum and iron ore are milled in Texas plan operations. Sand and gravel is by far the leading product mined in Texas. Most sand and gravel operations are classified as open pit mines. Large deposits of coal, granite, limestone and marble are also mined in an open pit fashion. Solution mining is found in south Texas where companies pump chemicals deep into the ground to leach uranium from the soil. There are only four underground mining operations in
Texas; two of these mine salt, one mines fluospar and the other mines granite.

Most mining operations in Texas are small. Of the 529 active mines in the state, 274 of them employ less than 10 people and only 32 employ more than 100 persons at a single site. In addition, most mines in the state are open pit; of the 529 active mines, only four are underground (20).

According to MSHA statistics, 22,498 miners are employed at the 529 active mining operations in Texas (20). This number only includes personnel located at the mine site who are exposed to hazards in the work environment. This number does not include corporate personnel, office personnel who do not go into the mine, salesmen, off-site materials storage personnel, on-road truck drivers and outside contractors and vendors.

Under Part 48 guidelines this workforce population can be divided into four categories for training purposes. These classifications are experienced miners, persons who enter the mine for specific task performance, newly employed experienced miners and newly employed inexperienced miners. Experienced miners are persons who have at least 12 months mining experience in the preceding three years and have worked at the mine site where they are currently employed for at least one year. Persons who need specific task training are those individuals who will only be in the work environment a short period of time, have a limited exposure to hazards, and will be under the direct observation or supervision of experienced mine personnel. Included in
this group of persons who require specific task training are:
corporate management, office personnel, outside contractors, short-time or temporary employees and vendors. Newly employed experienced miners are those new hires who have at least 12 months mining experience in the preceding three years or a certificate showing they have completed an approved Part 48 new miner training program. Newly employed inexperienced miners are those persons who do not have previous work experiences in the mining industry and have not completed an MSHA approved Part 48 training program (24).

Each of these classifications of miners has different training requirements. Experienced miners must receive a minimum of eight hours of health and safety training each year. This training is supposed to be structured to refresh experienced personnel in such areas as first aid and mine emergency procedures. During these refresher training sessions, new problems related to hazards at the mine can also be reviewed. No provisions are made for a specific number of hours for specific task training. The law requires that persons entering the mine in this classification be made aware of the hazards they will be exposed to and safety measures necessary to safely travel or work in the mine. Part 48 also requires that these persons be under the direct observation or supervision of experienced personnel.

Newly employed experienced miners are required to be instructed in the hazards and safety procedures that are unique to that mine
before they can enter the work environment. No specific hours are
assigned for the completion of this training. Newly employed inexperi-
enced miners are required to complete a training program in the
following subject areas before they can enter the work environment:
statutory rights of miners, hazard recognition, transportation controls
and communication systems, health hazards, respiratory devices, mine
emergency procedures, first aid, explosives, electrical hazards, and
illumination and water hazards. Part 48 guidelines require that this
training be for a minimum of 40 hours for underground operations and
a minimum of 24 hours for surface operations. The goal of this training
is to give persons with no mining background a conceptual knowledge
of accident prevention and hazard recognition, as well as how these
are related to the work environment of the mine at which they will be
working (24).

Newly employed inexperienced miners were chosen for the study
because they have a much higher accident rate than experienced
miners. In testimony before the House of Representatives Subcommittee
on Health and Safety, Robert Lagather, Assistant Secretary for Mine
Safety and Health stated that MSHA studies indicate that the first year
an employee is on the job, he is approximately twice as hazardous as
subsequent years (15, p.33). The prime reasons for this are that
hazards exist in the work environment that inexperienced persons will
not be aware of and generally inexperienced miners do not possess the
necessary skills and knowledge associated with safe operating
procedures to work around these hazards in a safe manner.
Role of Industry and Government

The Federal Mine Health and Safety Act of 1977 clearly places the task of miner safety and training within the realm of responsibility of the miner operator (9, pp. 31-32; 10, p. 1; 29, p. 10). According to Robert Lagather, Assistant Secretary for Mine Safety and Health, the government's role in mine health and safety is:

......to develop and implement training rules which are responsive to the legitimate concerns of the industry but which will ensure an adequate measure of training for the Nation's miners (29, p. 32).

Under Lagather's direction, MSHA has made a concentrated effort to work with industry and to receive its input as to problems mine operators experience in implementing the requirements of the regulations. In order to establish better lines of communication, MSHA personnel have conducted over seven hundred informational meetings with industry (29, p.31). When major problem areas were identified, MSHA worked with industry to provide a system that was workable for all parties concerned. Examples of this joint cooperation are changes in the following areas:

1. Scheduling of the initial twenty-hours of new surface mine training over an extended period of time.
2. Flexibility in obtaining instructor certification.
3. Clarification of who falls under the definition of a new miner.
4. Identification as to what type of training to provide for customer haulage truck drivers.
5. Interpretation of the strategy for conducting hazard training for equipment manufacturer's service representatives (29, pp. 27-31).

Public Reaction to Part 48

The enactment of mandatory health and safety training requirements has generated more adverse reaction from the public than all other sections of the Act and the subsequent subparts combined. This is evidenced in part by the lawsuits lodged by the National Sand and Gravel Association, National Crushed Stone Association, National Industrial Sand Association, National Ready Mix Cement Association, Associated General Contractors of America, and other interested groups.

Congress' reaction to this extreme amount of public pressure has been to attach a rider to MSHA's appropriation bill for fiscal years 1980 through 1985. This move by Congress prohibits MSHA from expending any federal funds for the enforcement of Section 115 of the Act (Part 48) or Section 104(g)(1) of the Act which provides for enforcement of the regulations (17, p. 3; 28, p. 4). The law still requires mining companies to conduct the training, but puts no penalty in the enforcement procedure against sand and gravel, surface stone, surface clay, surface limestone and colloidal phosphate operations (19, p.2; 21, p.2). This has resulted in government inconsistencies in ensuring that miners receive Part 48 training and suggests that Congress feels it has gone too far in requiring regulations with little or no supporting evidence to uphold them (17, p. 3; 21, p.2).
Impact of Training on Accidents

Miners work in extremely hazardous work environments. One mistake can result in an accident that could end in a disabling injury or fatality. Hazards commonly found in mining work environments include:

- Large pieces of mobile equipment such as trucks with tires ten feet high.
- Jaw crushers that can smash a boulder the size of a car.
- Endless pinch points on stationary equipment.
- Miles of belt conveyors.
- Large amounts of electricity.
- Explosives.
- Water hazards.
- Storage bins and stock piles of material.
- Hazards of falling rocks.
- Plants where miners must work at various levels and heights.
- Exposure to noise and respiratory hazards.
- Potential exposure to dangerous chemicals or gases.

Unfortunately, a person does not always get a second chance to make a mistake. According to the latest statistics available from the Bureau of Labor Statistics and reported by the National Safety Council, one common measure in comparing hazardous occupations is analyzing the industries' incidence rate. This is calculated according to the following formula (2, p. 148):
# of lost days or # of injuries and illnesses \( \times 200,000 \)

\[
\frac{\text{total manhours worked}}{} 
\]

The 200,000 figure which represents 100 full-time employees is used as a constant for comparison in the formula. Analysis of an industry's incidence rate can be done by reviewing injury and illness figures from several prospectives: days away from work and deaths, days away from work, total lost workday cases and total reportable cases. The following statistics from the Bureau of Labor Statistics compare selected mining incidence rates with those of all industries combined:

### Incidence rate - days away from work and deaths

<table>
<thead>
<tr>
<th>Industry</th>
<th>Incidence Rate</th>
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<tbody>
<tr>
<td>All industries</td>
<td>2.56%</td>
</tr>
<tr>
<td>Crushed stone</td>
<td>5.47%</td>
</tr>
<tr>
<td>Nonmetal</td>
<td>4.88%</td>
</tr>
<tr>
<td>Coal</td>
<td>4.21%</td>
</tr>
<tr>
<td>Cement</td>
<td>3.86%</td>
</tr>
<tr>
<td>Metal</td>
<td>3.00%</td>
</tr>
</tbody>
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### Incidence rate - days away from work

<table>
<thead>
<tr>
<th>Industry</th>
<th>Incidence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>47%</td>
</tr>
<tr>
<td>Nonmetal</td>
<td>139%</td>
</tr>
<tr>
<td>Metal</td>
<td>115%</td>
</tr>
<tr>
<td>Crushed stone</td>
<td>100%</td>
</tr>
<tr>
<td>Cement</td>
<td>87%</td>
</tr>
<tr>
<td>Coal</td>
<td>66%</td>
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</tbody>
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### Incidence rate - total lost workday cases

<table>
<thead>
<tr>
<th>Industry</th>
<th>Incidence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>3.46%</td>
</tr>
<tr>
<td>Goal and silver</td>
<td>6.61%</td>
</tr>
<tr>
<td>Sand and gravel</td>
<td>5.93%</td>
</tr>
<tr>
<td>Nonmetal</td>
<td>4.94%</td>
</tr>
<tr>
<td>Coal</td>
<td>4.50%</td>
</tr>
<tr>
<td>Metal</td>
<td>4.35%</td>
</tr>
<tr>
<td>Uranium</td>
<td>3.86%</td>
</tr>
<tr>
<td>All mining combined</td>
<td>2.95%</td>
</tr>
<tr>
<td>Crushed stone</td>
<td>2.24%</td>
</tr>
</tbody>
</table>

### Incidence rate - total reportable cases

<table>
<thead>
<tr>
<th>Industry</th>
<th>Incidence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All industries</td>
<td>7.77%</td>
</tr>
<tr>
<td>Nonmetal</td>
<td>15.18%</td>
</tr>
<tr>
<td>Metal</td>
<td>14.80%</td>
</tr>
<tr>
<td>Coal</td>
<td>12.56%</td>
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On a comparable basis, the total number of lost workday cases for mining is about the same as all industries combined; but when the severity (days away from work and deaths, or days away from work) is taken into consideration, mining accidents are about twice as severe (1, pp. 30-36; 26, pp. 104-110; 31, pp. 6-10).

In addition to the tremendous loss in terms of human suffering, accidents present a considerable drain on industries' financial resources. A study conducted by the New York State Workmen's Compensation Board provides some indication as to the magnitude of the costs of mining accidents. In 1976 the Workmen's Compensation Board analyzed 126,208 disabling injuries and calculated that the average compensation paid per mining related injury was $7,352. This figure was second only to longshore accidents which cost an average of $9,147 per case. When compared to an average of $2,912 per case for all industrial injuries combined, it is seen that in this study mining accidents cost over twice the average rate for all industries (1, p.27). Without any question this figure would be much higher based on today's economy. Besides the human suffering and direct cost, accidents can result in the following additional indirect costs and problems:

1. Loss of production.
2. Increased downtime.
3. Overtime necessitated by the accident.
4. Damaged equipment.
5. Increased worker's compensation rates.
6. Lost time wages paid the injured worker.
Bad publicity.
Increased paperwork.
Lost time investigating accidents.
Increased inspections by MSHA which cost both time and money.
Replacement costs in training or lower productivity if a miner must be replaced.

Generally the indirect costs of an accident account for a much larger percent than direct costs (2, pp. 168-169). This study closely correlates with the findings of a research project conducted by the Colorado School of Mines in 1978 of safety costs at western coal mining operations. The Colorado School of Mines study revealed that accidents cost the coal mining industry $1.34 per ton for underground operations and $.07 per ton for surface operations. This figure is staggering when it is taken into consideration that annual western coal production runs around 750 million tons per year (13, pp. 1-11).

Health and safety training is viewed by many people as a major part of the answer to reducing accident rates in the mining industry. A study of thousands of accidents revealed that ninety percent of accidents could be attributed to a lack of knowledge and/or skill (14, p. 34). These types of deficiencies are the problem areas that well-designed education and training programs can solve. This concept is further supported by research findings from studies conducted by the Peabody Coal Company, the state of West Virginia, and the Kentucky Department of Mines. The findings of these studies seemed to indicate that miners who went through formalized training programs worked
more safely and productively. Unfortunately, these studies did not have the statistical validity and reliability to prove a cause and effect relationship between training and accident reduction (7, p. 64; 27, p. 2).

Financial Impact of Training Requirements

No determination as to the exact financial impact of training costs on the mining industry has been made. In a report from the Office of Education and Training, MSHA, the statement was made that due to the diversity of the industry and the strategies utilized to comply with the training requirements, no statement of specific economic impact could be made (24, p. 47458). The cost factor of conducting training programs is extremely important to industry due to the numbers of persons who must be trained, the millions of manhours spent by miners in a training status and the cost of program development. Without any question the financial burden that industry must bear to comply with Part 48 runs into the billions of dollars per year.

Time Factor Involved in Conducting Programs

The Act requires that each newly employed inexperienced surface miner receive a minimum of 24 hours of training, each newly employed inexperienced underground miner receive a minimum of 40 hours of training, that all miners receive a minimum of 8 hours annual refresher training and that before a miner can be assigned unsupervised work activities the appropriate level of task training must be conducted (16, p. B-1). All of this training must be done during normal working hours. This means that the total training effort must be done on
company time (9, p. 32). In addition to the cost factor, a tremendous amount of production time must be allocated for training purposes. This can and does result in tremendous scheduling difficulties.

Effect of Non-Compliance of Regulations

Mining companies cannot afford to be found in non-compliance of the provisions of Part 48. When Part 48 Regulations were promulgated, there were provisions provided for severe civil penalties for the non-compliance with training regulations. If a federal mine inspector finds a person in the mine who has not received the necessary training, the employee will be removed from the work environment and the company will be issued a citation which carries a substantial monetary fine. The company must continue to pay that employee and must see that the required training is conducted. This could lead to production problems as well as the cost of the fine. Operators cannot afford to turn the training into a paperwork exercise because the penalties for this are even more severe. If companies are found to have falsified training certificates, they can receive a fine of up to $10,000 and the person who falsely signed the document could be imprisoned for up to five years (9, pp. 26-27). In short, the penalties for not conducting the required training are severe.

Definition of Terms

For the purpose of this study, the following terms need to be defined:


3. **Mine** - any operation engaged in the extraction and/or production of a mineral resource.

4. **Miner** - any person who is engaged in the extraction and/or production process or any person who is exposed to hazards within the mine environment.

5. **Mine Safety and Health Administration (MSHA)** - the regulatory agency of the U.S. Department of Labor that is charged with the enforcement responsibility of the provisions of the Act.

6. **Newly employed experienced miner** - a person who has had at least one year mining or related experience within the preceding three years or has successfully completed an approved Part 48 new miner training program.

7. **Newly employed inexperienced miner** - a person who has less than one year mining experience within the preceding three years and has not completed an approved Part 48 new miner training program.

8. **Operator** - the owner or any other person who operates, supervises or controls the mine.
9. **Part 48 - health and safety training and retraining**

   rules and regulations mandated by Section 115 of the
   Act.

**Summary**

The passage of the Federal Mine Health and Safety Act by Congress and its implementation by the Mine Safety and Health Administration (MSHA) has created a significant training requirement for the mining industry. In order to comply with these regulations, mining companies will be required to allocate a tremendous amount of resources including time, manpower and money to their corporate training efforts. The requirement of manhours of training will range from eight hours for an experienced miner who does not change jobs to over forty hours for a newly employed inexperienced miner (9). When this training requirement is multiplied by the approximate 480,000 miners in the United States, the number of training manhours will easily run into the millions. Industry must also bear the full cost of this expenditure of time because Part 48 regulations requires that all training be done on company time (9). When it is taken into consideration that in December 1981 that the average hourly wage per hour in mining ranged from a low of $8.09 per hour in crushed stone operations to a high of $12.38 in coal mines, the direct financial cost in terms of compensation for workers while in a training status could easily run into the billions. Add to this figure the cost of developing and managing each individual company training program and the costs become even more staggering. In addition to the billions of dollars
that industry must spend on Part 48 training, the federal government
must make a sizeable investment in terms of money and manpower in
order to enforce the regulations.

With all of the resources that are required for compliance with
Part 48 regulations, the question that remains to be answered is what
positive benefits will the mining industry and our nation's miners
realize from the conducting of mandatory health and safety training.
At present little research has been conducted that analyzes the effect
of Part 48 on such areas as: productivity, absenteeism, turnover,
employee morale, safety and the overall health and safety
knowledge level of miners. Only when additional research is done in
these areas will the effects both positively and negatively of Part 48
be able to be analyzed. This study attempts to deal with one aspect
of this problem, the impact of Part 48 training regulations of the
health and safety knowledge levels of our nation's miners.


CHAPTER II

REVIEW OF RELATED LITERATURE

Since 1910 when the Organic Coal Mining Act was passed, there has been government regulation of the mining industry. Fragmented throughout the thousands of health and safety standards that have been promulgated since this time have been a variety of minor training requirements. None of these training regulations have come close to impacting the mining industry in the same manner that Part 48 of the Federal Mine Health and Safety Act of 1977 has.

While there has never been a published study concerning the impact of mandatory health and safety training on the competency level of individual miners, there have been a number of studies that are directly related to this training issue. This research includes:

- Bureau of Mines Survey (1963)
- Bendix Study (1975)
- Westinghouse Behavioral Sciences Center Study (1976)
- National Academy of Services Study (1982)
- University of Washington Study (1982)
- Mine Safety and Health Administration Study (1982)
- National Crushed Stone Association Study (1982)

In addition to these studies, numerous primary resources are available concerning the impact of Part 48 training on the competency level of newly employed inexperienced miners. Sources of information
utilized in analyzing the background and significance of this research proposal included: accident analysis reports, copies of speeches given at national meetings, U.S. Department of Labor manuals, MSHA management letters, MSHA reports, regulations, testimony and written comments from public hearings, and other sources as documented in the bibliography of this proposal.

Bureau of Mines Survey (1963)

Research related to education and training in the mining industry began with a survey conducted by Robert F. Davis and R. W. Stahl of the Bureau of Mines in 1963. The objective of their survey was to conduct a detailed analysis of the safety organizations and activities of the coal industry's safety award winning companies. The target population for Davis and Stahl's study was twelve coal companies that had won either a National Safety Council or Joseph A. Holmes Safety Association award between 1957 and 1961. Of the twelve companies studied, twenty-one unique features related to their safety organizations and activities were identified. Six of these elements were directly related to education and training. These features that related to the companies' education and training function were:

1. Training of all mine personnel (supervisors and workmen) in job safety procedures.
2. Follow-up training in job safety procedures.
3. Periodic evaluation of supervisors and workmen in job safety procedures.
4. Attitude testing of safety violators and accident victims.
5. New employee orientation and indoctrination program.
6. Daily safety meetings (5).

An interesting aspect of these education and training activities is that they were perceived primarily from a safety standpoint on the part of the companies.

The major problem associated with this type of survey is that the researchers only looked at companies with exemplary safety records. With no control group to compare the elements identified as common to the award winning companies, a cause and effect relationship can not be shown to prove that these factors were truly responsible for the low accident rates.

Bendix Study (1975)

In 1975 with a grant from the Bureau of Mines, the Bendix Corporation began a study to provide a description of current mining training programs (objectives, sources of training, and methods and materials utilized) and evaluate the effectiveness of these programs. Bendix researchers analyzed 300 mining operations during the study in order to include as many different mining environments as possible (1, pp. 231-232). The results of their study provided some interesting conclusions.

1. Research indicated there is no best approach or method by which to train miners.
2. According to the Bendix report, "the effectiveness of the training depended on the skills with which the available resources were applied to the perception of the need for training" (3, p. 51).

