DEVELOPING A COMPREHENSIVE EMERGENCY PREPAREDNESS PLANNING MANUAL FOR UNDERGROUND MINING OPERATIONS

West Virginia Office of Miners' Health, Safety and Training

and

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PREFACE

❍ An underground coal mine crew of thirteen miners travels in a mantrip to their working section at the beginning of the shift. One miner is left off at the belt drive. Suddenly, they are engulfed with smoke and dust. Unbeknownst to them, an explosion has occurred behind a sealed area and ventilation controls for their working section have been destroyed. The miners on the section eventually don their self-contained self-rescuers (SCSR's) and attempt to get out of the mine. They find their escapeways and other means of egress blocked. They retreat back toward the face and hurriedly construct a barricade. Many hours later, 11 of the miners are found dead in the barricade by a mine rescue team. The miner left at the belt was killed by the initial explosion.

❍ A fire occurs at an underground belt conveyor drive. Smoke and dangerous levels of carbon monoxide travel into an adjacent working section. The miners don their SCSR's and begin to travel out the mine. Two of the miners get separated from the rest of the crew in heavy smoke and are unable to find their way out. They are later found dead by a mine rescue team.

No underground coal mine is immune from a major disaster. Major mine emergencies can occur at anytime and from a number of causes. Throughout the history of mining, mine emergencies have caused the loss of hundreds of miners, destruction of property, physical and psychological upheaval and enormous financial burden.

We can not prevent all mining disasters, but we can, through well designed emergency preparedness planning, mitigate or minimize their effects. If an emergency preparedness plan is well designed, properly implemented and periodically reviewed, it can greatly enhance a mining company's ability to respond effectively and efficiently to most underground emergencies and significantly reduce the potential loss or injury of miners and property.

When it comes to emergency preparedness planning, it is paramount that every conceivable action, reaction, response, resource and emotion be considered even if such considerations may later be dismissed as nonessential to the emergency preparedness effort. The whole purpose of emergency preparedness planning is to anticipate future emergency situations and requirements and then to apply effective and efficient countermeasures.

Obviously, the development of a comprehensive emergency preparedness plan requires considerable time and effort. However, the planning effort can yield valuable dividends. Emergency preparedness planning protects lives, equipment and property.

The emergency preparedness plan focuses on what types of emergencies can effect your mining operations; who will lead and make decisions during an emergency; and what procedures are put in place to ensure an effective response. It must be viewed as a dynamic, ongoing and ever-changing process.

The core elements of the plan are planning, prevention, preparation, response and recovery actions. The planning process is a key element that forces mine management and labor to explore viable options that can be employed to prevent or reduce the consequences of an emergency. A major component of the prevention phase is risk assessment and analysis.

This manual is designed to prepare mine operators with a systematic guide to manual is not new. It has been used by safety professionals in other industries for decades. This manual provides both a proactive and reactive approach for safeguarding a mining operation’s miners and property assets. It can be an important guide for times of great stress, confusion and frustration.

Lee Whistler once wrote, “Few people plan to fail, they just fail to plan.” Mine emergencies happen. Emergency preparedness planning before an emergency situation is the key to preventing and controlling these events.

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I. INTRODUCTION

A. What is An Emergency?

An emergency that occurs at an underground coal mine or the surface areas of an underground coal mine can be defined as “any unplanned event that causes serious injuries or loss of life; causes extensive property damage; shuts down or disrupts the mining operations; or threatens the operation’s financial standing or public image.”

Emergency preparedness plans are often referred to as disaster plans. The distinction is that a well designed and executed emergency preparedness plan can eliminate or control hazards so they don’t become a disaster; or if this isn’t possible, it can turn a potential disaster into a well managed situation with minimal effect on the miners and property of the mining operation.

Although the Mine Safety and Health Administration (MSHA) does not define an emergency, it does include three (3) types of incidents under the Mine Improvement and Emergency Response Act (Miner Act) that requires a mine operator to notify the Secretary within fifteen (15) minutes from realizing the occurrence of one of the following events:

1. The death of an individual at the mine.
2. An injury of an individual at the mine which has a reasonable potential to cause death; or
3. The entrapment of an individual at the mine which has reasonable potential to cause death.

MSHA has set stiff monetary penalties for failing to report these events in the specified time. A mine operator is subject to a civil penalty of not less that $5,000 and not more than $60,000 for failure to provide timely notification.

Furthermore, MSHA requires mine operators to develop and adopt a written accident response plan. These plans must provide for the evacuation of all individuals

endangered by an emergency and for maintenance of individuals trapped underground. Periodic updates of the company's emergency response plan are required to reflect changes in the mine, advances in technology and other relevant considerations.

B. What is Emergency Management?

Emergency management is the collective arrangement of personnel to plan for, mitigate/control, respond to and recover from an emergency. It provides for a structured framework for completing all perceived activities in an emergency situation. Emergency management ensures a solid, complete and collaborative arrangement of personnel, resources and services.

An emergency preparedness plan is not to be confused with an emergency response plan. Emergency response is just one of the key elements of the emergency preparedness plan. Emergency preparedness plans include risk management activities, prevention and/or control measures, response procedures and guidelines, and recovery efforts. Each of these components requires training, drills and periodic revisions.

C. Why Have a Plan?

One obvious characteristic of a major emergency at a mining operation is the rapidly evolving complexity that faces individuals trying to effectively manage all the organizations and people, operations and tasks, equipment and supplies, communications, and the safety and health of all involved. A well thought out emergency preparedness plan can alleviate much of this confusion.

If an emergency does arise, all aspects of the mining operations can be thrown into chaos and all personnel (management and labor) can be overwhelmed by the task before them. Since the success of mitigating or minimizing the effects of the emergency requires all personnel to act quickly and effectively, having an emergency preparedness plan makes good sense.