3. When training was required by law, union contract or company policy; it resulted in little more than a paperwork exercise.

4. Training programs conducted in roof and rib control, haulage, electrical safety, machinery and general accident prevention yielded the highest correlation that training resulted in a reduction in accident rates.

5. Miners responded more positively to training programs initiated by the operator in response to a perceived need (3, p. 51).

6. Approximately half of the total training effort in the mines evaluated had worth and value (3, p. 52).

7. The most effective safety training programs were those aimed at specific problem areas (3, pp. 52-53).

Westinghouse Behavioral Service Center Study (1976)

In 1976, the National Institute of Safety and Health (NIOSH) funded the Westinghouse Behavioral Services Center to conduct a large-scale survey of the behavioral, organizational and psychological factors in the coal industry. Westinghouse researchers compared responses of miners who worked in mines with extremely high
accident rates with miners who worked on operations with exceptionally low accident rates. The results of the survey identified the following major problem areas in operations with extremely high accident rates.

1. Ineffective organizational communications.
2. Lack of involvement by the workers in making decisions regarding health and safety practices in the work environment.
3. Need for a systems approach to the organization of work activities.
4. Poor and inadequate job skills and safety training.
5. Ineffectiveness of safety personnel (11).

The study specifically identified training as a major deficiency within companies that had accident problems. For these operations to improve their safety records, education and training in a wide range of subject areas of all mine personnel would have to take place.

National Academy of Sciences Study (1982)

In response to a recommendation by the President's Commission on Coal, the National Academy of Science conducted a research study to identify factors that distinguish a safe mining operation from the most dangerous mines in the United States. The initial phase of the project involved interviewing experts in the field of coal mining: officials from MSHA and the Bureau of Mines, coal company executives, union officials, directors of research agencies and coal miners.
The consensus of opinions from these groups was that the key to increased improvement in mine safety was not to be found in existing literature or the further application of existing safety rules. With this information, phase two of the project was started. This involved a detailed analysis of nearly 40,000 disabling injuries and fatalities which occurred during a three-year period from 1978 to 1980 in underground coal mines (9, p. 2).

The findings of their research indicated that there were significant differences between the injury rates of major coal mining companies. These differences could not be explained by physical differences in the work environment, technology utilized by the company or geographic location. The researchers felt the only logical reason for these differences were due to factors internal to the companies. The most important of these factors were: management's commitment to safety as measured by their attention and resources devoted to improving safety, cooperation between labor and management in developing and maintaining safety programs and the quality of training programs for employees and supervisors.

To make underground coal mines a safer place to work, National Academy of Science researchers presented the following recommendations for mine management and government.

For management:

1. Greater commitment to safety.
2. Higher degree of cooperation with labor.
4. Publicize the evidence that safety can enhance productivity (9, pp. 14-18).

For federal and state governments:
1. Continued enforcement of existing rules and regulations.
2. Provide consultative services to industry.
3. Substantial increase in the financial aid to educational institutions that provide health and safety training.
4. Improve methods for gathering and analyzing safety data.
5. Provide tax incentives for safety expenditures.
6. Increase training requirements (9, pp. 18-22).

One area that was a recommendation for both management and government involved education and training. Most managers, supervisors and workers that researchers talked to agreed that education and training is highly beneficial to safety. The twelve companies that the National Academy of Science researchers studied showed a direct correlation between good safety records and the company's emphasis on a quality education and training program (9, pp. 9-10). The National Academy of Science felt so strongly in the positive impact of training on safety that they set forth the following recommendations:

1. That the time allotted to new miner training be increased by an additional 40 hours (9, p. 21)
2. Some form of objective evaluation (explanation, written test, demonstration or on-the-job performance) should follow all training activities (9, p. 21).

3. That a minimum number of hours for task training areas be established after carefully considering the work environment in which the task will be performed.

4. Minimum educational requirements should be established for certain jobs.

5. Companies should provide more direct support for educational institutions that offer mining technology and geological engineering programs (9, p. 17).

6. States establish vocational educational programs for miners, mining technicians and mine safety technicians (9, p. 21).

7. That a major upgrading of all educational and training requirements and programs for all miners (new and experienced) and supervisors occurs (9, p. 17).

University of Washington Study (1982)

One of the biggest problems that safety proponents have had to contend with is the attitude that safety training interferes with productivity. In 1979 with funding from a Bureau of Mines grant, Martin Chambers and Cecil Bell started a research project to study the impact that a program of organizational and management development which emphasized an increase in safety behavior had on productivity.
For their two and a half year study, Chambers and Bill selected Heckla Mining Company of Idaho and Texas Gulf of Wyoming to serve as their research subjects.

At the Heckla operation, Bell concentrated his efforts around organizational development techniques which emphasized a series of team-building and problem-solving meetings (2, p. 3). Bell tracked those meetings with the operation's productivity and accident record. During the period in which these meetings were conducted, the Heckla operation reduced its incidence rate of lost time injuries from 21.1 injuries per 200,000 manhours in 1980 to 11.4 injuries per 200,000 manhours in 1982 to 4.00 in the first quarter of 1982 (2, p. 8). These figures strongly indicate that the training intervention had a significant positive effect on safety performance in the work environment. As for the effects of the program on productivity, Bell's findings were less conclusive. Several factors such as a long history of declining production and a labor strike made it more difficult to draw conclusions. Productivity improvements were shown in the last two quarters of 1981 and continued into the first quarter of 1982 when the project was concluded (2, p. 9).

At the Texas Gulf soda ash operation in Wyoming, Chambers concentrated his activities around presenting a series of management development training programs to first line supervisors (2, p. 12). The supervisory skills training programs which were conducted from May of 1980 to August of 1981 focused on increasing safety behavior (2, p. 16). By the end of the training sessions there was such
employee-wide acceptance of these sessions that they were incorporated into the company's overall training program. Data analysis of the program's effect on productivity and safety showed significant improvement in both areas. Productivity at the Texas Gulf operation increased by 10 to 15 percent (2, pp. 17-18).

The projects at Heckla and Texas Gulf, while they both differed in approach, each showed that a training intervention had positive effect on the levels of productivity and safety records of both work environments.


A study that attempted to analyze the impact of Part 48 mandatory health and safety training standards on the pattern of injury rates in the mining industry was conducted by John S. Curtis of the Department of Labor in his doctoral dissertation study in 1982. From statistics compiled by the Department of Labor's Health and Safety Analyses Center, Curtis was able to identify a trend in the number of days lost rate (NDL) for new miners since the implementation of mandatory training requirements. No trends could be found for fatal, incidence and no-fatal days lost rates for surface and underground miners (4, p. 4).

Findings of Curtis' research are:

1. Health and safety training may have an effect on reducing minor types of injuries.

2. Health and safety training has not had an effect on reducing serious types of accidents.
3. Newly employed experienced miners had the highest incidence rates of accidents (4, pp. 105-106).

This study provides an excellent systematic analysis of accident statistics in the mining industry from April 1980 to June 1981. Through research such as that conducted by Curtis, problem areas that can be addressed in health and safety training can be identified.

Mine Safety and Health Administration Study (1982)

Considerable progress has been made in recent years in reducing the number of fatalities in the mining industry. This progress has been due to a new and improved technology, increased education and training programs, and increased government enforcement activities. Unfortunately, the frequency of disabling injuries in surface and underground mines has not decreased at any where near the same rate as fatalities. In response to this problem, the Mine Safety Administration (MSHA) conducted a study in 1982 to identify causal factors contributing to disabling injuries in underground coal mines (8, p. 1).

Forty mines were selected by MSHA and surveyed through the utilization of a detailed questionnaire. In order to survey all populations with the work environment, five questionnaires were developed and administered to the following groups: mine superintendents, first line supervisors, safety department personnel, safety committee members (laborers), and MSHA inspectors (8, p. 19).
Numerous findings of the MSHA study related directly to health and safety training programs. These findings are as follows:

1. Training can be an effective tool for reducing accidents and injuries.
2. Training has few positive effects unless it is specifically designed to meet the miners' needs.
3. Many miners believed that the training they received was basically designed and conducted to administratively satisfy MSHA Part 48 requirements.
4. Safety training to be effective needs to utilize relevant training materials, be conducted by qualified instructors, restricted in class size and be conducted in a manner that is conducive to encourage miner involvement (8, p. 44).

National Crushed Stone Association Study (1982)

In mid-July 1982 the National Crushed Stone Association released its findings of a study they conducted when government enforcement responsibilities for surface aggregate operations were transferred from the Mine Safety and Health Administration (MSHA) to the Occupational Safety and Health Administration (OSHA).

When jurisdiction was shifted from MSHA to OSHA, there was an immediate and dramatic drop in the number of inspections of the workplace due to the limited amount of OSHA's available manpower. This decrease in government control was something that the mining industry had heavily lobbied for and was seen by industry as in their
best interest. Faced with the possibility that surface aggregate operations might be transferred back to MSHA, the National Crushed Stone Association conducted a study to evaluate the impact of the original transfer of jurisdiction on the mining industry.

During the seven-month period under which surface aggregate mining operations were subjected to a very limited amount of government control under OSHA's enforcement responsibility:

1. There was a 30 percent reduction in the number of fatalities in surface mines.

2. There were 10,000 less government inspections. This translates into a savings in excess of $5 million to mining companies.

3. With a fewer number of inspections, there was a reduction of an estimated 30,000 citations and orders which could have resulted in an estimated $2 to $3 million in civil penalties.

4. Companies saved more than $2 million in personnel costs whose time would have been diverted from production activities to perform tasks necessary to comply with MSHA requirements.

5. Companies realized a savings upwards of 50,000 manhours of company personnel whose efforts would have been necessary to conduct MSHA required work site checks and other reporting.
6. An additional savings of perhaps as many as 50,000 manhours of company personnel efforts to gather information, prepare for and participate in assessment conferences to reduce MSHA civil penalty assessments (10, p. 5).

The one area that the National Crushed Stone Association could not study was the effect that this transfer of authority had on the federal government. But the financial savings to the government and indirectly the taxpayers had to be substantial when it is taken into consideration the millions of dollars that it must take to conduct 10,000 work site inspections and administratively process the thousands of reports that would have been generated by MSHA during this seven-month period.

The goal of the National Crushed Stone Association's study was to analyze the impact of the transfer of enforcement responsibilities from MSHA to OSHA. The findings of their research was that a reduction in the amount of direct intervention on the part of the government in the day to day operation of surface aggregate operations had a significant positive impact on the industry.

Conclusion

These studies have all dealt with the impact of training on the performance of individual miners. However, none have specifically addressed the issue of the impact of Part 48 training on the health and safety competency level of new miners. What is needed,
therefore, is to expand the general research that has already been
done and begin to concentrate on more detailed analysis of specific
areas of training.


CHAPTER III

RESEARCH METHODS AND PROCEDURES

The Population

According to MSHA statistics, 529 mining operations are active in the state of Texas (5). For the purposes of this study, only surface mines with at least 25 persons were surveyed. Applying this restriction to identifying the population, 102 mines in Texas are surface operations and employ at least 25 miners at the mine site.

MSHA statistics identify that 22,498 miners are employed at these 529 active mining operations (5). This population consists of experienced miners, newly-employed experienced miners and newly-employed inexperienced miners. For the purposes of this study only newly-employed inexperienced miners were surveyed.

Design of the Study

A two-group pretest, posttest control-group research design was utilized for this study. Group one of the population surveyed consisted of newly employed inexperienced miners who received a Part 48 training program in accordance with MSHA requirements. Group two subjects were newly employed inexperienced miners who did not receive Part 48 training under MSHA regulations. Group one was the experimental group because it received the intervention of a formalized Part 48 training program. Group two was the control group because it was not required to be trained in accordance with
Part 48 Mandatory Health and Safety Training Standards. Both
groups were pretested to identify the health and safety knowledge
level that each person possessed upon hiring. This procedure sought
to examine the effect of any prior knowledge of the posttest scores
for both groups. Before the newly employed inexperienced miners
from both groups went through the company's strategy for training
new employees, they were pretested using the questions from the
knowledge inventory. This pretesting identified the individual's prior
health and safety knowledge levels before going to work at that
company. When the miners from both groups had completed the
company's training program regardless how structured or unstructured,
they were posttested to measure the effectiveness of the training
strategy. The pretesting procedure provided data to identify a
possible cause and effect relationship between a formalized Part 48
training program and a higher health and safety knowledge level when
compared to persons who had not received this training. Pretesting
also helped remove questions that the new miners could have had
prior knowledge that would have impacted the posttest scores. The
Part 48 training program was the treatment in the study. Only group
one received the treatment. Both groups were posttested; group one
was tested upon completion of sixty days of employment. This sixty
day time frame was used for group two because it is the time period
allowed by MSHA for mandatory health and safety training to be
completed. (1) (3).
Selection of the Sample

For the purpose of this study, mining operations in Texas can be divided into two major groups: those companies under the training exemptions provided by House Resolution 668 and those companies which must comply with all Part 48 training requirements and are subject to a compliance evaluation of their training program by the inspection division of MSHA. In 1979, House Resolution 4389 provided training exemptions for shell dredging operations and sand, gravel, surface stone, surface clay, colloidal phosphate and surface limestone miners (6). Under this resolution, MSHA could not expend any funds to enforce training requirements under Part 48. This exemption was continued and remains in effect presently when on July 18, 1982, House Resolution 668 was passed. In essence this resolution created two distinct groups: those companies which were exempt from Part 48 and those companies which had to comply with all the provisions of Part 48. Each of these groups were used as a sample for the purposes of this research study. All companies selected for the survey were placed into one of these two sample populations.

Due to the similarity of the types of mining operations found in Texas, the size of the sample needed for a meaningful study, ease of administration of the competency inventory and the economics involved in conducting the study, this research study surveyed a random sampling of Texas mining operations with at least twenty-five employees.
Using MSHA mine reference file reports, 106 operations were identified in Texas that had at least 25 employees (5). Of these operations, four were underground mines and were excluded from the study. This left 102 operations that could be potentially surveyed.

These 102 companies were divided into one of the following categories: those companies that are required to conduct Part 48 training programs and those that are not required to conduct Part 48 training. This resulted in 55 companies that were excluded from MSHA training requirements and 47 companies that were required to conduct Part 48 training.

Using the last number of an operation's MSHA identification code number, four operations were randomly selected from each group for participation in the study. With the scope of the research limited to newly employed inexperienced miners, the sample size of the group that conducted a Part 48 training program was 113 and the size of the group that did not conduct a formalized Part 48 training program was 131.

**Instrumentation**

MSHA's Health and Safety Knowledge Inventory (Appendix B) was utilized to measure the health and safety knowledge level of individual miners. This instrument was developed and implemented in 1978 by the Education and Training Division of MSHA to evaluate mine operator's training programs for compliance with Part 48 regulations. Under a contract with MSHA, the inventory was validated by the Continuing Education Division of Penn State University. According to
Richard Zolonka of Penn State, studies were conducted at sixteen mining operations over a three-year period of time to validate the instrument.

The inventory consists of 33 questions divided into ten sections. Each section represents an important subject area about which every newly employed inexperienced miner should be knowledgeable. The ten major sections of the inventory are: statutory rights, hazard recognition, transportation controls and communication systems, health, self rescue and respiratory devices, escape and emergency evacuation plans, first aid, explosives, electrical hazards, ground control, and illumination and water hazards (7).

The first subject area of the knowledge inventory deals with instruction in the statutory rights of miners and their representatives under the Federal Mine Safety and Health Act of 1977 and the authority and responsibility of supervisors. Questions center around the miner's knowledge of federal mining regulations, a review and description of the line of authority of company supervisors, an introduction to the company's operating policies and procedures and the company's procedure for reporting hazards.

Hazard recognition is the second competency area that the inventory covers. The purpose of hazard recognition training is to teach an employee the hazards of the work environment and how to safely avoid them. As previously discussed, most mining operations have very hazardous working environments where in many cases the slightest error or misjudgement can result in an accident. In addition,
most operations have a large number of different types of hazards. Hazards that are not confined to one specific area of the operation or limited to a few types of concerns make the need for a newly employed inexperienced person to be properly indoctrinated in hazard awareness even more imperative. Also, many hazards are unique to that mine. For example, haul road traffic rules are going to be different at every mine. This section should also emphasize the role of the individual in safety. It is the company's responsibility to remove to the highest degree possible unsafe conditions and train employees in safe operating procedures. It is the responsibility of the individual to report unsafe conditions, not create them and not commit unsafe acts.

The third area of the knowledge inventory is transportation controls and communication systems. This subject area covers two major issues: the procedures for riding in or on mine conveyances and the use of mine communication systems, warning signals and directional signs. This subject area is very important for two reasons. Most operations use a lot of mobile equipment which is extremely dangerous to work around. Also, should an emergency occur all miners within the work environment need to know where the closest means of communication is and how to use it.

Health is the fourth subject area covered by the knowledge inventory. Under Part 48 training standards miners should be knowledgeable in the following aspects of health as related to their working environment: the purpose for taking noise and dust measurements,
hazards associated with prolonged exposure to excessive levels of noise or dust, the mine's health control plan, how to use protective respiratory and auditory equipment and information on warning labels of any hazardous materials that may be used in the mine.

Self rescuer and respiratory devices is the fifth subject area of the knowledge inventory. The main emphasis of this area is the detection of hazardous underground gases and the equipment used to protect a miner from them.

The sixth area of the knowledge inventory involves training in the company's escape and emergency evacuation plans, firewarning and firefighting. When an emergency occurs it is not the time to learn what to do. In many cases in a mining environment it could be a life or death situation. If an explosion occurs, a miner needs to know how to get to safety as quickly as possible. If a fire starts, miners need to know how to report it, when they should fight a fire, how to fight it if that is the best alternative, when they should evacuate the area and the best means to do so.

First aid is the seventh area of the knowledge inventory. Not all accidents can be prevented and the work environment can only be made so safe. In addition, the fact that many mining operations are located in isolated rural areas and there is not close proximity to medical treatment should an injury occur makes the need for first aid training even more important. Questions covered in this subject area reflect a knowledge of the Bureau of Mines First Aid Manual. Attention to detail is very important in responding to the questions in this
subject area. Getting one step out of order in the artificial
ventilation process can make the entire process ineffective. It is
important to note that the Bureau of Mines first aid procedures
differs from those of the American Red Cross because they address
accidents related to mining which can be quite different than accidents
commonly reflected in American Red Cross training.

The eighth area of the knowledge inventory covers explosives.
This area of instruction includes the safe storage, transportation and
handling of explosives. It also should include the recognition of
explosives for persons who do not work with them and how to work
safely in an area in which explosives are being used.

Training in electrical hazards is the ninth area covered in the
knowledge inventory. An awareness of electrical hazards in the work
environment and safe operating procedures in dealing with electricity
is important because electrocution is one of the leading causes of
fatalities in surface mining.

The last subject area of the knowledge inventory is ground
control; working in areas of highwalls; water hazards, pits and spoil
banks; and illumination and night work. Part 48 training should
include instruction in the company's highwall and ground control
plan; safe operating procedures for working around water hazards,
pit areas and spoil banks; and safe work procedures for working at
night.