An often overlooked benefit of an emergency preparedness plan is that it requires the mining operation to consider the types of risks the operation might face, and therefore, provides an opportunity to mitigate and/or control these risks and prevent a major emergency.

Additionally, a well-developed, implemented and maintained emergency preparedness plan can:

- ❍ Help mining companies fulfill their moral responsibility of protecting their miners, property and possibly the public and environment.
- ❍ Ensure compliance with federal and state mining regulations.
- ❍ Enhance a company's liability to recover more quickly from financial loss, regulatory fines, loss of market, and damages to property and equipment.
- ❍ Reduce exposure to civil or criminal liability.
- ❍ Provide employees, customers and suppliers with a sense of security.
- ❍ Reduce insurance premiums.

It is paramount that planning proceed from the premise that the objective of the mine emergency preparedness plan is: (a) the prevention of an emergency, (b) preparation for the occurrence of an emergency, (c) response actions of an emergency, and (d) recovery efforts following an emergency.

II. ESTABLISHING THE PLANNING TEAM

A. Who's on the Team?

The emergency planning team is responsible for the development and administration of the emergency preparedness plan. Usually the safety director/manager at the mining operation is given the overall responsibility for developing the plan. However, he/she can not do it alone. The exact number of people who comprise the team will depend on the size, scope, and complexity of the mine. It is best to include a group of people from various departments. This diverse group is important because it provides "buy in" to the plan. Having a team will encourage participation and interest in the process as well as providing a broad perspective on those issues relevant to each person's department or function. It, also, enhances problem solving by allowing people with different backgrounds, experience and expertise to view problems from different

perspectives. Most importantly, it draws upon the expertise of those individuals who know the operations and processes the best.

Additionally, a person from upper management should be on the team. This person demonstrates management's commitment to the plan and can provide the necessary budgetary resources for completing the plan.

A representative of the miners (underground and surface) should be included on the planning team. Miners play an important role in developing the mine related aspects of the plan.

A person to act as secretary should also be included to take notes of the meeting, send out notices of meetings, and type the final plan.

It's important that these people want to serve on the planning team. If a particular person representing a department or function does not want to participate, the team leader should find a way for that person to exit and be replaced by a person who is willing to serve.

Usually, one (safety director/manager) or two people will do the bulk of the work with the rest of the team serving in an advisory capacity.

At the very least, people from the following departments or functions should be members of the planning team:

- ❍ General Mine Manager/Superintendent
- ❍ Mine Foreman
- ❍ Maintenance Manager/Supervisor
- ❍ Labor Representative
- ❍ Safety Manager/Director
- ❍ Human Resources Manager
- ❍ Engineering Manager/Supervisor
- ❍ Security Director

B. Authority of the Team

The success of the emergency preparedness plan depends heavily on the support of the chief executive officer or owner of the mining operation. This person sets the stage by authorizing the development of the plan. This commitment authorizes planning to take

place and directs mine personnel to actively get involved. Usually a statement is released from his office. This statement demonstrates to the planning team and the employees of the mine that the mining company is committed to the emergency preparedness plan. A simple, concise statement may read:

> The XYZ Coal Company is committed to operating at the highest standards to protect the health and safety of our workers, our customers and the public.
>
> Therefore, the safety manager/director with the help and support from each department will develop, implement and maintain a comprehensive emergency preparedness plan that is in compliance with all industry standards as well as any state and federal regulations to ensure a timely and appropriate response to any emergency that may happen at our operation.

C. Write a Mission Statement

The mission statement is developed by the highest ranking member of management. It defines the purpose of the emergency preparedness plan and indicates that it will involve the entire operation. The mission statement demonstrates the company's commitment to the plan. Moreover, it outlines the purpose of the plan and its importance. It defines the structure and authority of the planning team.

The mission statement serves as the basis for the entire emergency preparedness plan. An example of a short, but meaningful mission statement could be:

> The newly established emergency preparedness planning team is created with the goal of providing the highest degree of prevention, preparedness, response and recovery to the employees and stakeholders of our company through the development, implementation and maintenance of a comprehensive emergency preparedness plan. The plan is intended to provide leadership, coordination and continuity to allow our company to prepare for, respond to and recover from a mine emergency.

D. Develop a Schedule and Budget

As with any major mine project, the planning team establishes a work schedule and planning deadlines. Obviously, these timelines can be modified as priorities become more clearly defined.

An initial budget for such things as research, printing, seminars, consulting services and other expenses should be an integral function during the development of the plan.

III. ANALYZING CAPABILITIES AND HAZARDS

A. Review of Internal Plans, Policies, and State and Federal Regulations

This review consists of any company plans and policies as well as any state or federally mandated regulations. A few of the MSHA required plans include:

- ❍ Mine Emergency Notification Plan (30 CFR Part 49.9)
- ❍ Mine Emergency Evacuation and Firefighting Program of Instruction (30 CFR Part 75.1502)
- ❍ Various Training Plans (30 CFR Part 48)
- ❍ Duties of the Responsible Person (30 CFR Part 75.1501)
- ❍ Emergency Response Plan (Miner Act, Section 2)

Internal plans of the mining company that are reviewed include:

- ❍ Safety and health policies
- ❍ Fire prevention and protection plans
- ❍ Evacuation procedures
- ❍ Stockpile safety procedures
- ❍ Security procedures
- ❍ Mutual aid agreements
- ❍ Insurance plans
- ❍ State and federal emergency response actions

Many of the outside agencies needed in an emergency may also be governed by regulatory, jurisdictional or governmental policies. They may have certain limitations and authority during a mine emergency. It is important that the planning committee meet with these agencies. These outside groups include:

- ❍ Local emergency management group
- ❍ Fire department
- ❍ Local and state police
- ❍ Emergency medical services
- ❍ Telephone and other utility companies
- ❍ Supply vendors (including food caterers and motel owners)
- ❍ American Red Cross
- ❍ Other local community organizations
- ❍ Drilling operators

B. Evaluate Internal and External Resources

The internal and external resources needed during a mine emergency need to be evaluated in terms of being able to provide the desired effect. Resources necessary for emergency response may be different from resources that are currently available, so assessing internal and external resources is essential. For example, if the nearest fire department is an all volunteer service with limited manpower, their services during an emergency may be limited and of short duration. Another example is a newly formed mine rescue team at the mine. If this team is composed of miners who have never been involved in an emergency operation, they may have limited capabilities during a mine emergency.

Internal and external resources and capabilities that need to be evaluated include:

- ❍ Personnel – miners who are trained in first responder firefighting; fire brigades, mine rescue teams, emergency medical technicians (EMT's) and paramedics, specialized rescue technicians (confined space, hazardous materials, high angle rescue, urban search and rescue, etc.), emergency management

group, etc. Also consider the availability of key personnel on all shifts, including weekends.

- ❍ Equipment – fire protection and suppression equipment. Personal protective equipment for firefighters and/or mine rescue teams, communication systems (surface and underground), medical supplies, warning systems, emergency power equipment, specialty equipment (gas chromatograph, air bags, high expansion foam generators, etc.)
- ❍ Facilities – emergency command center, mine rescue cleaning area, media briefing area, sleeping quarters, food caterers, families and relative's area, morgue (etc.)
- ❍ Organizational – training, employee support system, experience, culture, etc.

C. Conduct a Risk Assessment

While preparing for an emergency is essential, preventing the event from ever happening is a much more desirable approach. If the causes and their potential consequences can be identified in advance, appropriate countermeasures can be taken to minimize the likelihood of the event causing an emergency. This is the basis of risk assessment.

Risk assessment is the basis for the emergency preparedness plan although the results of the assessment are not incorporated into the plan. A risk assessment is simply a careful evaluation of the hazards in the mining operation that could cause significant injury or illness to the miners; cause damage to the property or environment; create significant economic loss to the company; or cause damage to the public. It is a process by which the mining operation focuses on critical areas of concern and prioritizes their use of resources in order to maximize response and recovery efforts. It is an important tool for evaluating hazards as to the likelihood (probability) that a problem may occur and the damage (consequences) if such an event does happen.

Risk management acknowledges that all risk generally can not be completely eliminated, but can be significantly reduced through effective protective measures.

The principles of risk management are:

- ❍ Identifies weaknesses in a mining operation.
- ❍ Offers a realistic method for making decisions about the expenditure of scarce resources and the selection of cost-effective countermeasures to protect the company's personnel and property assets.
- ❍ Allows the mining operation to determine the magnitude and effect of a potential emergency.
- ❍ Determines the likelihood of such an emergency actually happening.
- ❍ Allows the mining operation to develop countermeasures that could lower the probability or magnitude of the emergency.

An event leading up to or causing a major mine emergency or disaster is known as a hazard. A hazard always denotes a possibility or potential. A hazard can be viewed as a possible or potential harm or injury (or an immediate precursor to harm or injury). Risk is the probability that a person or group will actually experience a specific hazard.

A comprehensive risk management program is paramount to preventing injuries and/or emergencies. Many coal mining operators are under the false pretense that compliance with State and Federal regulations will guarantee a prevention of accidents and emergencies. Compliance with these regulations is merely a prerequisite but is not always enough to achieve prevention. Complying with these regulations does not guarantee that a mine operator will not be confronted with a fire or explosion. More important, such compliance will, also, not guarantee that a mine is fully prepared to effectively respond to a major disaster. Prevention of mine emergencies requires that a comprehensive and well-managed emergency preparedness plan that includes risk management processes be incorporated.

The mining industry has been much too reactive to accidents/emergencies in recent years. We wait until we have an accident/emergency and then develop countermeasures to prevent it from happening again. This culture must change. A culture of prevention (proactive) needs to evolve if the mining industry is to achieve zero accidents/emergencies.

Risk management helps move the mine from a culture of reaction to a culture of prevention. Rather than responding to an emergency that has occurred (reactive), the mining company proactively assesses potential hazards/problems areas before they occur. In this approach, the company identifies the risks and then develops prevention or mitigation controls.

The first step in conducting a risk assessment is to determine who will conduct the inspection and what areas they will inspect. These people should be knowledgeable about specific areas of the mine and have extensive knowledge and/or experience in specific areas; e.g. belt haulage systems, long walls, continuous miner section, ventilation, electrical systems, transportation systems, etc. They identify all the possible hazards that exist in their assigned area.

A good source of hazard collection is historical knowledge and records of accidents. A review of past state and federal violations and inspection reports is another good source for identifying hazardous conditions. Safety audits, especially those done by an outside consultant, provide a good source of hazard identification.

The next step in risk assessment begins by creating a list of all hazards that could possibly impact the mining operation. In the mining environment, some hazards are more likely to cause significant damage than others and some could result in very severe personal injury or destructive property damage.

The third step is to conduct a risk analysis. The risk analysis determines which hazards should receive the most attention and what types of events are most likely to happen and/or cause the most damage. Those hazards that are identified as “most likely to happen” and produce the worst consequences should be targeted for immediate preventive activities. Those situations that are determined to be “less likely to occur” and would have a less severe consequence are considered for preventive and response activities after the more serious hazards are addressed.