Each of these subject areas represents a critical set of skills
that a newly employed inexperienced person in the mine environment
should possess. Within each of these subject areas are representative
questions to assist in evaluating the degree to which a person has mastered the skills required for each competency area of the knowledge inventory. The test questions on the inventory can be divided into three categories. Questions 1, 2 and 3 refer to the Federal Mine Safety and Health Act of 1977 and Part 48. Unless a person had worked in the mining community and completed training in this area, he or she would have no knowledge of the elements of the first subject area of the inventory. A second group of questions are specific to that mining operation and even if a person was knowledgeable about mining, he would have no way of knowing the answers to questions 4, 5, 6, 7, 8, 9, 15, 17, 18, 19, 20, 28, 29, 30, 31, 32 or 33. Also included in the inventory are questions that there might be a slight possibility that a new miner may have prior knowledge of the subject area. Questions that fall into this group are 10, 11, 12, 13, 14, 16, 21, 22, 23, 24, 25, 26 and 27. The most prevalent source of this prior knowledge would come from military or other industrial training.

The intent of the law is to provide for the health and safety of miners. The questions on the inventory are structured in such a manner that they require knowledge of specific hazards and safety procedures of the work environment to which the miner will be exposed. With the exception of the sections on statutory rights, health, first aid and explosives, all questions on the inventory are specifically related to the mine at which the newly employed inexperienced miner will be working.
Procedures for Collection of the Data

Three companies that conduct Part 48 training and three companies that did not conduct Part 48 training participated in the study. For the purposes of reporting the data, those companies that conducted a Part 48 training program are referred to as "group 1" and those companies that did not conduct a Part 48 training program are referred to as "group 2." When the study was concluded, 113 miners in group 1 had been tested and 132 miners in group 2 had been tested. The period of time over which the study was conducted was during 1982 and 1983. This length of time was needed in order to get a sufficient sample size. This time frame was longer than originally anticipated for the following reasons:

1. Over the past several years the mining industry in Texas has been faced with a tremendous slowdown in business.

2. Many companies have made cutbacks in their number of employees.

3. Companies have not been replacing many individuals who leave.

4. Some companies have been eliminating or cutting back on second and third shift operations.

5. Limited job opportunities at other companies have made it very difficult for people to move from job to job at will.
6. Numerous companies have gone out of business. This put more experienced miners in the job market. These persons are more likely to be hired than inexperienced persons.

7. Engineering controls and new equipment have eliminated some jobs.

8. Many mining companies are located in rural areas where other job opportunities are more limited and traditionally turnover rates are much lower.

All of these factors have resulted in a limited number of new hires who fall under the definition of a newly employed inexperienced miner.

With the sample identified, each of these companies was contacted by telephone to obtain their support in the project. The initial contact with each company was with the mine manager and the company's safety and/or training director. During the conversations, the following advantages were identified for a company's participation in the study:

- Pretesting new employees enabled the company to identify the prior knowledge level of new employees.
- Posttesting employees who completed the program provided the company an opportunity to evaluate the effectiveness of the company's training program in terms of instructors, course materials, and methods of presentation.
Posttesting employees who completed the program provided the company a means to evaluate the knowledge level of new miners once they complete the company's Part 48 training program.

Conducting the program provided a means by which to identify current and future training needs.

In each case, company representatives were positive about the study and their company's participation in it. Several companies indicated that they needed to get corporate approval prior to formally committing to the project. Of the six companies that were selected, only one company which operates a surface coal mine declined to participate in the study. The only reason given by the company's training director was that corporate headquarters would not approve it. Another company was then selected to participate in the study. Three companies that were exempt from MSHA training and three companies that were required to conduct Part 48 training programs were chosen for the study.

With the population identified and testing instrument selected, the next step was to schedule an on-site visit to the individual mining locations. The purpose of this visit was to get a firm commitment from mine management. Present at this initial on-site meeting was the mine manager and the person at the mine who was responsible for safety and training. During this meeting the purpose of the study, methods to be utilized for collecting the data and how the results of the
survey could be utilized were discussed. At the end of each meeting, a target date was established for implementation of the study at each mine.

Before any new employee interviews or testing of miners was conducted, the company person who would be responsible for gathering the data was thoroughly instructed in the means for administering the testing instrument. Each question on the inventory was reviewed to determine if it was applicable to that mine. Each question was discussed in detail to receive from mine management the answers to the questions that required specific knowledge of that operation and the company's operating procedures.

The testing procedure to measure the health and safety knowledge level of the newly employed inexperienced miner involved a pretest before the new miner entered the work environment and a posttest after the new miner completed the Part 48 training program. In the case of these companies that were not required to comply with the MSHA regulation that before new hires enter the work environment they complete the company's Part 48 new miner training program, their new miners were posttested after they had been on the job 60 days. The 60-day time frame is the amount of time under Part 48 that companies have to complete all the required new miner health and safety training. Pretesting identified the prior level of health and safety knowledge that newly employed inexperienced mines had prior to going through the company's training program. Posttesting the new miners after they had gone through the company's training
program provided a means of measuring the impact of the training program on their health and safety knowledge levels. With both pre and post test scores, a possible cause and effect relationship between the company's training program and the health and safety knowledge level of newly employed inexperienced miners could be established. Pretesting all miners prior to entry to the work environment also served as a control to measure knowledge individual new hires possessed prior to going through the company's new hire training program.

Before the testing procedure was implemented, two major problems were identified that could affect the administration of the study. These two problems were the adult literacy level of newly employed inexperienced miners and a potential language problem due to the heavy Spanish speaking population in Texas. The problem of adult literacy was solved by allowing the person who was administering the test to give it orally if the employee had any problem reading the questions or writing the responses. To help deal with the language problem, the inventory was translated into Spanish (Appendix C). However, there was a possibility that even though many potential new hires could speak Spanish, they were not able to read and write in it. This did not prove to be a problem at the operations surveyed because each had bilingual personnel who were responsible for the supervision and training of all Spanish speaking personnel.
Delimitations of the Study

For the purposes of this research study, the following limitations were imposed: only mining operations with at least twenty-five employees were used in the study and the geographic area of the study was limited to Texas.

Procedures for Analysis of Data

In order to statistically analyze the data gathered during the study, the t-test for independent samples was used. This measure was chosen for the following reasons (3, pp. 52-58):

1. The underlying assumption of the t-test is that there will be equal variance between the two groups, \( \sigma_1^2 = \sigma_2^2 \).

2. The sample analyzed during the study is independent because it was randomly selected from a larger population.

3. The data are continuous.

4. The t-test assumes the difference between the means of the two populations to be zero, \( V_i_2, U_1 - U_2 \).

The .01 level of significance was utilized when analyzing the data.

Randomly selecting the companies, limiting the study to newly employed inexperienced miners and sampling all these individuals theoretically eliminated the problem of the possible presence of any initial differences in the population. In addition, the process of pretesting all the newly employed inexperienced miners in both groups as soon as they were hired identified the miners' health and safety
knowledge levels before they entered the work environment. Thus, pretesting established a knowledge base for each miner to provide a means for comparison of what learning took place during the training period.

When all the miners had been tested, the inventories were scored and the data arranged in chart form for further analysis. The two groups were then compared to each other in terms of:

1. Total pretest and posttest scores
2. Pretest and posttest scores for individual sections of the inventory
3. Pretest and posttest scores on individual test items

The data for both groups were analyzed by a comparison of the changes of each of these scores from the pretest to the posttest. In addition, the significance for pretest mean scores for each group was listed and the variance for each group was reported. Finally, all data were arranged in the form of a t-table with the following information being reported: means, standard deviations and calculated t-scores values based on comparisons of means.


CHAPTER IV

RESULTS

Analysis of Total Posttest Scores

The primary question to be answered through this study was whether or not a Part 48 training program would have a significant impact on the overall health and safety knowledge of newly employed inexperienced miners. Prior to the new miners in group 1 completing the Part 48 training program or the new miners in group 2 being exposed to the company's strategy for new employee orientation and indoctrination, they were pretested using the Health and Safety Knowledge Inventory. Table I shows the total pretest scores for both groups 1 and 2.

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
<th>2-Tail Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>113</td>
<td>3.1947</td>
<td>2.367</td>
<td>.233</td>
<td>1.75</td>
<td>242</td>
</tr>
<tr>
<td>Group 2</td>
<td>131</td>
<td>2.6641</td>
<td>2.359</td>
<td>.206</td>
<td></td>
<td>.082 NS</td>
</tr>
</tbody>
</table>

As shown in Table I, no significant differences in the health and safety knowledge levels of miners from both groups existed at their time of hiring. This is particularly important because it shows that prior knowledge would not impact a significant difference in the total posttest scores for both groups.
The research findings revealed that both groups experienced a dramatic increase in gain scores when comparing the pretest with the posttest scores. An analysis of the posttest mean scores for both groups showed that there was a significant difference in the health and safety knowledge level acquired by newly employed inexperienced miners in group 1 when comparing them to newly employed inexperienced miners in group 2 who did not receive Part 48 training. Table II shows the analysis of posttest means for both groups.

**TABLE II**

ANALYSIS OF POSTTEST MEANS

<table>
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<tr>
<th></th>
<th>Number of Cases</th>
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<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
<th>2-Tail Prob.</th>
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Analysis of Posttest Scores By Subject Area

From the research findings, it was also possible to analyze the impact of a Part 48 training program on each of the ten subject areas of MSHA's Health and Safety Knowledge Inventory (Appendix B). The research findings indicated that for all of the subject areas except statutory rights and explosives a significant difference existed in the health and safety knowledge level of newly employed inexperienced miners who completed a Part 48 training program when they were compared with newly employed inexperienced miners who had not gone through the formalized training program. Table III provides the
results of a statistical analysis of the test scores by subject area. A more detailed analysis of each of ten subject areas follows this table.

### TABLE III

**ANALYSIS OF POSTTEST MEANS BY SUBJECT AREA**

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
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<table>
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<th>Transportation &amp; Communication</th>
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</thead>
<tbody>
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<table>
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<th>Self Rescue &amp; Respiratory</th>
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<table>
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<th>Emergency &amp; Fire Fighting</th>
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TABLE III (Continued)

ANALYSIS OF POSTTEST MEANS BY SUBJECT AREA

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<th>Standard Error</th>
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<td>.154</td>
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</table>

* Significant difference exists.

** No comparison could be made because no subjects were in group 2.

For the first subject area of the knowledge inventory, statutory rights, no significant difference in the knowledge level of miners was found when analyzing the posttest scores of both groups. Hazard recognition is the second competency area of the inventory. According to the research findings, where companies provided a detailed hazard recognition program of the entire mining operation, a significant difference did exist between miners from both groups. When the
posttest scores of the third area of the inventory, transportation controls and communication systems, were analyzed; it was found that the training that group 1 had received made a significant difference in the health and safety knowledge level of the newly employed inexperienced miners. The fourth subject area of the inventory is health. The findings of the research study indicated that there was a significant difference between the group of employees who received Part 48 training when compared with those miners who did not receive the training. Self rescue and respiratory devices is the first subject area of the knowledge inventory. No comparison could be made for this subject area because there were no subjects in group 2. The company's escape and emergency evacuation plans, firewarning and firefighting comprised the sixth competency area of the health and safety knowledge inventory. The research indicated that Part 48 training did have a positive effect on the health and safety knowledge level of newly employed inexperienced miners. There as a significant difference in the posttest scores when comparing group 1 and group 2. A comparison of the posttest scores of both groups for first aid, the seventh subject area of the inventory, indicates a significant difference did exist between the newly employed inexperienced miners who received the Part 48 training program and those who did not receive the training. The eighth subject area of the knowledge inventory covers explosives. Of the 113 persons in group 1 only 15 miners received explosives training. This left 98 miners to whom the
subject area was not applicable. The number of responses was however much better in group 2. Of the 131 miners in group 2 the subject area was applicable to 108. With these limited number of responses there was no significant difference identified when the posttest scores were analyzed. Training in electrical hazards is the ninth area covered in the knowledge inventory. The research indicated that there was a significant difference in the posttest scores of the two groups. Part 48 training did increase the health and safety knowledge level of new miners. The last subject area of the MSHA inventory is ground control; working in areas of highwalls; water hazards, pits and spoil banks; and illumination and night work. In group 1, there were only 15 persons of the 113 participants to which this section of questions was applicable. In group 2 this subject was applicable to 108 of the 131 participants. An analysis of the limited number of responses did show a significant difference when a comparison of the posttest scores of both groups was made.

Analysis of Gain Scores By Subject Area

The findings of the research as shown in Table 1 indicate that a significant difference in the total pretest scores did not exist. Extending the analysis one step further indicates that there was not a significant difference in the pretest subject area scores when comparing both groups. Table IV indicates the pretest scores by subject area.
### TABLE IV

**ANALYSIS OF PRETEST MEANS BY SUBJECT AREA**

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
<th>2-Tail Prob.</th>
<th>2-Tail Prob.</th>
<th>Prob.</th>
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<td><strong>Emergency &amp; Fire Fighting</strong></td>
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<tr>
<td>Group 1</td>
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<td>0.0</td>
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<td>0.0</td>
<td>242</td>
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</table>

* Significant difference exists.

** No comparison could be made because no subjects were in group 2.
TABLE IV (Continued)

ANALYSIS OF PRETEST MEANS BY SUBJECT AREA

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
<th>2-Tail Prob.</th>
<th>2-Tail Prob.</th>
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</thead>
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</table>

With the prior knowledge level of the newly employed inexperienced miners from both groups known, a comparison could be made to identify the effects of the company's training strategy. The comparison was done by calculating the gain score for each subject area. The gain score was calculated by subtracting the pretest score from the posttest score for each subject area. This mean of gain scores is shown under the heading "Mean" in Table V. Table V presents the analysis of the gain scores by subject areas. A significant difference was observed between the gain scores of both groups in the following subject areas: hazard recognition, transportation and communication, health, emergency evacuation and firefighting, first aid, electrical, and ground control and water hazards. For these areas, a formalized
Part 48 training program had a significant impact on increasing the new miners' health and safety knowledge levels. A significant difference did not exist for the following subject areas: statutory rights and explosives. No comparison could be made for self-rescuers and respiratory devices because there were no subjects in group 2.

**TABLE V**

**ANALYSIS OF GAINS IN MEANS BY SUBJECT AREA**

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
<th>Degrees of Freedom</th>
<th>2-Tail Prob.</th>
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<table>
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</thead>
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<table>
<thead>
<tr>
<th><strong>Self Rescue &amp; Respiratory</strong></th>
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<tbody>
<tr>
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* Significant difference exists.

** No comparison could be made because no subjects were in group 2.
TABLE V (Continued)

ANALYSIS OF GAINS IN MEANS BY SUBJECT AREA

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<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Value</th>
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<th>Prob.</th>
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The significance of pretesting the new miners was that no significant difference was observed in the total pretest scores and in seven of ten subject areas. But when a comparison of the posttest scores was made by gain scores and total posttest, a significant difference did exist for total posttest scores and in eight of the ten subject areas.


Discussion of the Findings

The federal government's passage of mandatory health and safety training standards as outlined in the Code of Federal Regulations 30 Part 48 (Appendix A) has been a very controversial issue. These training requirements and the government's increased involvement in the day-to-day operation of mining companies has cost industry and the Mine and Safety Health Administration (MSHA) significant amounts of resources in terms of manpower, time and money. The contention of many people in the mining community has been that the industry is able to take care of its own job in the training of its employees without any outside interference or regulation. Many questions have been raised by both industry and MSHA in relationship to the question of what types of mandatory training requirements if any are needed and how much good if any they do.

The purpose of this study was to investigate one important aspect of this issue, the effect of a Part 48 training program on the health and safety knowledge levels of newly employed inexperienced miners. By comparing the health and safety knowledge levels of newly employed inexperienced miners from companies that conduct Part 48 training with newly employed inexperienced miners from companies that do not conduct Part 48 training, the following question was analyzed: Does Part 48 mandatory health and safety
training increase the health and safety knowledge levels of newly employed inexperienced miners?

There was no significant difference in the health and safety knowledge level of the newly employed inexperienced miners from both groups when they were initially hired. The total pretest scores and pretest scores by subject area were low. These pretest scores were low for the following reasons:

1. By definition of their classification as newly employed inexperienced miners none of them should have had previous mining or related mining experience.

2. When the Act and Part 48 were being written, MSHA and the committees drafting the proposed standards took into consideration that a newly employed inexperienced miner would not have any knowledge of the subject matter as covered by Part 48 Mandatory Health and Safety Training Standards.

3. Most of the questions on the knowledge inventory are directly related to the specific work environment of that mine and even if a person had previous or related mining experience they would not be knowledgeable in their new work environment. The whole intent of the law is that these inexperienced workers become knowledgeable in the hazards associated with and the safety procedures of their new work environment.
4. Several of the questions come specifically from the Act itself. Under normal circumstances a person would not have prior knowledge in mining health and safety legislation and regulations.

The analysis of the posttest results indicated that there was a significant difference in the overall health and safety knowledge level when comparing newly employed inexperienced miners who completed a Part 48 training program with newly employed inexperienced miners who had not completed a formalized Part 48 training program. In addition, a more in depth analysis of the posttest scores by subject areas indicated that a Part 48 training program produced a significant difference in the following subject areas: hazard recognition, transportation controls and communication devices, health, self-rescue and respiratory devices, emergency evacuation and firefighting, first aid, electrical and ground control and water hazards. In short, a Part 48 training program does have a significant impact on the health and safety knowledge level of newly employed inexperienced miners.

The health and safety knowledge level of miners is important for the following reasons and anything that can be done to enhance it should be explored. First, mining produces a very hazardous work environment. The subject areas that Part 48 training stresses centers around making a newly employed inexperienced miner more aware of hazards in the work environment, strategies on how to avoid them and procedures on how to minimize their impact should they be encountered. Secondly, training in subject areas like first aid can
reduce the seriousness of an injury if an accident did occur. Getting
an ambulance to the scene of an accident or an injured miner to the
doctor as soon as possible can be the difference between life and
death. Training in emergency procedures can reduce the seriousness
of an event. Reporting a fire in a timely fashion can reduce the
extend of damages. Thirdly, if employees do not have a good
working knowledge of the job, it can affect their productivity. This
in turn can make a significant impact on the profit line of the mine.
Training that emphasizes job procedures, who in the work
environment the new miner should go to with a problem or question
and accident prevention should increase the efficiency of a new
employee. Fourthly, employees who are not well-trained tend to
damage more equipment, decrease the life of equipment and tools,
increase the amount of downtime and increase maintenance costs.
Lastly, employees who have a good knowledge of the requirements of
the job, company policies and procedures, the work environment and
other factors related to the job should have an increased level of
confidence, be happier with the job and the company they are
working for and be more highly motivated and satisfied employees.

The passage of the Federal Mine Safety and Health Act of 1977
and Part 48 Mandatory Health and Safety Training Standards has
created mandatory training requirements. This research study has
shown that they can have a positive impact on the health and safety
knowledge level of newly employed inexperienced miners.
Observations

During the course of initially working with companies prior to the start of the study, collecting the data, analyzing the data and writing this report, several observations were made that merit review. These observations relate to:

- Company and individual commitment to training.
- Company problems associated with compliance with government regulations.
- MSHA’s reaction to Part 48.
- Additional areas of training that should be included in new miner training under Part 48.
- Problems associated with conducting a new miner training program.
- Company incentives and motives for conducting training.
- Possible legal implications of not conducting a mine health and safety training program.

At the time this study was conducted, all six of the companies that participated in the study were in compliance with the law. But a significant difference was observed in the level of commitment that company and individual management personnel took in relationship to mine health and safety training. Prior to the passage of Part 48, one company in group 1 had a very strong commitment and program of safety and training. This strong commitment and program continued after Part 48 went into effect. Another company in group 1 had a
good safety and training program prior to the passage of Part 48 and strengthened it significantly after the regulations went into effect.