In addition to a risk analysis identifies the type of risk and its root causes. Failure to identify the root causes will negate a company’s ability to effectively eliminate or control the hazard. Various analytical techniques can be used to identify the potential sources of workplace emergencies and persons potentially at risk. These techniques include:

- ❍ Preliminary hazard analysis – focuses on certain areas of the mine in order to identify hazards and certain potential emergency situations. It focuses on the interface of miners with equipment in that area and then assigning a ranking to each hazardous situation that can be envisioned.
- ❍ Failure modes and effects analysis – focuses on failure modes of specific equipment and the effects of such failures on facility operations and personnel safety.
- ❍ What-if-analysis – focuses on the formulation of a series of questions that must be evaluated with respect to potential hazards identified in the preliminary hazard analysis.
- ❍ Hazard and operability analysis – focuses on detailed information on the design and operation of the facility.
- ❍ Fault tree analysis – focuses on graphically modeling accidents and failures in equipment and personnel that lead to an accident or emergency. It is also an analysis on how successes or failures of specific in-place safety equipment, devices and procedures may contribute to a developing emergency.
- ❍ Human reliability analysis – focuses on factors that influence the actual job performance of personnel. It includes the skills, knowledge and capabilities necessary for performing a task correctly and, if ignored, the consequences of such action.

The fourth step requires that potential emergency situations be evaluated in terms of likelihood to occur (probability) and severity of the consequences. A numerical matrix may be used to record the data.

Consequences should be viewed from the impact on personnel, property, environment, business or economic loss. A numerical scale from 1-5 is frequently used. Listed below are the human property consequences and the number rating:

Human:

5 – Death or fatal injury

4 – Permanent disability; severe injury or illness

3 – Lost time accident of more than one week

2 – Lost time accident of less than one week

1 – Treatable first aid; no lost time

Property:

5 – Closure of the mine for more than 6 months

4 – Major property damage; entire mine without production

3 – Moderate property damage; loss of production for more than 1 week

2 – Some property damage; less than one day production loss

1 – Little if any property damage; no loss of

Probability is another word that is often used to describe the likelihood of an event occurring. Usually it is a subjective consideration and falls into one of the following categories:

5 – Highly likely; the hazard is very probable (100%) within the next year

4 – Likely; the hazard is probable (50-100%) within the next year; or has at least one chance of occurring within the next 10 years

3 – Somewhat possible; the hazard is probable (10-50%) within the next year; or has one chance of occurrence in the next 50 years.

2 – Possible; the hazard is possible (1-10%); has a one chance of occurrence in the next 100 years

1 – Unlikely; the hazard is likely to occur less than once in a 100 years.

Some of the more obvious types of emergencies that could happen at a mining operation include:

- Fires
- Explosions
- Inundations (water or gas)

- ❍ Entrapment of miners
- ❍ Transportation accident
- ❍ Stockpile collapse
- ❍ Confined space emergency
- ❍ Heavy equipment accident with entrapment
- ❍ Chemical release
- ❍ Water or slurry impoundment failure/collapse

Don't forget those technological emergencies that could result from a process or system failure: Examples include:

- ❍ Major power failure
- ❍ Computer failure
- ❍ Ventilation failure

Brainstorm each potential emergency. Consider if some of the following scenarios could happen at your mining operation.

- ❍ Loss of electrical power at your preparation plant for more than 12 hours in sub-freezing weather
- ❍ High river water that prevents barge shipments for more than one week
- ❍ A major roof fall that traps 3 miners
- ❍ A tanker of chlorine gas overturning on your mine property
- ❍ A fire on the intake escapeway of a longwall gate section
- ❍ A bulldozer operator trapped in a stockpile collapse
- ❍ An explosion in a working section of 8 miners

The risk rating of these hazards determines what preventative and protective measures are required. Obviously, those hazards that have the highest numerical rating should be given first priority for future training, prevention and response actions. For each risk that we believe to be a high probability and severe consequence, we must make a concerted effort to prevent it from occurring. Some common safety –relating practices for eliminating the hazard include:

- ❍ Engineering
- ❍ Documented operating procedures

- ❍ Employee training
- ❍ Preventative maintenance programs
- ❍ Organizational culture change
- ❍ Thorough workplace inspections

At a minimum, each mining operation should conduct a risk assessment for the major hazards (fire, explosion, inundations) that could lead to catastrophic events. Some mines may have little probability of one of these events, but a higher probability of another. Nevertheless, once these hazards are identified, or such events have occurred, a mine operator must take a proactive approach to reduce or eliminate them. If this isn't possible, they must be controlled to the point that the risks are as low as possible. This is the basis for a sound risk management program.

The completed risk assessment analysis provides the basis of the emergency preparedness plan. In addition to developing prevention activities that may eliminate these risks, a risk assessment analysis also establishes criteria for developing appropriate levels of protection.

To complete this risk assessment, each potential emergency must be considered from the beginning to the end and each resource needed to respond. Examples of these resources include:

- ❍ Personnel – fire brigades, mine rescue teams, hazardous materials technicians, emergency medical technicians (EMT's)/paramedics, security, environmental experts, technical personnel (drilling, ventilation, gas analysis, etc.)
- ❍ Equipment – fire protection and suppression systems, communications equipment (intra-mine, surface to underground, surface to public), chromatograph, first aid supplies, emergency power, heavy equipment, drilling rigs
- ❍ Facilities – emergency operations center, media briefing areas, family areas, shelter areas, staging areas for mine rescue teams, first aid stations, breathing apparatus cleaning areas, sleeping areas, food areas
- ❍ Organization capabilities – training, finance
- ❍ Back-up systems

Many external resources are needed in an emergency. In some cases, formal arrangements or contacts may be necessary. External resources include:

- ❍ Local emergency management office
- ❍ Local municipal or professional fire department
- ❍ Specialized responders (Hazardous material, confined space, high angle rescue, underwater searches,)
- ❍ Hospitals or medical facilities
- ❍ Local and state police
- ❍ Communications services
- ❍ Utilities
- ❍ Suppliers of emergency equipment
- ❍ Consultants
- ❍ Food providers

For each type of emergency, one simple question has to be answered: Do we have the needed internal and external resources and capabilities to respond?

If the answer is “no”, then it is paramount to identify what needs to be done to correct the problem. For example, you may need to:

- ❍ Develop additional emergency procedures
- ❍ Conduct additional training
- ❍ Acquire additional equipment
- ❍ Establish agreement with specialized contractors

A simple risk assessment chart similar to the one at next page may be useful in determining what types of emergency would be given top priority. On the first column of the matrix, list all emergencies that could affect your facility. Be specific. For example, a fire at the #1 South belt drive might have greater consequences than a fire on another belt drive. Be sure to consider both emergencies that could occur in the underground mine as well as those that could occur on surface areas of the operation. List the likelihood in the next column. The consequences of the emergency are viewed from the human and property impact. The next two columns provide an assessment of what capabilities the internal and external resources have for controlling or mitigating the emergency. All

areas are rated from 1-5, with 5 being the worst case. The completed chart provides the mine operator with a tool for addressing the specific emergency.

RISK ASSESSMENT CHART

Type of Emergency	Probability	Human Impact	Property Impact	Internal Resources	External Resources	Total

IV. DEVELOP THE PLAN

A. Executive Summary

The executive summary provides management with a brief overview of the emergency preparedness plan. It would include the mine operation's emergency management policy; authorities and responsibilities of key personnel; the types of emergencies that could occur; how and where these emergencies will be managed; and how recovery efforts will be structured.

B. Emergency Management Elements

1. Direction and Control

Someone must be in charge during an emergency. Usually this person's function is delegated to the most senior level management person at the mine. This person, with assistance (and approval) from other mine management personnel, state and federal regulatory agency personnel, and possibly a representative of the miners, is responsible for managing resources, analyzing information and making decisions.

The configuration of the mine's direction and control system will depend on many factors. Many of the larger mines have specially trained on site fire brigades and/or mine

rescue teams that are readily available. Most of the smaller mines have to rely on mutual aid agreements with other mines or contractors. Management personnel at a small mine may also have to be responsible for a number of the initial emergency activities or procedures.

During a full scale emergency, an Emergency Management Group (EMG) is assembled. This group is responsible for all aspects of the emergency and response activities. They must understand that the safety of the miners and responders is their first priority. Their next concern is preventing the incident from escalating and their last concern is property damage. The EMG is usually headed by the senior level manager at the mine. This person is in command and control of all aspects of the emergency. The EMG, depending on the size of the mine, usually includes:

- Senior level management person
- Mining engineer
- Safety director
- Mine Foreman
- Human resources manager
- Legal personnel
- Environmental engineer
- State regulatory representative
- MSHA representative(s)
- Labor representative

The emergency management group enables all of these people to manage an incident by establishing a common set of goals and objectives. The EMG provides a forum for these entities to make consensus decisions. They mutually work together to develop a set of strategic and tactical plans, share information, maximize the use of available resources, and enhance the efficiency of the individual response organizations. The EMG is a team effort, but to be effective, the number of personnel should be kept as small as possible.

The EMG is generally headed by the mine manager or superintendent. With assistance from the other members of the EMG and approval from the state and federal regulatory agencies, the emergency director is in command and control of the emergency.

However, when MSHA issues a 103(k) Order, all rescue and recovery plans must be submitted to MSHA and the state agency for review and approval. Modifications to the plan must, also, be approved.

Once these plans are approved, the head of the emergency command group has the responsibility and authority to:

- ❍ Determine what actions are necessary to control or mitigate the emergency.
- ❍ Allocate personnel and material resources needed in the emergency.
- ❍ Interface with outside agencies.
- ❍ Through the Mine Safety and Health Administration, issue press releases and provide information to the families.
- ❍ Determine when to terminate emergency response activities.
- ❍ Determine what actions to take if response activities are terminated.

The EMG will appoint an Incident Commander (IC) who is responsible for the front-line management of the incident and the tactical planning and execution. This position is usually handled by the mine foreman. The IC will usually be accompanied by a state and federal mine inspector and a representative of the miners while he is carrying out his duties.

It's paramount that an accurate log of all events be made. All communications between the EMG and emergency responders and/or trapped miners is required. The date, time, the person making the call and the person receiving the call should be entered into the communications log.

The emergency management group should not be confused with the incident commander. The incident commander is usually pre-determined in the response plan or assigned by the EMG. Initially, depending on the structure of the mine, the incident commander could be the "responsible person" required under federal law.

This "responsible person" has a huge responsibility in the event of an emergency at the mine. As outlined in 30CFR 30 Part 75.1501:

(a) For each shift that miners work underground, there shall be in attendance a responsible person designated by the mine operator to take charge during mine emergencies involving a fire, explosion, or gas or water inundation.

(1) The responsible person shall have current knowledge of the assigned location and expected movements of miners underground, the operation of the mine ventilation system, the location of the mine escapeways, the mine communications system, any mine monitoring system if used, locations of firefighting equipment, the mine's Emergency Response Plan, the Mine Rescue Notification Plan, and the Mine Emergency Evacuation and Firefighting Program of Instruction.

(2) The responsible person shall be trained annually in a course of instruction in mine emergency response, as prescribed by MSHA's Office of Educational Policy and Development. The course will include topics such as the following: (i) Organizing a command center; (ii) Coordinating firefighting personnel; (iii) Deploying firefighting equipment; (iv) Coordinating mine rescue personnel; (v) Establishing fresh air base; (vi) Deploying mine rescue teams; (vii) Providing for mine gas sampling and analysis; (viii) Establishing security; (ix) Initiating an emergency mine evacuation; (x) Contacting emergency personnel; and (xi) Communicating appropriate information related to the emergency.