The other company in group 1 and two of the companies in group 2 had no onsite safety or training efforts prior to Part 48. When these regulations were passed, they were motivated to evaluate their needs, create a local onsite training effort at the mine and place more mine and corporate emphasis on training. Unfortunately when training exemptions were granted, one of the companies in group 2 reduced their training efforts. The remaining companies in group 2 merely complied with the legal requirements but had no real commitment to safety or training. In short, commitment is the key.

When Part 48 was passed, many companies had problems with initial compliance with the regulations. One problem was that some company officials lacked a "total" understanding of the regulations themselves. The regulations are difficult to read and interpret. Couple this with a lack of understanding of the background behind the standards and it became difficult for some companies to write their Part 48 training plan, implement their program and maintain it on a continuing basis. Another problem companies experienced was the difference between strict interpretation of the law versus the intent of the law. A third problem was that some companies lacked an understanding of what their options were regarding training program development and implementation. Adding to this problem was the fact that MSHA did not always explain to companies all of the options and alternatives related to Part 48 training that they had.
The logical solution to these problems is more communication and a closer working relationship between the industry and MSHA. Unfortunately, there seems to be a lot of reluctance on both sides to establish these lines of communication.

Traditionally, MSHA has taken an active role in enforcing mandatory health and safety standards. Conversations with MSHA officials and representatives from the company's involved in this study indicated that MSHA has not aggressively enforced the Part 48 training requirements. Indications of this lack of enforcement were seen in the following areas:

- A large number of companies still have not submitted Part 48 training plans or their plans are not in compliance.
- MSHA only conducts a limited number of training audits on individual company training plans and programs each year.
- Talking with numerous company officials and MSHA inspection personnel revealed that MSHA inspectors do not check company training records very often.
- Very few citations or orders have been written for company noncompliance with Part 48 regulations.

MSHA eliminated their regional education and training centers which had served as a support function to the industry for health and safety training and Part 48 compliance. These actions by MSHA have down played the importance of the Part 48 training requirements and
communicated to the industry that they are not going to be held accountable for training. One possible reason for these actions is that when Part 48 was passed there was negative public reaction from industry and several major lawsuits followed. If indeed MSHA is reacting to these pressures, they are by passing the intent of the law.

During the course of this research study, two areas of new miner training were found to be lacking in the Health and Safety Knowledge Inventory. The first area of training that should be included in a training program for newly employed inexperienced miners is an introduction to the work environment. This would include a complete tour of the mine. A second area that should be included is training in the health and safety aspects of the task to which the new miner will be assigned. Training in this area would include: hazards of the work area, safety rules, MSHA standards related to their job and safe operating procedures. Including these two areas in a new miner training program should make it even more effective.

Before Part 48 training programs were implemented, many companies did not have a lot of experience in conducting health and safety training. This lack of experience created numerous problems for companies in conducting a new miner training program. One major problem centered around new employees starting at a variety of different times. In response to this problem some companies hired employees in groups and waited for everyone to start at the same
time. Other companies trained as persons were hired, even if it required doing training on a one-on-one basis. Another problem was choosing the proper method of instruction for conducting the training. Many company trainers were not experienced in doing classroom training and the most effective uses of on-the-job training. Also many people felt the regulations called almost exclusively for all the training be done in the classroom. Unfortunately many of the subject areas do not lend themselves to exclusively utilizing the classroom method of instruction. This also provided for very little application of training or hands on experience. A third problem that companies faced was the lack of training materials that were applicable to mine health and safety. Most companies do not have the expertise or resources to develop these materials and the industry has not taken a leadership role in the development of training resources. MSHA has developed some materials, but a tremendous void in quality training materials still exists. The adult literacy level of many employees presents another problem. When training materials are available, many miners have problems in reading and/or understanding them. To make the problem even worse, many miners in the southwest United States speak Spanish as their primary language. This results in some persons who may be literate in Spanish but illiterate in English. This problem is compounded by the fact that very few training materials are produced in Spanish. The large Mexican-American population in the mining industry also presents a vast number of individuals who are illiterate in two languages.
Even though MSHA has dissolved its education and training function and its inspection division has not identified training as a high priority area, many companies have continued to train. One area that several companies that participated in this study found very beneficial was pretesting new employees. These companies have seen a definite advantage in identifying what a person knows when they are hired. An employee's answers to questions on the Health and Safety Knowledge Inventory also reveals a lot about the person. An example to this was the person who responded to the question about who they would notify in case of an accident or emergency with the answer of "a lawyer." Several company representatives also remarked that they felt new miner training had a positive effect on the productivity of the mine and helped in reducing accidents and injuries.

The passage of Part 48 also has created a potential impact on increased liability by companies for the health and safety of its employees. Should an employee be injured on the job and the company be found not to have provided adequate training, a company opens itself up for a negligence suit under the workers compensation laws of most states. This could result in additional damages being paid and significant increases in insurance rates.

Conclusions of the Study

Upon review of the statistical analysis of the data gathered during this study the following conclusions were drawn:
1. There was a significant difference in the health and safety knowledge level of newly employed inexperienced miners who completed a mandatory Part 48 training program when compared with newly employed inexperienced miners who did not receive the Part 48 training program.

2. There was a significant difference in the health and safety knowledge levels of newly employed inexperienced miners who completed a Part 48 training program when compared with miners who did not receive the Part 48 training for eight of the ten subject areas of the health and safety knowledge inventory. The subject areas in which there was a significant difference were: hazard recognition, transportation and communication, health, self-rescue and respiratory devices, emergency and fire fighting, first aid, electrical, ground control and water hazards. There was not a significant difference in the subject areas of statutory rights and explosives.

3. There was a significant difference in the gain scores for the same eight subject areas as identified in conclusion 2 for newly employed inexperienced miners who completed a Part 48 training program when compared to miners who did not receive the Part 48 training per year.

Implications for Further Study

While answering the questions related to the impact of a Part 48 training program on the health and safety knowledge level of newly
employed inexperienced miners, the research study also identified several areas for further study. Questions that merit further research related to health and safety training are:

1. What impact does this training have on preventing accidents and reducing injuries?
2. What impact does this training have on the individual productivity of an employee?
3. What impact does this training have on the productivity of the mine?
4. What impact does this training have on employee absenteeism and turnover?
5. What impact does this training have on employee motivation and job satisfaction?
6. What methods of instruction are most effective for conducting training in the various subject areas of this training?
7. What types of training resource materials need to be developed for this training?
8. What impact does adult literacy have on this training?
9. What is the best means by which to evaluate the effectiveness of this training?
10. What role should MSHA play in the health and safety training of miners?
11. What management styles work best in enhancing the effectiveness of a mine health and safety training program?
Research on these questions should enhance the efforts of new miner training.

Recommendations to the Mining Industry

This research study has produced valuable information regarding the training of newly employed inexperienced miners. The primary recommendation to the mining industry is to conduct new miner training. The research did indicate that a formalized Part 48 training program did significantly increase the health and safety knowledge level of newly employed inexperienced miners. In order to make the training effort as effective as possible there needs to be commitment from all levels within the company's organization. This goes from the corporate offices to mine management to line supervision to the individual miner. Everyone needs to be involved in the company's training effort.

Additionally companies need to evaluate the needs of their employees. No one approach or program meets the needs of all companies, miners or training situations.

Recommendations to MSHA

The study also produced findings that are directly related to MSHA and its role in providing health and safety for our nation's miners. Recommendations that would be made to the Mine Safety and Health Administration are:

- Build up rather than cut back MSHA's education and training efforts.
- Conduct more onsite evaluations of individual mining operations training programs.
Provide more assistance to mine operators in improving their training efforts.

Allow companies the flexibility they need in meeting the training needs of their employees.

Provide mining companies with technical expertise and consulting services related to mining and training.

Offer an indepth program for instructor training and certification.

Develop more training resource materials.

Produce more training materials in Spanish.

Conduct research on the best methods of instruction to use in mine health and safety training.

Research the problems of adult literacy in the mining industry and develop strategies to deal with these problems.

Increase their research and development activities in mine health and safety.

Provide financial and technical assistance to states and other organizations involved in promoting mine health and safety.

In short, a training need does exist in the mining industry and through a spirit of mutual cooperation, a working relationship between the industry and the government can be developed that would best meet the needs of individual miners, mining companies and the government.
Title 30 - Mineral Resources

CHAPTER I - MINE SAFETY AND HEALTH ADMINISTRATION,
DEPARTMENT OF LABOR

Subchapter H - Education and Training

Part 48 - Health and Safety Training and Retraining of Miners

FINAL RULE

AGENCY: Mine Safety and Health Administration, Department of Labor.

ACTION: Final rule.

SUMMARY: Section 115 of the Federal Mine Safety and Health Act of 1977 (Mine Act) requires each mine operator to have a health and safety training program for miners, which must be approved by the Secretary of Labor (Secretary), and requires the Secretary to publish rules governing such programs. These rules implement section 115 (a), (b) and (c) of the Mine Act by setting forth the requirements for obtaining approval of training programs and specifying the kinds of training, including refresher and hazard training, which must be provided to miners. These rules are intended to insure that miners will be effectively trained in matters affecting their health and safety, with the ultimate goal of reducing the frequency and severity of injuries in the Nation's mines.

FOR FURTHER INFORMATION CONTACT: Harry L. Schell,
Office of Education and Training, Room 514, Ballston Tower No. 3,

SUPPLEMENTARY INFORMATION: Statutory and Rulemaking

Background

The Mine Act, Pub. L. 91-173, as amended by Pub. L. 95-164,
applies to coal, metal and nonmetal mines. The Secretary is respon-
sible under section 115(a) of the Mine Act for promulgating regulations
with respect to health and safety training programs for miners. The
secretary has therefore established a new subchapter H of chapter I
of title 30 CFR containing this new part 48.

An advisory committee was established in accordance with sections
101 and 102(c) of the Mine Act in order to assist the Secretary in the
development of the proposed rules on mine health and safety training.
The committee held two series of meetings in March and April 1978 in
which the public participated, and submitted recommendations to the
Secretary. The proposed rules, which adopted with a few changes
the advisory committee's recommendations, appeared in 43 FR 30990-30999
(July 18, 1978) and a correction of the proposed rules appeared in
43 FR 34504-34505 (August 4, 1978). Interested persons were given
an opportunity to submit comments until August 23, 1978, and were
notified that hearings would be held on the proposed rules. The
hearings were held in Charleston, W. VA, St. Louis, MO, and Phoenix,
AZ, on August 14, 16, and 18, 1978, respectively. A total of 86
witnesses presented testimony. In addition, the Mine Safety
and Health Administration (MSHA) has received and reviewed over 240 written comments and statements from interested persons.

Discussion of Comments and Changes

1. General discussion

The predominant concern expressed by the mining industries, particularly the metal and nonmetal industries, in testimony and written comments, was that the proposed rules, if adopted and applied, would be extremely burdensome and costly to implement, forcing many small operations to curtail production during training periods or go out of business altogether, and resulting in substantial increases in the prices of mined materials. A related concern was that the rules, as proposed, were neither tailored to fit the needs of the various types of mining operations nor flexible enough to be adaptable to those needs.

The first year costs of the training requirements contained in the Mine Act and these final rules will total approximately $125 million for all mining industries. A discussion of economic issues is contained under the heading "Economic Analysis" in this preamble. Congress recognized that "miner training may strain the financial resources of many small operators." Conference Report No. 95-461, 95th Cong., 1st sess. 63 (1977). To help alleviate this burden, Congress directed the Secretary "to maintain a flexible approach in approving * * * training programs * * *," Conference Report No. 95-461, supra at 63.

In keeping with this mandate, the mining industries can be assured that MSHA will make every effort to be flexible in carrying
out its responsibilities with respect to training in order to be as responsive as possible to the needs and circumstances of the various segments of the mining community and of individual operators. Several of the changes made in these final rules reflect that intention.

There was also concern expressed that, in attempting to comply with the date Congress established in section 114 of the Mine Act for publication of the final rules, MSHA would not be able to review and consider thoroughly the testimony and comments received on this important proposal. MSHA has a fundamental responsibility to comply with this congressional directive to the maximum extent feasible without compromising the basic objective of the rulemaking process, which is to develop and implement rules which have a rational basis, are effective and are responsive to the concerns of the affected public. MSHA believes that this balance has been achieved in these rules; it has studied the public response carefully and appropriate changes have been made.

However, MSHA wishes to emphasize that it is sensitive to the uncertainty and anxiety with which these new training requirements are being met. As experience is gained under the program, changes in these rules and in the procedures MSHA uses to implement them may prove to be desirable or even necessary. Therefore, MSHA encourages continued public response on these matters in order to assess the need for possible revisions and to provide the most effective training to the Nation's miners without unduly burdening the affected industries.
2. Discussion of Major Issues

a. Definition of "miner." The most frequently raised criticism of the proposed rules was that the definition of the term "miner" was too broad and vague and that coverage under these rules should be more precisely drawn. MSHA agrees. The language in the proposed rule which would have included "any person whose duties require" either being underground in subpart A or the person's presence at the mine in subpart B has been eliminated.

(i) Subpart B - surface mines and surface areas of underground mines. With respect to surface operations, MSHA generally agrees with the comments suggesting that only those workers who are regularly exposed to the many hazards associated with the mining industry need receive the full range of training. It is those workers who Congress sought to insure would be fully apprised of those hazards and familiarized with safe work practices at the time work duties begin. Accordingly, the final rule requires that, in addition to those workers actually performing extraction or production functions, most maintenance and service workers and workers whose duties require a substantial presence at those locations in the mine where extraction or production occurs and who are thereby exposed on a frequent basis to the risks at those areas should also receive the comprehensive training set forth in the rules. Such workers would include for example, dragline oilers and haulage workers transporting minerals from the pit areas through preparation stages to storage facilities.
The proposed rule excluded "nonproduction and nonmaintenance personnel" from the definition of "miner" in §48.22(a). In reappraising the definition based upon the comments received, MSHA has determined that certain changes are appropriate with respect to the proposed exclusion. While only those persons most directly and regularly exposed to mining hazards need to undergo comprehensive training, other workers at the mine, such as scientific, office, or delivery personnel, either employed or contracted by the operator, or short-term maintenance or service personnel contracted by the operator are exposed to certain mine hazards on a less regular basis in performing duties ancillary to or supportive of extraction or production. Such workers, if not given any training, could expose not only themselves but other miners to unnecessary risks. These workers should, therefore, have periodic instruction concerning the hazards they may encounter from time to time at the extraction or production site. Accordingly, MSHA has added sections to subpart B which would require the operator to acquaint such individuals with the specific hazards they may confront at the mine. It is contemplated that this should not generally require classroom instruction and may often consist of an instructional sheet distributed to the worker containing a "checklist" of hazards. It may be that certain workers in these categories, depending on the nature and location of their duties, are exposed to no significant mining hazards at a particular mine. Examples might include the person who refills the vending machines or certain clerical employees. However, MSHA expects a realistic appraisal by the operator of the hazards associated with such jobs. The operator
should certify that such workers have received this instruction and should include the proposed method for providing this instruction in the training plan.

Also subject to this type of hazard training under these final rules are students who are not purely short-term visitors but whose work may require their presence at the mine for more than one day for the purpose of fulfilling academic or professional requirements. Such projects might include geological studies conducted by geology students or the development of a reclamation plan by landscape architecture students. These types of projects require the student to spend some time at the mine site to collect information. Such a person should be instructed in the hazards he or she may confront or present to others while on mine property.

Confusion was also expressed concerning the status of visitors to the mine, such as corporate or government officials, or students on a field trip. These types of persons are not covered by these rules. However, it is expected and the comments and testimony reflect that such persons will be accompanied by experienced miners and will be provided appropriate safety equipment.

Many commenters suggested that other categories of mine workers, such as short-term workers, seasonal workers and vacation student workers be exempted from the surface training requirements. These workers are exposed to the same hazards, present the same hazards and need the same training as other similarly situated "long-term" workers. The need for training is usually not diminished, and may,
in fact, be increased because such workers are slated for a short work tenure. Accordingly, short-term workers should generally receive the same training as other miners, with the exceptions discussed above.

(ii) Subpart A—underground mines. MSHA generally believes that the same distinctions discussed above with respect to the training of surface miners are also applicable to underground miners. For example, those engaged in the extraction or production process are required to undergo the comprehensive training prescribed in §§48.5 through 48.8, as applicable. Mine personnel, such as office personnel, who are not regularly exposed to mining hazards and who may go underground during the course of their duties are required to have periodic instruction concerning the hazards they may encounter and must, in addition, be accompanied at all times while underground by an experienced miner. Accompaniment is believed to be necessary because of the more hazardous conditions which generally exist in underground mines. Although visitors are not, per se, covered under these rules, it is likewise expected that such persons will be provided with and given instruction in the use of appropriate safety equipment and will be accompanied at all times while underground by an experienced miner.

(iii) Training of nonemployees. Mining industry representatives contended that an operator should not be responsible for training workers who are not employed by the operator. Nothing in the Mine Act removes from the operator the primary responsibility for the health and safety of all miners on mine property. The operator has
control not only over his own employees but, either directly or indirectly, over those with whom he contracts and allows to perform work on mine property. The operator remains ultimately responsible for, and is the beneficiary of all work done at the mine. Moreover, in the specific area of training, an operator can best assure that all miners working at his mine receive systematic training consistent with the health and safety needs and conditions existing at the mine. Accordingly, except with respect to those independent contractors that may be identified as operators under rules currently being developed, operators will be primarily responsible for training workers on mine property.

A somewhat unique problem exists with certain specialized contract production and extraction workers, particularly drillers and blasters, who come onto mine property for short duration to perform their tasks and then move to other sites. Since these workers are unquestionably engaged in the extraction process, they would ordinarily be subject to the full training requirements of §§48.5 through 48.8 or §§48.25 through 48.28. MSHA believes such workers should be subject to "new miner" training if they are inexperienced or to "new task" training if they are new to the specialty. However, it would not serve any useful purpose to require such individuals to undergo newly employed experienced miner training each time they go to a new job for a few days. They are skilled at their particular tasks and need only be acquainted with the specific hazards they may encounter at the mine site. Accordingly, they will be required to take only hazard training, discussed previously. However, it will be
necessary for this category of worker to take annual refresher training, at least with respect to those subjects which are not mine-specific, such as first aid.

b. Full training of new miners prior to commencement of work duties. There was strong opposition from the nonmetal mining industry concerning the requirement in the proposed rule that the 24 hours of new miner training under subpart B must all be given prior to the commencement of job duties. There was very little resistance to an identical provision with respect to the 40-hour inexperienced miner training requirements for underground mines. The comments came primarily from and on behalf of smaller surface operations from whom this requirement would work particular hardship due to the inability to hire or spare employees for training purposes and the often high employee turnover rates. MSHA is sensitive to the economic hardships that many provisions of the Mine Act may have upon small operators and seeks to be responsive to the congressional directive to minimize the adverse impact of the training requirements.

The testimony and comments received on this issue focus almost exclusively on the adverse economic impact of this requirement rather than the effect a change in the proposed requirement might have upon health and safety of new miners. MSHA remains convinced that in most cases, the health and safety of miners is best served by requiring the inexperienced miner to be fully trained in the subjects delineated in the rules prior to commencing job duties. However, in response to the genuine concern expressed in the record by small surface mine operators, the final rules have been changed so that
MSHA may permit, in appropriate cases, as determined by the Training Center Chief, new surface miners to receive up to 16 hours of training within 60 days after assignment to work duties: Provided, that at least 8 hours of training is furnished prior to the commencement of work duties. In such cases, to insure that the miner is familiarized with the job environment and associated hazards the initial 8 hours of training shall include the following courses: Hazard recognition, introduction to work environment, and health and safety aspects of the tasks the new miner will be assigned. In addition, until the new miners affected by this provision have received the full 24 hours of training, they must always work under the close supervision of an experienced miner. An operator must submit a request to the training center as part of the proposed training plan in order to be permitted to take advantage of this exception to the usual rule. The training center will consider such factors as the size and the safety record of the mine and the rate of employee turnover at the mine.

c. MSHA-approved instructors. Many commenters questioned the necessity for having instructors approved by MSHA. Instead, it was suggested that a "competent person" be required to give the instruction for purposes of training new miners, training newly employed experienced miners, and providing annual refresher training for all miners.

MSHA believes that it is essential for a person who is going to be responsible for instructing miners concerning the health and safety aspects of their jobs to be highly qualified, not only in the particular
subject matter he or she proposes to teach, but in the skills an instructor must have in order to teach that subject effectively. The testimony and comments have not persuaded MSHA that there is an acceptable alternative method to insure that those goals are met, and these rules retain the requirement for MSHA approval of instructors.

The comments reflect a great deal of concern and confusion about how instructors will be approved and whether MSHA has the capabilities to insure timely training of instructors. MSHA is making every effort to provide a flexible system of instructor approval in order to meet the expected demand.

There are two basic types of instructor course offered by MSHA. One will enable an individual to train miners. The other will enable an individual to be approved by MSHA to train other instructors, who will then be able to training miners but not additional instructors. For example, an industry association in a State could make arrangements for a certain number of individuals to receive instructor training and approval from MSHA. These person would then be able to return to their State to give instructor training to skilled persons in particular subject matter areas, e.g., electrical. These skilled individuals could then write to MSHA, describing their experience in the particular subject matter and provide proof of having received instructor training. Based upon this submission, these persons would be approved by MSHA to provide training of miners under these rules.

It may also be possible for an instructor to receive approval by requesting MSHA to have a representative attend classes of a prospective instructor and provide approval based upon performance at the
classes. Such as request should be made a part of the operator's proposed training plan. MSHA's resources do not permit the frequent use of this method of approval. Therefore, the operator should demonstrate, based upon such factors as the size of the mine, remoteness from a training center, and other relevant considerations, that utilizing other methods of instructor approval would work an extreme hardship on the operator. Utilization of this method of instructor approval will be at the discretion of the training center.

In addition, if a person already has taught courses or given health and safety workshops or seminars or has other comparable experience, it may not be necessary to take the MSHA instructor training course. Such a person may receive approval based solely on qualifications and teaching experience.

d. Submission of proposed plan to miners' representatives.
Many comments were received objecting to the inclusion of the miners' representative as the recipient of an operator's proposed training plan 2 weeks prior to submission to the Training Center Chief for approval, and the participation of the miners' representatives in consultations over required revisions of the training plan. Congress recognized that an active participation by MSHA, the operator, and the miner were necessary to maximize the health and safety benefit derived from the mandated training program. Numerous references to the "representative of miners" through the Mine Act evidence the importance of involving the miner in all aspects of mine health and safety. Nowhere does the Mine Act either explicitly or implicitly limit the participation of the representative of miners only to the enumerated
situations in the Act. A miner's intimate knowledge of health and safety conditions at his particular mine, and his instinctive concern for his fellow miners make the representative of miners an ideal resource in the formulation of an effective training plan. Indeed, MSHA would be remiss in attention to fulfill its statutory obligation to insure that the training plan submitted by the operator would afford adequate training to miners if it failed to include the representative of miners in the approval process.

3. Discussion of Other Significant Issues
   a. Course requirements. Commenters expressed concern that the language of the proposed rules appeared to require all operations, including milling or other production facilities covered by the Mine Act, to give instruction in all of the delineated courses even if some of the courses are not applicable to conditions at the mine. This was not intended and clarifying changes have been made. Most of the courses enumerated will generally be applicable to most mining operations. However, MSHA does not expect workers engaged solely in milling operations, for example, to be trained in highwall and ground control plans. The operator needs only to include in the proposed training plan those courses which are relevant to conditions at the site and should add those courses, not outlined in the rules, which would be important for the workers at the facility involved. MSHA intends to adopt a practical approach to course requirements.

   b. Coverage of the rules. These rules are applicable to all facilities which are covered under the Mine Act. MSHA does not have the authority to exempt or exclude operations otherwise covered by
the Act from the training requirements. Thus, milling, dredging, and clay winning operations are subject to these requirements. MSHA is aware that the scope of the Mine Act and these rules is broad and that each type of operation may have unique safety and health problems. MSHA encourages operators to contact MSHA's training centers in order to discuss the type of operations involved and the type of training program which may be appropriate to meet the needs of the workers at that operation.

c. New task training. Questions were raised in the record about whether the training required for miners assigned new tasks (§§48.7, 48.27) could be incorporated into the 24 hours of new miner training or whether new miners are required to take new task training in addition to new miner training before commencing work assignments. The proposed rules discussed miners "assigned" to new tasks. In reviewing the Mine Act and the legislative history, MSHA has determined that, in the words of section 115 of the Mine Act, Congress was seeking to cover miners who are "reassigned" new tasks. The intent is to provide task training for experienced miners who are undertaking a new task assignment. Therefore, new task training is not a part of new miner training and does not have to be provided to new miners who are receiving the 24 hours of initial training. Under §§48.5(b)(13) and 48.25 (b)(12), new miners will receive training in the health and safety aspects of their initially assigned tasks as part of the new miner training. Only if those miners are subsequently assigned to a new task training.
d. Certificate of training. Commenters stated that MSHA should provide the certificates to be given to the trainee upon completion of training, and that miners who receive the training, as well as operators, should acknowledge the completion of the training courses on the certificate. Although MSHA intends to supply the certification forms and will distribute them to MSHA field offices and operators as soon as the Government clearance process has been completed, it is the operator's statutory obligation to certify completion of the training on the forms. MSHA also believes that it is advisable, both for the protection of the miner as well as the operator for the miner to sign the certificate.

e. Approval of phases of the training plan. Several complaints were voiced concerning the provisions of the proposed rule which would permit MSHA to approve "separate phases of the training program and withhold approval of other phases * * *" (§§48.3(h)(2), 48.23(h)(2). Commenters argued that the piecemeal approach to plan approval suggested by this language would result in chaotic and cumbersome implementation by an operator. The purpose of this provision is to provide MSHA with the flexibility to approve a major "phase" of the plan, referred to in the final rules as a "program," such as new task training or new miner training, even if there is a problem with another major "phase" or "program" such as annual refresher training. Each of these major programs of an operator's plan is discrete enough in application to be approved separately, if necessary, without disrupting the operator's overall training effort. MSHA does not believe that, under the circumstances, training under
approved major programs of the plan should be delayed pending
approval of the entire plan. MSHA does not intend to approve plans
in phases except under the limited conditions just described. The
proposed rule is therefore adopted with the nomenclature changes just
discussed.

f. Annual submission of refresher training schedule. Sections
48.3(c)(7) and 48.23(c)(7) of the proposed rules would have required
the annual submission of a "schedule" of refresher training information.
It was argued by commenters that to require such annual reporting
was administratively burdensome and that it would be extremely
difficult to pinpoint from year to year precisely when refresher
training might be given. MSHA agrees that it is important to maintain
a flexible approach to refresher training in order that it might be
offered at particularly appropriate times to be of maximum
benefit. It is therefore unnecessary to submit the plan annually if no
changes are being proposed. Under §§ 48.3(1) and 48.23(1),
operators must notify MSHA and the representative of miners of
proposed modifications in the refresher training schedule. In order
to permit training center personnel to monitor all training classes,
under §§48.3(3) and 48.23(3), operators must provide MSHA, upon
request, with the times upcoming training classes are scheduled to be
given.

g. Reimbursement for costs of attending training. Several
commenters objected to provisions of proposed §§ 48.10 and 48.30
concerning compensation of miners for costs incurred if training is
given somewhere other than the normal work site. MSHA agrees that
the proposed language neither took into account certain possible alternative methods of transporting workers nor adequately reflected the provisions of section 115(b) of the Mine Act. Therefore, the final rule uses the language of the statutory provision and requires miners to be compensated for all actual "additional costs they may incur" in attending training sessions away from their work site.

h. Explosives. Commenters argued that the requirement in the proposed rules to have all miners receive instruction in the "handling of explosives" would actually have an diverse effect on the safety of the miners and would also be contrary to the practices of operators in the industry, who only allow handling of explosives by persons with specialized training in the handling and use of explosives. While all miners should receive a review of the hazards related to explosives, as required in §§48.5(b)(9), 48.8(b)(9), 48.25(b)(11) and 48.28(b)(9), MSHA agrees that "instruction in the procedures for the safe handling of explosives" should only be given to miners assigned to handle or use explosives. Therefore, this phrase has been deleted from the final rule.

Miners assigned to handle or use explosives will receive safety and health training for such assignments in new miner training and new task training, as applicable. Moreover this comports with the operator's responsibility of assuring that persons handling explosives are experienced, or under the supervision of experienced persons and understand the hazards involved, and that explosives are used in a permissible manner, in accordance with §§ 15.19, 15.24 (note), 55.6-90, 56.6-90, 57.6-90, 75.1303 and 77.1303(a) of Title 30, Code of Federal Regulations.
MSHA emphasizes that the handling of explosives means the physical contact with explosives in any way, and includes the loading and unloading of explosives from vehicles, and the hauling of explosives from location to location at the mine site.

i. Content of miners' rights course. Several commenters were uncertain over the content of the course that will deal with the statutory rights of miners. This course will be available to the operator and instructors and provide them with the content necessary to teach the course and provide sufficient information to the miners. In addition, MSHA's Office of Information is also in the process of developing a pamphlet dealing with the same subject.

Through both of these sources and through others who may develop materials on the same subject, MSHA believes that adequate information will be provided for clarification of course content. This does not, however, preclude the operator from developing his own materials should he feel the need to do so.

j. Hazard recognition training. Several commenters have suggested that the word "known" be inserted before course titles such as "hazard recognition" and "electrical hazards" because of possible legal repercussions that may result from such an omission. MSHA agrees that the courses should include known hazards at the mine. However, such courses should also include training in the recognition and avoidance of possible hazards beyond those that may have actually resulted in accidents or are obvious. Instruction should also be given with respect to potential hazards which are
reasonably foreseeable under the circumstances at the mine. The scope of this type of instruction can be discussed with MSHA training center personnel in order to arrive at what it is reasonable to teach.

k. Construction occurring underground. It was suggested that the exclusion of workers engaged in the "sinking of slopes and shafts" should cover not only the actual construction of the slope or shaft itself, but the installation in the completed slope or shaft of such things as belts, track, hoists, loading equipment or other machinery prior to the time the mine is operational. This would mean that coverage under subpart A would be limited to the construction or repair of underground facilities while the mine is operational and the normal hazards associated with an operating mine are encountered. MSHA agrees that construction of facilities in the slope or shaft prior to commencing operations and the construction of major additions or facilities to an existing mine which require the mine to cease operations, should be covered under the same rules which govern construction workers generally. The training of most construction workers will be the subject of future rulemaking and this rule has been changed accordingly to cover only underground construction occurring while the mine is in operation.

l. Revocation of instructor's approval. A few commenters urged that due process protection be afforded an instructor when MSHA intends to revoke the instructor's approval. The proposed regulations provided that approval could only be revoked "for cause" and thereby contemplated protection, including administrative appeal, from arbitrary agency action. However, recognizing that personal
livelihood and significant property interests may be at issue, the final rule has been changed to expressly provide that instructors are entitled to a statement of agency reasons for intended revocation and an opportunity to demonstrate or achieve compliance before any revocation of approval is effective. Moreover, initial decisions to revoke approvals may be appealed to the Director of Education and Training. Such appeal will be expedited to avoid negative impact upon the instructors and training programs affected by the revocations.

In addition, operators who are using a particular instructor will be notified if that instructor's approval is revoked. This notice will serve to prevent the operators from relying in good faith, upon the services of an instructor who has lost approval and to alert the operators that a new instructor may be need to maintain compliance.

m. Other appropriate courses. Commenters have objected to those portions of the proposed rule which would permit MSHA to prescribe courses not enumerated, based on "circumstances and conditions at the mine." Just as it is necessary for MSHA to be flexible in order for operators to be able to adopt effective training programs which fit conditions at a particular mine, MSHA also must have flexibility to require appropriate courses which address specific problems at a mine. Examples of such problems might be unusually high accident rates of a certain type or the existence of particularly hazardous conditions.

n. Training of supervisors. The final rule retains the exclusion from these training requirements of supervisory personnel
subject to an approved State certification program. Some commenters were not aware of State certification requirements for supervisory personnel. Presently, certification programs are generally administered by coal producing states and are used by operators when complying with the training requirement for certified personnel found in §§75.160, 75.160-1, 77.107 and 77.107-1, Title 30, Code of Federal Regulations. MSHA will approve or evaluate the State certification programs to assure that such programs provide sufficient training as an alternative to the training requirements of subparts A and B; no formal approval process is contemplated. Commenters questioned why only those supervisors certified by approve State programs should be exempt from the training requirements. State certification programs are administered according to specific criteria, which helps insure that supervisors will receive adequate training. MSHA believes that a person is not necessarily adequately trained by virtue of holding a supervisory position and that it is essential for supervisors to receive formal training.

o. Normal working hours and pay. Several commenters objected to §§48.10 and 48.30 requiring training of miners during normal working hours. Commenters contended that this restriction limited their opportunities for conducting training during equipment downtime and slack periods of production.

Section 115(b) of the Mine Act specifically requires that training "shall be provided during normal working hours." This insures that miners will be alert and receptive during scheduled training sessions.
Similarly, MSHA has no authority in promulgating these rules to make any exceptions to the requirement of section 115(b) of the Mine Act and miners "shall be paid at their normal rate of compensation" for training. Accordingly, miners are to receive the same pay they would have received if they had been working at that time.

p. Task training. Reference was made to the word "task" not being defined clearly enough to provide sufficient guidance to the operator as to what is required for task training. MSHA intends to provide guidelines for the development of training programs for surface mines and surface areas of underground mines as well as for underground mines. The guidelines will include a section on training of miners assigned to a task in which they have had no previous experience and will state that in order to have a complete and efficient program for new task training, it is necessary to know:

1. All jobs that are being performed,
2. What tasks each of these jobs entails,
3. The skills, knowledge, and abilities necessary to perform the tasks,
4. Any hazards that may be associated with the tasks, and
5. Training that may be required to perform the tasks in a safe and efficient manner.

Many of the tasks can be listed from recall or from looking at job descriptions. Developing a complete list of tasks should entail talking with individuals now working on the job or watching them actually do the job. Talking to the supervisor, consulting established operating procedures and reviewing or developing job safety analyses
(JSA's) will assist in completing the list of tasks. For instance, the job of general laborer includes several tasks such as manual handling of material, manual handling of equipment and operating as forklift. Depending upon the actual analysis of the tasks involved, these tasks may be further broken down into, among other things, loading and unloading supplies from a truck, receiving and distributing parts from a storeroom, use of handtools for various jobs, and operating air compressors and spray guns. Some of the hazards that may be included are slips and falls, inadequate lighting, adverse weather conditions and improper lifting. The training required for these tasks would include mandatory health and safety standards, hazard recognition, proper lifting techniques and proper use of handtools.

q. Economic analysis. Witnesses and commenters were in agreement that the training requirements encompassed by the proposed rule would constitute an economic impact for major segments of the mining industry. There was concern expressed that, given this impact, no regulatory analysis was prepared under Executive Order 12044. In the reamble to the proposed rule, this action was justified by explaining that the major portion of the economic impact of the proposal was represented by the hours of training required under the Mine Act itself.

Section 115 of the Mine Act does not permit a reduction of the required hours of training. Since the purpose of a regulatory analysis is to provide a basis for assessing alternative approaches to an issue which is the subject of rulemaking, such an analysis would not be
fruitful with respect to the impact of the statutory requirements. In addition, the requirements of the proposed rule which are not statutory in origin do not impose a "major" increase in costs upon the mining industries sufficient to necessitate the preparation of a regulatory analysis. Finally, it must be pointed out that the rulemaking process has been expedited in certain respects in order to come as close as possible to meeting the date set forth in the statute for the promulgation of these rules. Only the most compelling of circumstances could justify further delay.

Taking into account these considerations, MSHA nevertheless believes that conformance with the spirit of Executive Order 12044 is important in this case and that analysis of the economic consequences of the requirements of the Mine Act and these rules, and of possible alternative approaches, is warranted. A summary discussion of that analysis follows.

With respect to the statutory requirements themselves, it is estimated that the costs associated with the training of new miners, annual refresher training and task training for both underground and surface miners in all mining industries will total over $102 million during the first year. As noted previously, there are no alternatives which would result in a lowering of the cost of this requirement since the statute sets forth the minimum number of hours to training required in each of the statutory categories and these rules adopt the minimum levels.

This cost estimate is based upon a project average daily cost per miner of $140, which includes the miner's wages, meals, transportation
and lodging, where appropriate, and a proportionate share of the cost for training facilities, materials and wages of an instructor. It also assumes a 30 percent annual employee turnover rate, with one-third of the replacement employees being new miners and the remaining two-thirds being experienced miners. Based upon Bureau of Labor Statistics (BLS) data for the coal and metal mining industries, this 30 percent turnover rate is considerably overinflated. However, statistics are not yet being kept by BLS for nonmetal mining employee turnover and testimony from this segment of the mining community indicated a frequently high turnover. MSHA nevertheless believes that the 30 percent figure is an absolute maximum. A further assumption is that 25 percent of all miners will be required to undergo new task training annually.

These rules do impose two economically significant requirements beyond those minimally necessary to comply with the statutory mandates. These are the training of newly-employed experienced miners and the obtaining of MSHA approval in order to be qualified as an instructor. The total cost of these features of the final rule for both underground and surface mines in all mining industries is estimated to be approximately $28 million during the first year. The assumptions used to compute the cost of the newly-employed experienced miner training are similar to those used above with respect to the statutory requirements and, in addition, that an average of 8 hours will be required for such training.
MSHA could have eliminated this requirement altogether. However, MSHA's experienced leads to the conclusion that even experienced miners should be thoroughly familiarized with their particular mining environment and the attendant hazards before they begin their new job duties. In addition, there was virtually no disagreement expressed during the rulemaking process that it was appropriate to include this category of miner in the training rules. Another alternative would have been possible to require only hazard training for newly-employed experienced miners. However, MSHA believes that hazard training, as described in §§48.11 and 48.31 is adequate only for persons only occasionally exposed to a limited range of mining hazards.

With respect to MSHA approval of instructors, it is assumed that approximately 17,500 new approved instructors will be required and that 80 percent will be operator-employed persons for whom replacement personnel will have to be acquired for the 3-day period of instructor training. It should first be pointed out that the rules themselves provide several alternative methods of obtaining MSHA approval. These are discussed on pages 14-16 of the preamble. MSHA does not believe, however, for reasons also discussed on those pages, that the elimination of the approval mechanism in favor of a system of instruction by "competent persons" will insure an adequate level of training.