(3) The operator shall certify by signature and date after each responsible person has completed the training and keep the certification at the mine for 1 year.

(b) The responsible person shall initiate and conduct an immediate mine evacuation when there is a mine emergency which presents an imminent danger to miners due to fire or explosion or gas or water inundation. Only properly trained and equipped persons, essential to respond to the mine emergency may remain underground.

(c) The mine operator shall instruct all miners of the identity of the responsible person designated by the operator for their workshift. The

mine operator shall instruct miners of any change in the identity of the responsible person before the start of their workshift.

(d) Nothing in this section shall be construed to restrict the ability of other persons in the mine to warn of an imminent danger which warrants evacuation.

MSHA's Instruction Guide Series 110 "Responding to a Mine Emergency – Training Responsible Persons at Underground Coal Mines" is an excellent tool for training foremen and/or supervisors who will be initially in charge of an emergency. An abbreviated copy of this manual is found in Appendix C.

Additionally, the responsible person must realize that MSHA requires the mine operator to report certain types of "accidents" immediately to the MSHA Office having jurisdiction over the mine. If this contact is not available, the mine operator must call the MSHA Headquarters in Arlington, VA at 800-746-1553. These accidents listed in 30 CFR 50.2(h) include:

- A death of an individual at a mine
- An injury to an individual at a miner which has reasonable potential to cause death
- An entrapment of an individual for more than thirty minutes
- An unplanned inundation of a mine by liquid or gas
- An unplanned ignition of or explosion of gas or dust
- An unplanned mine fire not extinguished within 30 minutes of discovery
- An unplanned ignition or explosion of a blasting agent or an explosive
- An unplanned roof fall at or above the anchorage zone in active workings where roof bolts are in use; or, an unplanned roof or rib fall in active workings that impairs ventilation or impedes passage

- ❍ A coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour
- ❍ An unstable condition at an impoundment, refuse pile, or culm bank which requires emergency action in order to prevent failure, or which causes individuals to evacuate an area; or, failure of an impoundment, refuse pile, or culm bank
- ❍ Damage to hoisting equipment in a shaft or slope which endangers an individual or which interferes with use of the equipment for more than thirty minutes
- ❍ An event at a mine which causes death or bodily injury to an individual not at the mine at the time the event occurs.

As the emergency escalates and more senior level management personnel arrive at the scene or mine, this responsible person would relinquish his authority to a higher level of management. However, until this person arrives, the responsible person will serve as incident commander of the emergency.

During most full-scale mine emergencies, the mine foreman or superintendent will act as the incident commander (IC). The (IC) is responsible for front-line management of the incident, tactical planning and execution, and determining whether outside assistance is needed. The IC must have the capability and authority to:

- ❍ Assume command
- ❍ Implement the emergency response plan
- ❍ Determine response strategies
- ❍ Activate resources
- ❍ Oversee all incident response activities
- ❍ Terminate the incident

2. Communications

One of the keys to an effective emergency response is an effective communications system that is able to relay accurate information quickly and clearly.

Communication systems report emergencies to miners underground, coordinate response activities, contact outside response agencies and suppliers, keep families, off-duty employees and the news media with periodic updates. Under the Miner Act, MSHA requires under Section 7(3) that “the Mine Safety and Health Administration shall serve as the primary communicator with the operator, miners’ families, the press and the public”.

One of the most important communication needs during a mine emergency is between personnel and responders who are underground and the emergency command center. Intra communications between the emergency responders is also paramount.

New technological advancements in wireless communications and tracking will greatly improve the ability of the mine operator to communicate with or locate trapped miners.

3. **Surface Facilities and Arrangements**

During a major mine emergency, a number of surface facilities and arrangements are required. These facilities include:

- Emergency Command Center (ECC) - serves as a centralized management and information center for emergency operations. The ECC is where decisions are made based on information received from the incident commander and other personnel. Regardless of the size of the mine, an area where the ECC is located must be designated. This designation should be clearly spelled out in the emergency preparedness plan. An alternative ECC should be included in the plan in case the first one is not available. The ECC is located on the surface in a building or room that is large enough to accommodate at least 5-10 people. The ECC should be a dedicated area equipped with communication systems (surface to underground, surface to surface, and surface to outside), internet, reference materials, mine maps, activity logs, and any other tools and resources that may be necessary to respond quickly and effectively to an emergency.

❍Waiting Areas for Mine Rescue Teams – is required so that the mine rescue team members have a central location to prepare for rescue operations. When mine rescue teams arrive at the mine, they are checked in and assigned to a team area. A rotation schedule is established for the exploration team, back up team and standby team. This schedule is posted in the waiting area and lists each team's status during the rescue and recovery operation. Teams not on one of these rotations should be away from the mine where they can get rest and eat.

❍ Bench Area for Mine Rescue Apparatus – is needed so that mine rescue team members can clean, test and prepare their apparatus. This area should be well lit and have water and electricity available. Some of the mine rescue teams may bring their own rescue vehicle for this purpose. A parking area must be designated for rescue vehicles. Most of these rescue vehicles have hook-ups for electricity and some for water.

❍ Security – establishing good security at the mine is essential in order to keep roads open for responding personnel and suppliers. Security, also, ensures that curious bystanders do not interfere with response efforts or get injured while on mine property. It is imperative that all roads and paths leading to the mine site be secured and guarded. Much of the security can be handled by the fire department or police.

❍ Information Center – is staffed by a company official and a federal and/or a state official who are qualified to provide information and answer questions from miners' families and relatives and the news media.

❍ Waiting Area for Families, Relatives and Friends – should be located away from any rescue activity and the information center. The area should include cots, food and restrooms.