EFFECTIVE DATE. These rules will take effect upon publication in accordance with section 101 of the Mine Act.
DRAFTING INFORMATION. The principal persons responsible for drafting this final rule are: John S. Curtis, Office of Education and Training, Mine Safety and Health Administration, Robert C. Snashall Jr. and Manual R. Lopez, Attorney Advisors, Division of Mine Safety and Health, Office of the Solicitor, Department of Labor.


Subchapter H - Education and Training

1. A new subchapter H is added to chapter I of title 30, CFR, to read as set forth above and a new part 48 is added to subchapter H, as set forth below:

Part 48 - Training and Retraining of Miners

Subpart A - Training and Retraining of Underground Miners.

SEC.

48.1 Scope.
48.2 Definitions.
48.3 Training plans; time of submission; where filed; information required; time for approval; method for disapproval; commencement of training; approval of instructors.
48.4 Cooperative training program.
48.5 Training of new miners; minimum courses of instruction; hours of instruction.
48.6 Training of newly-employed experienced miners; minimum courses of instruction.
48.7 Training of miners assigned to a task in which they have had no previous experience; minimum courses of instruction.
48.8 Annual refresher training of miners; minimum courses of instruction; hours of instruction.

48.9 Records of training.

48.10 Compensation for training.

48.11 Hazard training.

48.12 Appeals procedures.

Subpart B – Training and Retraining of Miners Working at Surface Mines and Surface Areas of Underground Mines.

SEC.

48.21 Scope.

48.22 Definitions.

48.23 Training plans; time of submission; where filed; information required; time for approval; method for disapproval; commencement of training; approval of instructors.

48.24 Cooperative training program.

48.25 Training of new miners; minimum courses of instruction; hours of instruction.

48.26 Training of newly-employed experienced miners; minimum courses of instruction.

48.27 Training of miners assigned to a task in which they have had no previous experience; minimum courses of instruction.

48.28 Annual refresher training of miners; minimum courses of instruction; hours of instruction.

48.29 Records of training.

48.30 Compensation for training.

48.31 Hazard training.
Subpart A—Training and Retraining of Underground Miners

§48.1 Scope

The provisions of this subpart A set forth the mandatory requirements for submitting and obtaining approval of programs for training and retraining miners working in underground mines. Requirements regarding compensation for training and retraining are also included. The requirements for training and retraining miners working at surface mines and surface areas of underground mines are set forth in subpart B of this part.

§48.2 Definitions

For the purposes of this subpart A—(a)(1) "Miner" means, for purposes of §§48.3 through 48.10 of this subpart A, any person working in an underground mine and who is engaged in the extraction and production process, or who is regularly exposed to mine hazards, or who is a maintenance or service worker employed by the operator or a maintenance or service worker contracted by the operator to work at the mine for frequent or extended periods. This definition shall include the operator if the operator works underground on a continuing, even if irregular, basis. Short term, specialized contract workers, such as drillers and blasters, who are engaged in the extraction and production process and who have received training under §48.6 (training of newly-employed experienced miners) of this
subpart A may, in lieu of subsequent training under that section for each new employee, receive training under §48.11 (hazard training) of this subpart A. This definition does not include:

(i) Workers under subpart C of this part 48, including shaft and slope workers, workers engaged in construction activities ancillary to shaft and slope sinking, and workers engaged in the construction of major additions to an existing mine which requires the mine to cease operations;

(ii) Supervisory personnel subject to MSHA approved State certification requirements; and

(iii) Any person covered under paragraph (a)(2) of this section.

(2) Miner means, for purpose of §48.11 (Hazard training) of this subpart A, any person working in an underground mine and excluding persons covered under paragraph (a)(1) of this section and subpart C of this part and supervisory personnel subject to MSHA approved State certification requirements. This definition includes any delivery, office, or scientific worker or occasional, short term maintenance or service worker contracted by the operator, any student engaged in academic projects involving his or her extended presence at the mine.

(b) "Experienced miner" means a person who is employed as an underground miner, as defined in paragraph (a)(1) of this section, on the effective date of these rules; or a person who has received training acceptable to MSHA from an appropriate State agency within their preceding 12 months; or a person who has had at least 12 months experience working in an underground mine during the preceding 3 years; or a person who has received the training for a new miner
within the preceding 12 months as prescribed in §48.5 (Training of new miners) of this subpart A.

(c) "New Miner" means a miner who is not an experienced miner.

(d) "Normal working hours" means a period of time during which a miner is otherwise scheduled to work. This definition does not preclude scheduling training classes on the sixth or seventh working day if such a work schedule has been established for a sufficient period of time to be accepted as the operator's common practice. Miners shall be paid at a rate of pay which shall correspond to the rate of pay they would have received had they been performing their normal work task.

(e) "Operator" means any owner, lessee, or other person who operates, controls or supervises an underground mine; or any independent contractor identified as an operator performing services or construction at such mine.

(f) "Task" means a work assignment that includes duties of a job that occur on a regular basis and which requires physical abilities and job knowledge.

(g) "Act" means the Federal Mine Safety and Health Act of 1977.

§48.3 Training plans; time of submission; where filed; information required; time for approval; method for disapproval; commencement of training; approval of instructors.

(a) Each operator of an underground mine shall have an MSHA approved plan containing programs for training new miners, training
newly-employed experienced miners, training miners for new tasks annual refresher training, and hazard training for miners as follows:

(1) In the case of an underground mine which is operating on the effective date of this subpart A, the operator of the mine shall submit such plan for approval within 90 days after the effective date of this subpart A.

(2) Within 60 days after the operator submits the plan for approval, unless extended by MSHA, the operator shall have an approved plan for the mine.

(3) In the case of a new underground mine which is to be opened or a mine which is to be reopened or reactivated after the effective date of this subpart A, the operator shall have an approved plan prior to opening the new mine, or reopening or reactivating the mine.

(b) The training plan shall be filed with the Chief of the Training Center, MSHA, for the area in which the mine is located.

(c) Each operator shall submit to the Chief of the Training Center, MSHA, the following information:

(1) The company name, mine name, and MSHA identification number of the mine.

(2) The name and position of the person designated by the operator who is responsible for health and safety training at the mine. This person may be the operator.
(3) A list of MSHA approved instructors with who the operator proposes to make arrangements to teach the courses, and the courses each instructor is qualified to teach.

(4) The location where training will be given for each course.

(5) A description of the teaching methods and the course materials which are to be used in the training.

(6) The approximate number of miners employed at the mine and the maximum number who will attend each session of training.

(7) The predicted time or periods of time when regularly scheduled refresher training will be given. This schedule shall include the titles of courses to be taught, the total number of instruction hours for each course, and the predicted time and length of each session of training.

(8) For the purposes of §48.7 (new task training of miners) of this subpart AS, the operator shall submit:

(i) A complete list of task assignments to correspond with the definition of "task" in §48.2 (f) of this subpart A.

(ii) The titles of personnel conducting the training for this session.

(iii) The outline of training procedures used in training miners in those work assignments listed according to paragraph (c)(8)(i) of this section.

(iv) The evaluation procedures used to determine the effectiveness of training under §48.7 of this subpart A.

(d) The operator shall furnish to the representative of the miners a copy of the training plan two weeks prior to its submission.
to the Chief of the Training Center. Where a miners' representative is not designated, a copy of the plan shall be posted on the mine bulletin board 2 weeks prior to its submission to the Chief of the Training Center. Written comments received by the operator from miners or their representatives shall be submitted to the Chief of the Training Center. Miners or their representatives may submit written comments directly to the chief of the training center.

(e) All training required by the training plan submitted to an approved by the Chief of the Training Center as required by this subpart A shall be subject to evaluation by the Office of Education and Training, MSHA, to determine the effectiveness of the training programs. If it is deemed necessary, the Chief of the Training Center may require changes in, or additions to, programs. Upon request from the Office of Education and Training, MSHA, the operator shall make available for evaluation by the Office of Education and Training the instructional materials, handouts, visual aids and other teaching accessories used or to be used in the training programs. Upon request from the Office of Education and Training, MSHA, the operator shall provide information concerning the schedules of upcoming training.

(f) The operator shall make a copy to the MSHA approved training plan available at the mine site for MSHA inspection and for examination by the miners' and their representatives.

(g) Except as provided in §48.7 (New task training of miners) and §48.11 (Hazard training) of this subpart A, all courses shall be conducted by MSHA approved instructors.
(h) Instructors shall be approved by the Office of Education and Training. MSHA, in one or more of the following ways:

(1) Instructors all take an instructor's training course conducted by the Office of Education and Training, MSHA, or given by persons designed by the Office of Education and Training, MSHA, to give such instruction: and instructors shall have satisfactorily completed a program of instruction approved by the Office of Education and Training, MSHA, in the subject matter to be taught.

(2) Instructors may be designated by MSHA as approved instructors to teach specific courses based on written evidence of the instructors' qualifications and teaching experience.

(3) At the discretion of the Chief of the Training Center, instructors may be designated by MSHA as approved instructors to teach specific courses based on the performance of the instructors while teaching classes monitored by MSHA. Operators shall indicate in the training plans submitted for approval whether they want to have instructors approved based on monitored performance. The Training Center Chief shall consider such factors as the size of the mine, the number of employees, the mine safety record and remoteness from a training facility when determining whether instructor approval based on monitored performance is appropriate.

(4) On the effective date of this subpart A, cooperative instructors who have been designated by MSHA to teach MSHA approved courses and who have taught such courses within the 24 months prior to the effective date of this subpart shall be considered approved instructors for such courses.
(i) Instructors may have their approval revoked by MSHA for good cause which may include not teaching a course at least once every 24 months. Before any revocation is effective, the Chief of the Training Center must send written reasons for revocation to the instructor and the instructor shall be given an opportunity to demonstrate or achieve compliance before the Chief of the Training Center on the Matter. A decision by the Chief of the Training Center to revoke an instructor's approval may be appealed by the instructor to the Director of Education and Training, MSHA, 4015 Wilson Boulevard, Arlington, VA 22203. Such an appeal shall be submitted to the Director of Education and Training within 5 days of notification of the Chief of the Training Center's decision. Upon revocation of an instructor's approval, the chief of the training center shall immediately notify operators who use the instructor for training.

(j) The Chief of the Training Center for the area in which the mine is located shall notify the operator and the miners' representative in writing, within 60 days from the date on which the training plan is filed, of the approval or status of the approval of the training programs.

(l) If revisions are required for approval, or to retain approval thereafter, the revisions required shall be specified to the operator and the miners' representative and the operator and the miners' representative shall be afforded an opportunity to discuss the revisions with the Chief of the Training Center, or to propose alternate revisions or changes. The Chief of the Training Center, in consultation with the operator and the representative of the miners,
shall fix a time within which the discussion will be held, or alternate revisions or changes submitted, before final approval is made.

(2) The Chief of the Training Center may approve separate programs of the training plan and withhold approval of other programs, pending discussion of revisions or submission of alternate revisions or changes.

(k) Except as provided under §48.8(c) (Annual refresher training of miners) of this subpart A, the operator shall commence training of miners within 60 days after approval of the training plan, or approved programs of the training plan.

(l) The operator shall notify the Chief of the Training Center, MSHA, in the area in which the mine is located, the miners' representative of any changes or modifications the operator proposed to make in the approved training plan. The operator shall obtain the approval of the Training Center Chief for such changes or modifications.

(m) In the event the Chief of the Training Center or the Director of Education and Training disapproves a training plan or a proposed modification of a training plans or requires changes in a training plan or modification, the Chief of the Training Center or the Director of Education and Training shall notify the operator and the miner's representative in writing of:

(1) The specific changes or items of deficiency.

(2) The action necessary to effect the changes or bring the disapproved training plan or modification into compliance.

(3) The deadline for completion of remedial action to effect compliance, which shall serve to suspend punitive action under the
provisions of sections 104 and 110 of the Act and other related regulations until that established deadline date, except that no such suspension shall take place in imminent danger situations.

(n) The operator shall post on the mine bulletin board, and provide to the miners' representative, a copy of all MSHA revisions and decisions which concern the training plan at the mine and which are issued by the Chief of the Training Center or the Director of Education and Training.

§48.4 Cooperative training program.

(a) An operator of a mine may conduct his own training programs, or may participate in training programs conducted by MSHA, or may participate in MSHA approved training programs conducted by State or other Federal agencies, or associations of mine operators, miners' representatives, other mine operators, private associations, or educational institutions.

(b) Each program and course of instruction shall be given by instructors who have been approved by MSHA to instruct in the courses which are given, and such courses and the training programs shall be adapted to the mining operations and practices existing at the mine and shall be approved by the Chief of the Training Center for the area in which the mine is located.

§48.5 Training of new miners; minimum courses of instruction; hours of instruction.

(a) Each new miner shall receive no less than 40 hours of training as prescribed in this section before such miner is assigned to work duties. Such training shall be conducted in conditions which as
closely as practicable duplicate actual underground conditions, and approximately 8 hours of training shall be given at the mine site.

(b) The training program for new miners shall include the following courses:

(1) Instruction in the statutory rights of miners and their representatives under the Act; authority and responsibility of supervisors. The course shall include instruction in the statutory rights of miners and their representatives under the Act, including a discussion of section 2 of the Act; a review and description of the line of authority of supervisors and miner's representatives and the responsibilities of such supervisors and miners' representatives; and an introduction to the operator's rules and the procedures for reporting hazards.

(2) Self-rescue and respiratory devices. The course shall include instruction and demonstration in the use, care, and maintenance of self-rescue and respiratory devices used at the mine. Such course shall be given before the new miner goes underground.

(3) Entering and leaving the mine; transportation; communications. The course shall include instruction on the procedures in effect for entering and leaving the mine; the check-in and check-out system in effect at the mine; the procedures for riding on and in mine conveyances; the controls in effect for the transportation of miners and materials; and the use of the mine communication systems, warning signals, and directional signs.
(4) Introduction to the work environment. The course shall include a visit and tour of the mine, or portions of the mine which are representative of the entire mine. A method of mining utilized at the mine shall be observed and explained.

(5) Mine map; escapeways; emergency evacuation; barricading. The course shall include a review of the mine map; the escapeway system; the escape, firefighting and emergency evacuation plans in effect at the mine; and the location of abandoned areas. Also included shall be an introduction to the methods of barricading and the locations of the barricading materials, where applicable. The program of instruction for escapeways and emergency evacuation plans approved by the District Manager shall be used for this course.

(6) Roof or ground control and ventilation plans. The course shall include an introduction to and instruction of the roof or ground control plan in effect at the mine and procedures for roof and rib or ground control; and an introduction to and instruction on the ventilation plan in effect at the mine and the procedures for maintaining and controlling ventilation.

(7) Health. The course shall include instruction on the purpose of taking dust, noise, and other health measurements, and any health control plan in effect at the mine shall be explained. The health provisions of the act and warning labels shall also be explained.

(8) Cleanup; rock dusting. The course shall include instruction on the purpose of rock dusting and the cleanup and rock dusting program in effect at the mine, where applicable.
(9) Hazard recognition. The course shall include the recognition and avoidance of hazards present in the mine, particularly any hazards related to explosives where explosives are used or stored at the mine.

(10) Electrical hazards. The course shall include recognition and avoidance of electrical hazards.

(11) First aid. The course shall include instruction in first aid methods acceptable to MSHA.

(12) Mine gases. The course shall include instruction in the detection and avoidance of hazards associated with mine gases.

(13) Health and safety aspects of the tasks to which the new miner will be assigned. The course shall include instruction in the health and safety aspects of the tasks to be assigned, the safe work procedures of such tasks, and the mandatory health and safety standards pertinent to such tasks.

(14) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(c) Methods, including oral, written, or practical demonstration, to determine successful completion of the training shall be included in the training plan. The methods for determining such completion shall be administered to the miner before he is assigned work duties.

(d) Upon proof by an operator that a newly employed miner has received the courses and hours of instruction set forth in paragraphs (a) and (b) of this section within 12 months preceding initial employment at a mine, such miner need not repeat the training, but the operator shall give and the miner shall receive and complete the
instruction and program of training set forth in paragraph (b) of § 48.6 (Training of newly employed experienced miners), and §48.7 (New task training of miners), if applicable, before commencing work.

§48.6 Training of newly employed experienced miners; minimum courses of instruction.

(a) A newly employed experienced miner shall receive and complete training in the program of instruction prescribed in this section before such miner is assigned to work duties.

(b) The training program for newly employed experienced miners shall include the following:

1. Introduction to work environment. The course shall include a visit and tour of the mine. The methods of mining utilized at the mine shall be observed and explained.

2. Mandatory health and safety standards. The course shall include the mandatory health and safety standards pertinent to the tasks to be assigned.

3. Authority and responsibility of supervisors and miners' representatives. The course shall include a review and description of the line of authority of supervisors and miners' representatives; and an introduction to the operator's rules and the procedures for reporting hazards.

4. Entering and leaving the mine; transportation; communications. The course shall include instruction in the procedures in effect for entering and leaving the mine; the check-in and checkout system in
effect at the mine; the procedures for riding on and in mine conveyances; the controls in effect for the transportation of miner and materials; and the use of the mine communication systems, warning signals, and directional signs.

(5) Mine map, escapeways; emergency evacuation; barricading. The course shall include a review of the mine map; the escapeway system; the escape, firefighting, and emergency evacuation plans in effect at the mine; the location of abandoned areas; and, where applicable, methods of barricading and the locations of barricading materials. The program of instruction for escapeways and emergency evacuation plans approved the District Manager shall be used for this course.

(6) Roof or ground control and ventilation plans. The course shall include an introduction to and instruction on the roof or ground control plan in effect at the mine and procedures for roof and rib or ground control; and an introduction to and instruction on the ventilation plan in effect at the mine and the procedures for maintaining and controlling ventilation.

(7) Hazard recognition. The course shall include the recognition and avoidance of hazards present in the mine, particularly any hazards related to explosives where explosives are used or stored at the mine.

(8) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.
§48.7 Training of miners assigned to a task in which they have had no previous experience: minimum courses of instruction.

(a) Miners assigned to new work tasks as mobile equipment operators, drilling machine operators, haulage and conveyor systems operators, roof and ground control machine operators, and those in blasting operations shall not perform new work tasks in these categories until training prescribed in this paragraph and paragraph (b) of this section has been completed. This training shall not be required for miners who have been trained and who have demonstrated safe operating procedures for such new work tasks within 12 months preceding assignment. This training shall also not be required for miners who have performed the new work tasks and who have demonstrated safe operating procedures for such new work tasks within 12 months preceding assignment. The training program shall include the following:

(1) Health and safety aspects and safe operating procedures for work tasks, equipment and machinery. The training shall include instruction in the health and safety aspects and the safe operating procedures related to the assigned tasks, and shall be given in an on-the-job environment; and

(2) (i) Supervised practice during nonproduction. The training shall include supervised practice in the assigned tasks, and the performance of work duties at times or places where production is not the primary objective; of
(ii) Supervised operation during production. The training shall include, while under direct and immediate supervision and production is in progress, operation of the machine or equipment and the performance of work duties.

(3) New or modified machines and equipment. Equipment and machine operators shall be instructed in safe operating procedures applicable to new or modified machines or equipment to be installed or put into operation in the mine, which require new or different operating procedures.

(4) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(b) Miners under paragraph (1) of this section shall not operate the equipment or machine or engage in blasting operations without direction and immediate supervision until such miners have demonstrated safe operating procedures for the equipment or machine or blasting operation to the operator or the operator's agent.

(c) Miners assigned a new task not covered in paragraph (a) of this section shall be instructed in the safety and health aspects and safe work procedures of the tasks, prior to performing such task.

(d) Any person who controls or directs haulage operations at a mine shall receive and complete training courses in safe haulage procedures related to the haulage system, ventilation system, firefighting procedures, and emergency evacuation procedures in effect at the mine before assignment to such duties.

(e) All training and supervised practice and operation required by this section shall be given by a qualified trainer, or a supervisor
experienced in the assigned task, or other person experienced in the assigned tasks.

§48.8 Annual refresher training of miners; minimum courses of instruction; hours of instruction.

(a) Each miner shall receive a minimum of 8 hours of annual refresher training as prescribed in this section.

(b) The annual refresher training program for all miners shall include the following courses of instruction:

(1) Mandatory health and safety standards. The course shall include mandatory health and safety standard requirements which are related to the miner's tasks.

(2) Transportation controls and communication systems. The course shall include instruction on the procedures for riding on and in mine conveyances; the controls in effect for the transportation of miners and materials; and the use of the mine communication systems, warning signals, and directional signs.

(3) Barricading. The course shall include a review of the methods of barricading and locations of barricading materials, where applicable.

(4) Roof or ground control and ventilation plans. The course shall include a review of roof or ground control plans in effect at the mine and the procedures for maintaining and controlling ventilation.

(5) First aid. The course shall include a review for first aid methods acceptable to MSHA.

(6) Electrical hazards. The course shall include recognition and avoidance of electrical hazards.
(7) Prevention of accidents. The course shall include a review of accidents and causes of accidents, and instruction in accident prevention in the work environment.

(8) Self-rescue devices and respiratory devices. The course shall include instruction in the use, care and maintenance of self-rescue and respiratory devices.

(9) Explosives. The course shall include a review and instruction on the hazards related to explosives. The only exception to this course component is when there are no explosives used or stored on the mine property.

(10) Mine gases. The course shall include instruction in the detection and avoidance of hazards associated with mine gases.

(11) Health. The course shall include instruction on the purpose of taking dust, noises and other health measurements and any health control plan in effect at the mine shall be explained. The health provisions of the Act and warning labels shall also be explained.

(12) Such other course as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(c) All experienced miners already employed at a mine on the effective date of the Act (March 9, 1978) shall receive refresher training, as prescribed in this section and in accordance with the approved plan, to begin not more than 90 days after the date of approval of the training program required by this subpart A.

(d) Where annual refresher training is conducted periodically, such sessions shall not be less than 30 minutes of actual instruction.
time and the miners shall be notified that the session is part of annual refresher training.

§48.9 Records of training.

(a) Upon a miner's completion of each MSHA approved training program, the operator shall record and certify on MSHA form 5000-23 that the miner has receive the specified training. A copy of the training certification shall be given to the mine at the completion of the training. The training certificates for each miner shall be available at the mine site for inspection by MSHA and for examination by the miners, the miner's representative, and State inspection agencies. Where a miner leaves the operator's employ, the miner shall be entitled to a copy of his training certificates.

(b) False certification that training was given shall be punishable under section 110(1) and (f) of the Act.

(c) Copies of training certificates for currently employed miners shall be kept at the mine site for 2 years, or for 60 days after termination of employment.

§48.10 Compensation for training.

(a) Training shall be conducted during normal working hours; miners attending such training shall receive the rate of pay as provided in § 48.2(d) (Definition of normal working hours) of this subpart A.

(b) If such training shall be given at a location other than the normal place of work, miners shall be compensated for the additional cost, such as mileage, meals and lodging, they may incur in attending such training sessions.
§48.11 Hazard training.

(a) Operators shall provide to those miners, as defined in §48.2(a)(2) (Definition of miner) of this subpart A, a training program before such miners commence their work duties. This training program shall include the following instruction, which is applicable to the duties of such miners:

(1) Hazard recognition and avoidance;
(2) Emergency and evacuation procedures;
(3) Health and safety standards, safety rules, and safe working procedures;
(4) Self-rescue and respiratory devices, and
(5) Such other instruction as may be required by the Chief of the Training Center based on circumstances and condition at the mine.

(b) Miners shall receive the instruction required by this section at least once every 12 months.

(c) The training program required by this section shall be submitted with the training plan required by § 48.3(a) (Training plans: Submission and approval) of this subpart A and shall include a statement on the methods of instruction to be used.

(d) In accordance with §48.9 (Records of training) of this subpart A, the operator shall maintain and make available for inspection certificates that miners have received the hazard training required by this section.
(e) Miners subject to hazard training shall be accompanied at all times while underground by an experienced miner, as defined in §48.2(b) (Definition of miner) of this subpart A.

§48.12 Appeals procedures

The operator, miner, and miners' representative shall have the right of appeal from a decision of the Training Center Chief.

(a) In the event an operator, miner, or miners' representative decides to appeal a decision by a Training Center Chief, such an appeal shall be submitted, in writing to the Director of Education and Training, MSHA, 4015 Wilson Boulevard, Arlington VA 22203, within 30 days of notification of the Chief of the Training Center's decision.

(b) The Director of Education and Training may required additional information from the operator, the miners, or their representatives, and the Chief of the Training Center, if the Director determines such information is necessary.

(c) The Director of Education and Training shall render a decision on the appeal within 30 days after receipt of the appeal.

Subpart B - Training and Retraining of Miners Working at Surface Areas of Underground Mines

§48.21 Scope

The provisions of this subpart B set forth the mandatory requirements for submitting and obtaining approval of programs for training and retraining miners working at surface mines and surface areas of underground mines. Requirements regarding compensation
for training and retraining are also included. The requirements for training and retraining miners working in underground mines are set forth in subpart A of this part.

§48.22 Definitions

For the purposes of this subpart B - (a)(1) "Miner" means, for purposes of §§48.23 through 48.30 of this subpart B, any person working in a surface mine or surface areas of an underground mine and who is engaged in the extraction and production process, or who is regularly exposed to mine hazards, or who is a maintenance or service worker employed by the operator or a maintenance or service worker contracted by the operator to work at the mine for frequent or extended periods. This definition shall include the operator if the operator works at the mine on a continuing, even if irregular basis. Short-term, specialized contract workers, such as drillers and blasters, who are engaged in the extraction and production process and who have received training under §48.26 (Training of newly employed experienced miners) of this subpart B, may in lieu of subsequent training under that section for each new employment, receive training under §48.31 (Hazard training) of this subpart B.

This definition does not include:

(i) Construction workers and shaft and slope workers under subpart C of this part 48;

(ii) Supervisory personnel subject to MSHA approved State certification requirements; and

(iii) Any person covered under paragraph (a)(2) of this section.
(a)(2) Miner means, for purposes of §48.31 (Hazard training) of this subpart B, any person working in a surface mine or surface areas of an underground mine excluding persons covered under paragraph (a)(1) of this section and subpart C of this part and supervisory personnel subject to MSHA approved state certification requirements. This definition includes any delivery, office, or scientific workers, or occasional, short-term maintenance or service worker contracted by the operator, and any student engaged in academic projects involving his or her extended presence at the mine.

(b) "Experienced miner" means a person who is employed as a miner, as defined in paragraph (a)(1) of this section, on the effective date of these rules; or a person who has received training acceptable to MSHA from an appropriate State agency within the preceding 1 months; or a person who has had at least 12 months' experienced working in a surface mine or surface areas of an underground mine during the preceding 3 years; or a person who has receive the training for a new miner within the preceding 12 month as prescribed in §48.25 (Training of new miners) of this subpart B.

(c) "New miner" means a miner who is not an experienced miner.

(d) "Normal working hours" means a period of time during which a miner is otherwise scheduled to work. This definition does not preclude scheduling training, classes on the sixth or seventh working day if such a work schedule has been established for a sufficient period of time to be acceptable as the operator's common practice.
Miners shall be paid at a rate of pay which shall correspond to the rate of pay they would have received had they been performing their normal work tasks.

(e) "Operator" means any owner, lessee, or other person who operates, controls, or supervises a surface mine or surface area of an underground mine; or an independent contract identified as an operator performing services or construction at such time.

(f) "Task" means a work assignment that includes duties of a job that occur on a regular basis and which requires physical abilities and job knowledge.

(g) "Act" means the Federal Mine Safety and Health Act of 1977.

§48.23 Training plans; time of submission; where filed; information required; time for approval; method for disapproval; commencement of training; approval of instructors.

(a) Each operator of a mine shall have an MSHA approved plan containing programs for training new miners, training newly-employed experienced miners, training miners for new tasks, annual refresher training, and hazard training for miners as follows:

(1) In the case of a mine which is operating on the effective date of this subpart B, the operator of the mine shall submit such plan for approval within 150 days after the effective date of this subpart B.

(2) Within 60 days after the operator submits the plan for approval, unless extended by MSHA, the operator shall have an approved plan for the mine.
(3) In the case of a new mine which is to be opened for a mine which is to be reopened or reactivated after the effective date of this subpart B, the operator shall have an approved plan prior to opening the new mine, or reopening or reactivating the mine unless the mine is reopened or reactivated periodically using portable equipment and mobile teams of miners as a normal method of operation by the operation. The operator to be so excepted shall maintain an approved plan or training covering all mine locations which are operated with portable equipment and mobile teams of miners.

(b) The training plan shall be filed with the Chief of the Training Center, MSHA, for the area in which the mine is located.

(c) Each operator shall submit to the Chief of the Training Center, MSHA, the following information:

(1) The company name, mine name, and MSHA identification number of the mine.

(2) The name and position of the person designated by the operator who is responsible for health and safety training at the mine. This person may be the operator.

(3) A list of MSHA approved instructors with whom the operator proposes to make arrangements to teach the courses, and the courses each instructor is qualified to teach.

(4) The location where training will be given for each course.

(5) A description of the teaching methods and the course materials which are to be used in training.

(6) The approximate number of miners employed at the mine and the maximum number who will attend each session of training.
(7) The predicted time or periods of time when regularly scheduled refresher training will be given. This schedule shall include the titles of courses to be taught, the total number of instruction hours for each course, and the predicted time and length of each session of training.

(8) For the purposes of §48.27 (New task training of miners) of this subpart B, the operator shall submit:

(i) A complete list of task assignments to correspond with the definition of "task" in §48.22(f) of this subpart B.

(ii) The titles of personnel conducting the training for this section.

(iii) the outline of training procedures used in training miners in those work assignments listed according to paragraph (c)(8)(i) of this section.

(iv) The evaluation procedures used to determine the effectiveness of training under §48.27 of this subpart B.

(d) The operator shall furnish to the representative of the miners a copy of the training plan 2 weeks prior to its submission to the Chief of the Training Center. Where a miners' representative is not designated, a copy of the plan shall be posted on the mine bulletin board 2 weeks prior to its submission to the Chief of the Training Center. Written comments received by the operator from miners or their representatives shall be submitted to the Chief of the Training Center. Miners or their representatives may submit written comments directly to the Chief of the Training Center.
(e) All training required by the training plan submitted to and approved by the Chief of the Training Center as required by this subpart B shall be subject to evaluation by the Office of Education and Training, MSHA, to determine the effectiveness of the training programs. If it is deemed necessary, the Chief of the Training Center may require changes in, or additions to, programs. Upon request from the Office of Education and Training, MSHA, the operator shall make available for evaluation by the Office of Education and Training the instructional materials, handouts, visual aids, and other teaching accessories used or to be used in the training programs. Upon request from the Office of Education and Training, MSHA, the operator shall provide information concerning schedules of upcoming training.

(f) The operator shall make a copy of the MSHA approved training plan available at the mine site for MSHA inspection and examination by the miners and their representatives.

(g) Except as provided in §48.27 (New task training of miners) and §48.31 (Hazard training) of this subpart B, all courses shall be conducted by MSHA approved instructors.

(h) Instructors shall be approved by the Office of Education and Training, MSHA, in one or more of the following ways:

(1) Instructors shall take an instructor's training course conducted by the Office of Education and Training, MSHA, or given by persons designated by the Office of Education and Training.
MSHA, to give such instruction; and instructors shall have satisfactorily completed a program of instruction approved by the Office of Education and Training, MSHA, in the subject matter to be taught.

(2) Instructors may be designated by MSHA as approved instructors to teach specific courses based on written evidence of the instructor's qualifications and teaching experience.

(3) At the discretion of the Chief of the Training Center, instructors may be designated by MSHA as approved instructors to each specific courses based on the performance of the instructors while teaching classes monitored by MSHA. Operators shall indicate in training plans submitted for approval whether they want to have instructors approved based on monitored performance. The Training Center Chief shall consider such factors as the size of the mine, the number of employees, the mine safety record and remoteness from a training facility when determining whether instructor approval based on monitored performance is appropriate.

(4) On the effective date of this subpart B, cooperative instructors who have been designated by MSHA to teach MSHA approved courses and who have taught such courses within 24 months prior to the effective date of this subpart shall be considered approved instructors for such courses.

(i) Instructors may have their approval revoked by MSHA for good cause which may include not teaching a course at least once every 24 months. Before any revocation is effective, the Chief of the Training Center must send written reasons for revocation to the instructor and the instructor shall be given an opportunity to
demonstrate or achieve compliance before the Chief of the Training Center on the matter. A decision by the Chief of the Training Center to revoke an instructor's approval may be appealed by the instructor to the Director of Education and Training, MSHA, 4015 Wilson Boulevard, Arlington VA 22203. Such an appeal shall be submitted to the Director of Education and Training within 5 days of notification of the Chief of the Training Center's decision. Upon revocation of an instructor's approval, the Chief of the Training Center shall immediately notify operators who use the instructor for training.

(j) The Chief of the Training Center for the area in which the mine is located shall notify the operator and the miners' representative, in writing, within 60 days from the date on which the training plan is filed, of the approval or status of the approval of the training programs.

(1) If revisions are required for approval, or to retain approval thereafter, the revisions required shall be specified to the operator and the miners' representative and the operator and the miners' representative shall be afforded an opportunity to discuss the revisions with the Chief of the Training Center, or proposed alternate revisions or changes. The Chief of the Training Center, in consultation with the operator and the representative of miners, shall fix a time within which the discussion will be held, or alternative revisions or changes submitted, before final approval is made.

(2) The Chief of the Training Center may approve separate programs of the training plan and withhold approval of other programs,
pending discussion of revisions or submission of alternate revisions or changes.

(k) Except as provided under §48.28(c) (Annual refresher training of miners) of this subpart B, the operator shall commence training of miners within 690 days after approval of the training plan, or approved programs of the training plan.

(I) The operator shall notify the Chief of the Training Center, MSHA, in the area in which the mine is located and the miners' representative of any changes or modifications which the operator proposed to make in the approval training plan. The operator shall obtain the approval of the Training Center Chief for such changes or modifications.

(m) In the event the Chief of the Training Center or the Director of Education and Training disapproves a training plan or a proposed modification of a training plan or requires changes in a training plan or modification, the Chief of the Training Center or th Director of Education and Training shall notify the operator and the miners' representative in writing of:

(1) The specific changes or items of deficiency.

(2) The action necessary to effect the changes or bring the disapproved training plan or modification into compliance.

(3) The deadline for completion of remedial action to effect compliance, which shall serve to suspend punitive action under the provisions of sections 104 and 110 of the Act and other related regulations until that established deadline date, except that no such suspension shall take place in imminent danger situations.
(n) The operator shall post on the mine bulletin board, and provide to the miners' representative, a copy of all MSHA revisions and decisions which concern the training plan at the mine and which are issued by the Chief of the Training Center or the Director of Education and Training.

§48.24 Cooperative training program.

(a) An operator of a mine may conduct his own training programs, or may participate in training programs conducted by MSHA, or may participate in MSHA approved training programs conducted by State or other Federal agencies, or associations of mine operators, miners' representatives, other mine operators, private associations, or educational institutions.

(b) Each program and course of instruction shall be given by instructors who have been approved by MSHA to instruct in the courses which are given, and such courses and the training programs shall be adapted to the mining operations and practices existing at the mine and shall be approved by the Chief of the Training Center for the area in which the mine is located.

§48.25 Training for new miners; minimum courses of instructor; hours of instruction.

(a) Each new miner shall receive no less than 24 hours of training as prescribed in this section. Except as otherwise provided in this paragraph, new miners shall receive this training before they are assigned to work duties. At the discretion of the Chief of the Training Center, new miners may receive a portion of this training after assignment to work duties: Provided, That no less than 8 hours of
training shall in all cases be given to new miners before they are assigned to work duties. The following courses shall be included in the 8 hours of training: Introduction to work environment, hazard recognition, and health and safety aspects of the tasks to which the new miners will be assigned. Following the completion of this pre-assignment training, new miners shall then receive the remainder of the required 24 hours of training, or up to 16 hours, within 60 days. Operators shall indicate in the training plans submitted for approval whether they want to train new miners after assignment to duties and for how many hours. In determining whether new miners may be given this training after they are assigned duties, the Training Center Chief shall consider such factors as the mine safety record, rate of employee turnover and mine size. Miners who have not received the full 24 hours of new miner training shall be required to work under the close supervision of an experienced miner.

(b) The training program for new miners shall include the following courses:

(1) Instruction in the statutory rights of miners and their representatives under the Act; authority and responsibility of supervisors. The course shall include instruction in the statutory rights of miners and their representatives under the Act, including a discussion of section 2 of the Act; a review and description of the line of authority of supervisors and miners' representatives and the responsibilities of such supervisors and miners' representatives; and an introduction to the operator's rules and the procedures for reporting hazards.
(2) Self-rescue and respiratory devices. The course shall include instruction and demonstration in the use, care, and maintenance of self-rescue and respiratory devices, where applicable.

(3) Transportation controls and communication systems. The course shall include instruction on the procedures in effect for riding on and in mine conveyances where applicable; the controls for the transportation of miners and materials; and the use of mine communication systems, warning signals, and directional signs.

(4) Introduction to work environments. The course shall include a visit and tour of the mine, or portions of the mine which are representative of the entire mine. The method of mining or operation utilized shall be observed and explained.

(5) Escape and emergency evacuation plans; firewarning and firefighting. The course shall include a review of the mine escape system, and escape and emergency evacuation plans in effect at the mine; and instruction in the firewarning signals and firefighting procedures.

(6) Ground control; working in areas of highwalls, water hazards, pits and spoil banks; illumination and night work. The course shall include, where applicable, and introduction to and instruction on the highwall and ground control plans in effect at the mine; procedures for working safely in areas of highwalls, water hazards, pits and spoil banks; the illumination of work areas and safe work procedures during the hours of darkness.

(7) Health. The course shall include instruction on the purpose of taking dust measurements, where applicable, and noise and other
health measurements, and any health control plan in effect at the mine shall be explained. The health provisions of the Act and warning labels shall also be explained.

(8) Hazard recognition. The course shall include the recognition and avoidance of hazards present in the mine.

(9) Electrical hazards. The course shall include recognition and avoidance of electrical hazards.

(10) First aid. The course shall include instruction in first aid methods acceptable to MSHA.

(11) Explosives. The course shall include a review and instruction on the hazards related to explosives. The only exception to this course component is when no explosives are used or stored on mine property.

(12) Health and safety aspects of the tasks to which the new miner will be assigned. The course shall include instructions in the health and safety aspects of the tasks to be assigned, the safe work procedures for such tasks, and the mandatory health and safety standards pertinent to such tasks.