❍ Newsroom for the Media – is the only area where the news media is allowed and where they will be given periodic updates. News media should be restricted to this area for their own safety and so that they don't get in the way of rescue efforts. According to the Miner Act, the Mine Safety and Health Administration shall "serve as the primary

communicator with the operator, miners' families, the press and the public."

❍ Food and Sleeping Quarters – it may be necessary to feed and provide basic lodging for mine rescue personnel during an emergency. Arrangements should be made with a local restaurant or caterer to bring in food. Sleeping arrangements should be made at a nearby motel.

❍ Medical Facilities – some medical services and facilities are usually needed. If no one is trapped underground, a simple first-aid station will usually suffice. However, if a number of miners are trapped or where injuries may be extensive, a temporary hospital staffed by EMT's and paramedics may be required.

❍ Temporary Morgue – if bodies are being recovered from the mine, this type of facility is needed. The local coroner's office should be contacted if the facility is used.

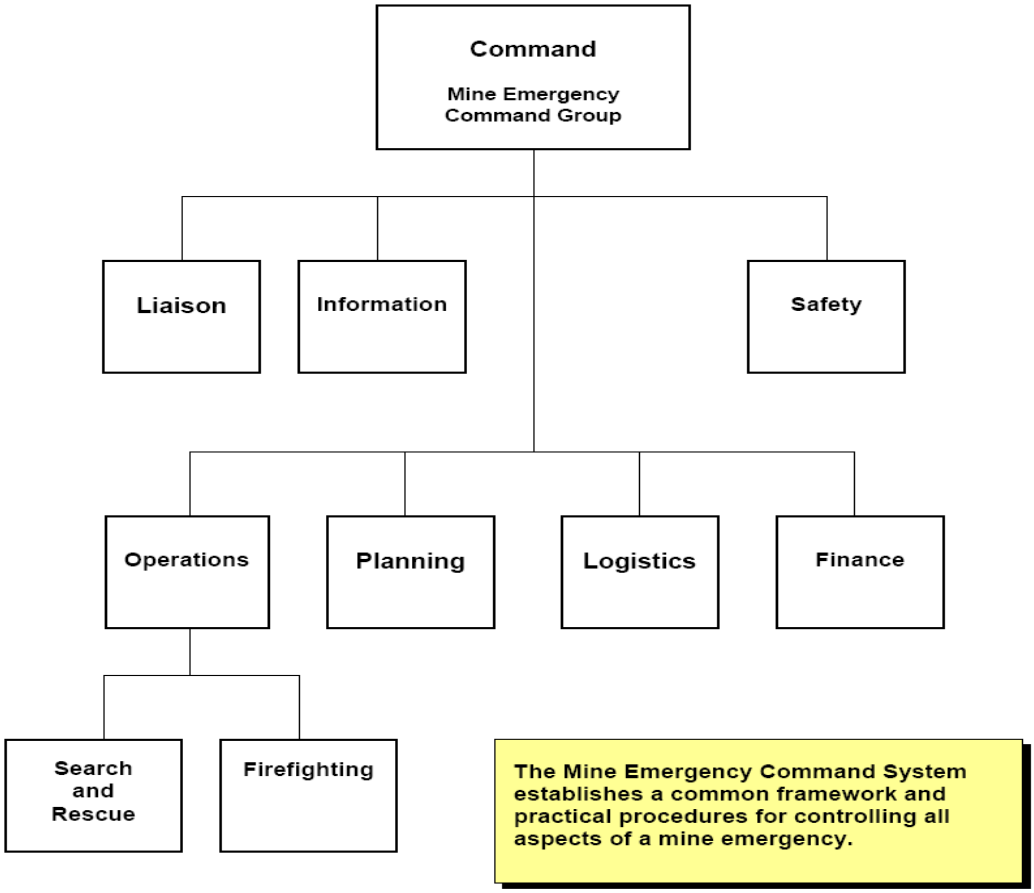
4. Incident Command System

The Emergency Management Group is based on the standardized Incident Command System (ICS) which has been adopted by fire departments, search and rescue organizations, and other government agencies. The Incident Command System establishes a common framework and practical procedures for controlling all aspects of a mine emergency. It is a system for managing personnel and material resources, analyzing information and making decisions in an emergency.

An effective incident command system provides for a solid management structure and creates a logical system for conducting on-site operations in a manner that is both efficient and safe for all people involved. ICS provides the structure and allows for a flexible, yet rapidly deployable and expandable, organizational format to support the tactical functions performed during a mine emergency.

The configuration of the ICS will depend on many factors. Large underground mines will generally have one or two mine rescue teams; organized, well trained and equipped fire brigades; and a large number of emergency medical technicians (EMT's). Most smaller mines have to rely on outside or contracted resources.

A typical incident command system suggested by MSHA is illustrated below:



C. Develop Emergency Response Procedures

The emergency preparedness planning team has, at this step, evaluated the internal and external resources and capabilities, assessed the risks in terms of probability and consequences, and should have started plans for preventing and mitigating these individual hazards and potential emergencies. However, the planning team must prepare for emergencies that may still occur due to unforeseen circumstances or failure of prevention, mitigation or management systems. Their focus is now on formulating strategies to deal with these potential emergency situations. They will need to:

- ❍ Determine what personnel expertise and resources are needed to mitigate or control the incident.

- ❍ Identify the types of equipment needed.
- ❍ Develop appropriate response strategies.

The planning team should consider state and federal regulatory requirements in developing response strategies. Government regulations may mandate that certain actions be taken.

The plan may include generic actions that are common to all emergencies and specific plans that address certain types of emergencies. For example, in any emergency there is a standard set of notification procedures. These notification procedures would hold true for a major fire, explosion or inundation. However, specific procedures for controlling a major mine fire would be quite different from those for dealing with a major explosion. Emergency response procedures spell out how the mining operation will respond to an emergency.