(13) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(c) Methods, including oral, written or practical demonstration, to determine successful completion of the training shall be included in the training plan. Upon completion of training, the methods for determining successful completion shall be administered to the miner. The method for determining successful completion of preassigned
training under paragraph (a) of this section shall be administered to
the miner before he is assigned to work duties.

(d) Upon proof by an operator that a newly employed miner has
received the courses and hours of instruction set forth in paragraphs
(a) and (b) of this section with 12 months preceding initial employment
at a mine, such miner need not repeat the training, but the operator
shall give and the miner shall receive and complete the instruction
and program of training set forth in paragraph (b) of §48.26 (Training
of newly employed experienced miners) and §48.27 (New task training
of miners), if applicable, before commencing work.

§48.26 Training of newly employed experienced miners;
minimum courses of instruction.

(a) A newly employed experienced miner shall receive and complete
training in the program of instruction prescribed in this section
before such miner is assigned to work duties.

(b) The training program for newly employed experienced miners
shall include the following:

(1) Introduction to work environment. The course shall include
a visit and tour of the mine. The methods of mining or operations
utilized at the mine shall be observed and explained.

(2) Mandatory health and safety standards. The course shall
include the mandatory health and safety standards pertinent to the
tasks to be assigned.

(3) Authority and responsibility of supervisors and miners' 
representatives. The course shall include a review and description of
the line of authority of supervisors and miners' representatives and
the responsibilities of such supervisors and miners' representatives; and an introduction to the operator's rules and the procedures for reporting hazards.

(4) Transportation controls and communication systems. The course shall include instruction on the procedures in effect for riding on and in mine conveyances; the controls for the transportation of miners and materials; and the use of the mine communication system, warning signals, and directional signs.

(5) Escape and emergency evacuation plans; firewarning and firefighting. The course shall include a review of the mine escape system; escape and emergency evacuation plans in effect at the mine; and instruction in the firewarning signals and firefighting procedures.

(6) Ground controls; working in areas of highwalls; water hazards, pits, and spoil banks; illumination and night work. The course shall include, where applicable, an introduction to and instruction on the highwall and ground control plans in effect at the mine; procedures for working safely in areas of highwalls, water hazards, pits, and spoil banks, the illumination of work areas, and safe work procedures for miners during hours of darkness.

(7) Hazard recognition. The course shall include the recognition and avoidance of hazards present in the mine, particularly any hazards related to explosives where explosives are used or stored at the mine.

(8) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.
§48.27 Training of miners assigned to a task in which they have had no previous experience; minimum courses of instruction.

(a) Miners assigned to new work tasks as mobile equipment operators, drilling machine operators, haulage and conveyor systems operators, ground control machine operators, and those in blasting operations shall not perform new work tasks in these categories until training prescribed in this paragraph and paragraph (b) of this section has been completed. This training shall not be required for miners who have been trained and who have demonstrated safe operating procedures for such new work tasks within 12 months preceding assignment. This training shall also not be required for miners who have performed the new work tasks and who have demonstrated safe operating procedures for such new work tasks within 12 months preceding assignment. The training program shall include the following.

(1) Health and safety aspects and safe operating procedures for work tasks, equipment, or machinery. The training shall include instruction in the health and safety aspects and safe operating procedures related to the assigned tasks, and shall be given in an on-the-job environment; and

(2)(i) Supervised practice during nonproduction. The training shall include supervised practice in the assigned tasks, and the performance of work duties at times or places where production is not the primary objective; or

(ii) Supervised operation during production. The training shall include, while under direct and immediate supervision and production
is in progress, operation of the machine or equipment and the performance of work duties.

(3) New or modified machines and equipment. Equipment and machine operators shall be instructed in safe operating procedures applicable to new or modified machines or equipment to be installed or put into operation in the mine, which require new or different operating procedures.

(4) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(b) Miners under paragraph (a) of this section shall not operate the equipment or machine or engaged in blasting operations without direction and immediate supervision until such miners have demonstrated safe operating procedures for the equipment or machine or blasting operation to the operator or the operator's agent.

(c) Mines assigned a new task to covered in paragraph (a) of this section shall be instructed in the safety and health aspects and safe work procedures of the task, prior to performing such tasks.

(d) All training and supervised practice and operation required by this section shall be given by a qualified trainer, or a supervisor experienced in the assigned tasks, or other person experienced in the assigned tasks.

§48.28 Annual refresher training of miners; minimum courses of instruction; hours of instruction.

(a) Each miner shall receive a minimum of 8 hours of annual refresher training as prescribed in this section.
(b) The annual refresher training program for all miners shall include the following courses of instruction:

(a) Mandatory health and safety standards. The course shall include mandatory health and safety standard requirements which are related to the miner's tasks.

(2) Transportation controls and communication systems. The course shall include instruction on the procedures for riding on and in mine conveyances; the controls in effect for the transportation of miners and material; and the use of the mine communication systems, warning signals, and directional signs.

(3) Escape and emergency evacuation plans; firewarning and firefighting. The course shall include a review of the mine escape system; escape and emergency evacuation plans in effect at the mine; and instruction in the firewarning signals and firefighting procedures.

(4) Ground control working in areas of highwalls, water hazards, pits and spoil banks; illumination and night work. The course shall include, where applicable, a review and instruction on the highwall and ground control plans in effect at the mine; procedures for working safely in areas of highwalls, water hazards, pits, and spoil banks; the illumination of work areas; and safe work procedures during hours of darkness.

(5) First aid. The course shall include a review of first aid methods acceptable to MSHA.

(6) Electrical hazards. The course shall include recognition and avoidance of electrical hazards.
(7) Prevention of accidents. The course shall include a review of accidents and causes of accidents, and instruction in accident prevention in the work environment.

(8) Health. The course shall include instruction on the purpose of taking dust measurement, where applicable, and noise and other health measurements, and any health control plan in effect at the mine shall be explained. The health provisions of the Act and warning labels shall also be explained.

(9) Explosives. The course shall include a review and instruction on the hazards related to explosives. The only exception to this course component is when there are no explosives used or stored on the mine property.

(10) Self-rescue and respiratory devices. The course shall include instruction and demonstration in the use, care and maintenance of self-rescue and respiratory devices, where applicable.

(11) Such other courses as may be required by the Training Center Chief based on circumstances and conditions at the mine.

(c) All experienced miners already employed at a mine on the effective date of the Act (March 9, 1978) shall receive refresher training, as prescribed in this section and in accordance with an approved plan, to begin not more than 90 days after the day of approval of the training program required by this subpart B.

(d) Where annual refresher training is conducted periodically, such sessions shall not be less than 30 minutes of actual instruction time and the miners shall be notified that the session is part of annual refresher training.
§ 48.29 Records of training.

(a) Upon a miner's completion of each MSHA approved training program, the operator shall record and certify on MSHA form 5000-23 that the mine has receive the specified training. A copy of the training certificate shall be given to the miner at the completion of the training. The training certificates for each miner shall be available at the mine site for inspection by MSHA and for examination by the miners, the miners' representative and State inspection agencies. When a miner leaves the operator's employ, the miner shall be entitled to a copy of his training certificates.

(b) False certification that training was given shall be punishable under section 110(a) and (f) of the Act.

(c) Copies of training certificates for currently employed miners shall be kept at the mine site for 2 years, for for 60 days after termination of employment.

§ 48.30 Compensation for training.

(a) Training shall be conducted during normal working hours; miners attending such training shall receive the rate of pay as provided in §48.22(d) (Definition of normal working hours) of this subpart B.

(b) If such training shall be given at a location other than the normal place of work, miners shall be compensated for the additional costs, such as mileage, meals and lodging, they may incur in attending such training sessions.
§48.31 Hazard training.

(a) Operators shall provide to those miners, as defined in §48.22(a)(2) (Definition of miner) of this subpart B, a training program before such miners commence their work duties. This training program shall include the following instruction, which is applicable to the duties of such miners:

(1) Hazard recognition and avoidance;
(2) Emergency and evacuation procedures;
(3) Health and safety standards safety rules and safe working procedures;
(4) Self-rescue and respiratory devices; and,
(5) Such other instruction as may be required by the Chief of the Training Center based on circumstances and conditions at the mine.

(b) Miners shall receive the instruction required by this section at least once every 12 months.

(c) The training program required by this section shall be submitted with the training plan required by §48.23(a) (Training plans: Submission and approval) of this subpart B and shall include a statement on the methods of instruction to be used.

(d) In accordance with §48.25 (Record of training) of this subpart B, the operator shall maintain and make available for inspection, certificates that miners have received the instruction required by this section.
§48.32 Appeals procedures.

The operator, miner and miners' representative shall have the right of appeal from a decision of the Training Center Chief.

(a) In the event an operator, miner, or miners' representative decides to appeal a decision by the Training Center Chief, such an appeal shall be submitted, in writing, to the Director of Education and Training, MSHA, 4015 Wilson Boulevard, Arlington, VA 22203, within 30 days of notification of the Chief of the Training Center's decision.

(b) The Director of Education and Training may require additional information from the operator, the miners or their representatives, and the Chief of the Training Center, if the Director determines such information is necessary.

(c) The Director of Education and Training shall render a decision on the appeal within 30 days after receipt of the appeal.
KNOWLEDGE QUESTIONS

I. Statutory Rights

1. Do you as a miner have the right to bring safety violations to the attention of MSHA? *(1)

2. Is the mine operator required to pay you your normal salary when you are receiving training? (1)

3. If a Federal inspector visits your mine, does a miner representative have the right to accompany the inspector? (1)

4. Who should you notify in case of an emergency? (1)

II. Hazard Recognition

5. What are the two most common causes or potential causes of accidents in a mine of this type? (2)

6. What is the leading cause or potential cause of fatalities in a mine of this type? (1)

7. Give an example of an unsafe act. Give an example of an unsafe condition. (4)

III. Transportation Controls and Communications Systems

8. How would you contact the proper person if there were an accident or other emergency? (1)

9. What is the procedure for checking in, entering and leaving the mine and your work place? (2)

IV. Health

10. What is the purpose of taking dust measurements? (1)

11. What is the purpose of taking noise measurements? (1)

12. What is the major health hazard associated with working in a dusty work environment? (1)

13. What is the major health hazard associated with working in an excessively noisy work environment? (1)
V. Self Rescue and Respiratory Devices

14. A self rescuer is designed to protect you from what gas? For how long? (2)

15. Name at least two methods used to protect you from excessive dust at this mine. (2)

16. When should you put on an approved self rescuer? (1)

VI. Escape and Emergency Evacuation Plans: Firewarning and Firefighting.

17. What is (or locate on a map) the primary and secondary routes of escape? (2)

18. Describe at least one method used to alert miners, if there is a fire at this mine. (1)

19. Name at least three of the steps you would take in the event of a fire. (3)

20. When and how would you barricade yourself from a fire? (2)

VII. First Aid

21. Describe at least five steps you would take to administer mouth to mouth resuscitation. (5)

22. How would you recognize and treat a person encountering physical shock? (2)

23. Describe two methods to control severe bleeding. (1)

VIII. Explosives

24. Name at least two possible sources or causes of premature explosives detonation. (2)

25. What is a blasting cap? (1)

26. Why can't blasting caps and explosives be stored and transported together in the same container? If explosives and detonators are being transported in the same vehicle, what safety precautions should be taken? (2)
IX. Electrical Hazards

27. What is the difference between an energized and a de-energized electrical circuit? (2)

28. How do you recognize electrical equipment that has been de-energized at this mine? (1)

29. Name at least two potential dangers associated with electrical equipment in this mine? (2)

X. Ground Control: Illumination: Water Hazards

30. What is the leading cause or potential cause of ground failure at this mine? (1)

31. Relative to your work areas, when and where are you in the greatest potential danger of being injured due to ground failure? (1)

32. Name at least two methods incorporated to control unwanted or dangerous ground movements at this mine. (2)

33. Name at least two hazards associated with working in a poorly illuminated work place? (2)
POSSIBLE ANSWERS TO KNOWLEDGE QUESTIONS

1. Yes: And has the right to obtain an immediate inspection (FMS&HA of 1977, 103 g (1) (2). The name of the person giving such notice and the names of individual miners referred to therein shall not appear in such a copy or notification.


4. The correct response to this question can be determined from mine policy.

5. The correct responses to this question must be determined from mine data or HSAC data.

6. The correct response to this question must be determined from HSAC data.

7. UNSAFE ACT: An individual performing an action that has a high potential for causing an accident:

   Examples - operating equipment at improper speeds.
   - making safety devices inoperable.
   - using equipment improperly.

   UNSAFE CONDITION: Conditions that exists in the work environment that has a high potential for causing an accident:

   Examples - inadequate supports on guards.
   - poor housekeeping.

8. Response should match company policy or procedure.

9. Response should match company policy or procedure.

10. The purpose of dust sampling is to determine the average concentration of respirable dust in the air for comparison to Federal Standards on safe working levels.

11. The purpose of noise sampling is to determine an average level of excessive noise exposure an individual is exposed to for comparison to Federal Standards on safe working limits.
12. The results of excessive exposure to respirable dust is disease of the respiratory system, if swallowed, damage in stomach, liver, and kidney, and will irritate eyes, ears, nose and throat.

13. Exposure to excessive and extended noise can cause hearing loss, effect the circulatory, nervous and endocrine systems. Noise also effects communication and causes fatigue.

14. The MSA W-65 and the Drager 810 Self-rescuers are small gas respirators designed to protect one individual against carbon monoxide in concentrations of up to one percent of one hour.

15. Response should match company policy or prudent behavior.

16. The self-rescuer should be used immediately at the first indication of a fire or explosion even though no smoke may be visible.

17. Response should match company escape plan.

18. Response should match company firewarning procedures and can include such items as smoke, air blasts and explosions.

19. Self-rescuer, notification, assembly points, primary and secondary escape routes, barricading and fire extinguisher use.

20. Escape routes blocked; company or MSHA mine emergency procedures for building barricades.

21. (MESA First Aid Safety Manual No 3, pp. 6 & 7). Check for response, open airway, check for breathing, seal nose, mouth to mouth seal, inflate till chest rises, release seal, repeat every five seconds; obstructed airway procedure.

22. Supine position, head slightly lowered or fee raised, clear airway, keep warm, loosen tight clothing. (MESA First Aid Safety Manual No. 3, pp. 18-22).


24. External heat, stray electrical charges, shock, electrical storms, static, fire, bullets.

25. An explosives detonator containing a charge of detonating compound which is ignited by electric current or heat of a fuse or detonating cord.
26. Primarily because of the high risk of premature detonation. Secondly, it is against the law. If they are transported in same vehicle, they must be separated by (4) four inches of hard wood or its equivalent (CFR 30 55.6-40, 56.6-40, 57.6-40, 77.1302 (c). In underground coal mines, explosives and detonations must be kept in separate containers (CFR30 74.1301).

27. An energized or hot circuit is one that is connected to the source of power and has voltage applied. A de-energized circuit is one that has been disconnected from the source of voltage applied. Never assume a circuit is de-energized unless it can be determined by visual observation that no voltage is applied.

28. The type of equipment and procedures at the mine would determine correct answer. Generally, the equipment would be locked out or tagged.

29. Refer to type of equipment at the mine to determine electrical hazards. Generally, the hazards associated with electrical shock caused by contact with energized circuits and burns caused by arcs and heat generated by electrical equipment. Specific examples might be improper grounding of equipment, improper lock-out procedures, overhead high voltage.

30. Ground fall history, company records, and enforcement records.

31. Unsupported roof or back (underground), at the toe of the working face or bench (surface).

32. Company records or policy.

33. Slips and falls, vehicles accidents, machinery entanglement, etc.
PREGUNTAS DE CIENCIA

I. Derechos Estatutarios

1. Siendo minero tiene Ud. el derecho de hacer presente a la MSHA violaciones de la seguridad? *(1)

2. Es exigido el operador minero pagarle a Ud. su salario normal cuando esta Ud. recibiendo entrenamiento? (1)

3. Si visita la mina de Ud. un inspector federal, tiene el derecho de acompanarle al inspector un representativo minero? (1)

4. En caso de emergencia a quien debe Ud. de notificar? (1)

II. Reconocimiento de Riesgo

5. En una mina de esta tipa cuales son las dos causas mas comunes o causas potenciales de accidentes? (2)

6. En una mina de esta tipa cual es la causa principal o causa potencial de las fatalidades? (1)

7. De Ud. en ejemplo de un acto inseguro. De Ud. un ejemplo de una condicion insegura? (4)

III. Controles de Transporte y Sistemas de Comunicacion

8. En caso de un accidente u otra emergencia como se pondria Ud. en contracto con la persona apropiada? (1)

9. Cual es el procedimiento del reportarse, del entrar y del salir de la mina y del lugar de trabajo de Ud.? (2)

IV. Salud

10. Cual es el proposito de la medicion del polvo? (1)

11. Cual es el proposito de la medicion del ruido? (1)

12. Cuel es el principal riesgo a la salud asociado con el trabajar en un ambiente polvoroso? (1)

13. Cuel es el principal riesgo a la salud asociado con el trabajar en un ambiente excesivamente ruidoso? (1)
V. Auto-Tescate y Aparatos Respiratorios

14. Un aparato de auto-rescate es disenado para protegerle a Ud. de qual gas? Hasta cuando? (2)

15. Diga Ud. a lo menos dos metodos usados para protegerle del polvo excesivo en esta mina? (2)

16. Cuando debe Ud. de ponerse un aparate de auto-rescate aprobado? (1)

VI. Planes para el Escape y la Evacuacion de Emergencia: Aviso de Fuego y Combate de Fuego

17. Cuales son (o localice Ud. en un mapa) las rutas de escape primarias y secundarias? (2)

18. Si hay fuego en esta mina, describa Ud. a lo menos un metodo de alertarles a los mineros. (1)

19. Diga Ud. a lo menos tres de los pasos que usaria Ud. en caso de un fuego? (3)

20. Cuando y como se barrearia Ud. contra un fuego? (2)

VII. Primeros Auxilios

21. Describa Ud. a lo menos cinco pasos que usaria Ud. para administrar la resucitacion de boca en boca? (5)

22. Como reconoceria y trataria Ud. a una persona sufriendo de choque fisico? (2)

23. Diga y describa Ud. dos metodos de controlar el desangramiento? (2)

VIII. Explosivos

24. Dig. Ud. a lo menos dos posibles fuentes of causas de detonacion prematura de explosivos? (2)

25. Que es un detonador? (1)

26. Por que no se pueden almacenar y transportar juntos en el mismo envase los detonadores y explosivos? Si son transportados explosivos y detonadores en el mismo vehiculo, caules precauciones de seguridad deben de ser tomadas? (2)
IX. **Riesgos Electricos**

27. **Cual es la diferencia entre un circuito electrico excitado y no-excitado?**  (2)

28. **Como reconoce Ud. equipo electrico que ha sido des-excitado en esta mina?**  (1)

29. **Diga Ud. a lo menos dos peligros potenciales asociados con equipo electrico en esta mina?**  (2)

X. **Control de Tierra: Illuminacion: Riesgos Acuaticos**

30. **Cual es la causa principal o causa potencial de fracaso de tierra en esta mina?**  (1)

31. **Concerniente al lugar de trabajo de Ud. cuando y donde encuentra Ud. el mayor peligro potencial de ser herido debido al fracaso (movimiento) de tierra?**  (1)

32. **Diga Ud. a los menos dos metodos usados en esta mina a fin de controlar indeseados o peligrosos movimientos de tierra?**  (2)

33. **Diga Ud. a lo menos dos riesgos asociados con el trabajar en un lugar mal iluminado?**  (2)
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