Whenever possible, these procedures should be developed in a checklist form. If done in this manner, managers/supervisors and other responsible or responding personnel can quickly assess what has been done and what still needs to be done. These checklists should include the date, time, and initials of the person who completed the item. Many of these procedures are regulated by state and federal agencies.

Another good method for mapping out the emergency response procedures is to use a simple flow chart to identify the major activities that must take place from the moment that a potential emergency arises. The flow chart helps to identify the concept of operations for use in the time of an emergency. It, also, helps to identify deficiencies or gaps in logic.

There are a number of factors to be considered when deciding what type of response is appropriate. These factors include:

- ❍ Response time – rapid and safe response to an emergency is essential for effective mitigation or control. The sooner responders mobilize and respond to the scene, the greater the chance of resolving the incident.
- ❍ Miners on shift – are there enough trained miners on the shift who are available to respond to the incident? What is the minimum number of miners necessary for response?

- ❍ Training – consider what type of training the miners have. Are they trained in firefighting?
- ❍ Equipment – is equipment readily available for controlling the incident? If not, where is it and how is it obtained?
- ❍ Outside resources – at what point of the incident are outside responders needed? How soon can they arrive?

Another important task is to assign emergency responsibilities to personnel. A simple method for determining responsibilities is to develop a matrix listing mine personnel or departments on one axis and required emergency responsibilities or functions on the other. When making such assignments, remember to consider experience, expertise, and authority. These functions should be set as much as possible on position skill requirements rather than personal skill attributes. If done in this manner, changes in personnel do not become a big factor.

An underground coal mine's firefighting and evacuation plan, also, spells out certain procedures that must be followed. In accordance with 30 CFR Part 75.1502, these procedures include:

- ❍ Emergency escape procedures and escapeways
- ❍ Procedures to account for underground miners, contractors, and visitors after an evacuation is completed
- ❍ Firefighting, rescue and medical duties for selected miners
- ❍ Reporting procedures from the lowest level to the highest levels in the organization

The Mine Rescue Handbook developed by the National Mining Association and found in Appendix B is an excellent reference for understanding how mine rescue teams are used in a mine emergency.

D. Recovery Phase

After the emergency response phase is completed or terminated, the mining operation is now faced with the recovery stage. Although every mine emergency is unique, pre-planning and preparation can anticipate many of the

problems that may be encountered during the recovery phase. Some of these issues may include:

- ❍ Critical stress debriefing for responders
- ❍ Insurance settlements
- ❍ Legal issues
- ❍ State and federal investigations
- ❍ Information to employees
- ❍ Supply contracts
- ❍ Financial obligations to responders
- ❍ Property damage assessment
- ❍ Clean-up

Immediately after a mine disaster, the finger pointing and regulatory investigation begin. Miners may have been killed or seriously injured, families have lost loved ones, property has been damaged or lost, supply contracts can't be filled and someone is going to be responsible.

The mine operator can be assured, within a relatively short period of time following a mine emergency, that he will be confronted with legal complaints, regulatory issues, insurance adjusters, news media, etc.

V. TEST THE PLAN

It is a bad philosophy to test the effectiveness of an emergency preparedness plan during an emergency. A plan needs to be tested before the emergency. The purpose of testing is to make sure the plan is functional.

A very effective method of testing the plan is a tabletop exercise. A tabletop exercise is a simulation of a mine emergency where the exercise is conducted in a formal setting and in a narrative format. This mode of testing can be very useful if it is done correctly. The exercise should include several objectives that you want to accomplish. Participants would include those identified in the emergency management group. You may also want to include the "responsible person."

A table-top scenario could start with a fire in its incipient stage and then advance to the point where it is out of control. The scenario could also include miners trapped inby the fire.

Rules for the exercise are simple. Everyone is free to contribute. The exercise is not a test. A facilitator is present to answer questions and resolve any issues. The facilitator's primary responsibility is to ensure the tabletop exercise proceeds on schedule and covers the objectives outlined at the start of the exercise.

This type of exercise does take considerable planning. The National Institute of Occupational Safety and Health and MSHA have developed this type of exercise and have, also, been involved in conducting them. Elements to consider in developing a table-top exercise include:

- What type of emergency (fire, explosion, inundation)
- Will outside agencies be involved
- How long will the exercise last
- How will the exercise be evaluated

If planned properly, tabletop exercises are usually a cost-effective method of testing plans and procedures. These exercises will often show a need to update or modify the plan. Consequently, you need to modify duty assignments or responsibilities.

Another type of testing tool that could be used in the mining environment is a functional exercise. The 90-day fire drills required by MSHA provide the mine operator with an excellent opportunity to conduct "mini-exercises" of the response phase of the plan.

It is recommended that a table-top exercise be conducted at least once a year and a thorough revision should be made at least once every six months. At least once every three (3) years, a full scale exercise should be conducted.

VI. IMPLEMENT THE PLAN

Implementation of the plan means more than simply carrying on the policies and procedures during an emergency. It means acting on the recommendations that were

made during the risk assessment; integrating the plan into mining operations; training employees; and evaluating and revising the plan.

The emergency preparedness plan must become part of the mining operation's culture. Opportunities must be provided to build awareness; to educate and train personnel; to test procedures; to involve all levels of management in the planning process; and to make emergency preparedness part of what all personnel do on a daily basis.

Each element of the emergency preparedness plan should be carefully analyzed to ensure that it is accomplishing its intended purpose. A new person who is hired to replace a person identified in the plan needs to be fully aware of his function and responsibility in the plan. This new person may not have the experience or expertise to assume the role of his predecessor. He may have to play a back-up role until he gains the knowledge and experience.

Miners will not follow the plan if they have not been trained on what they are expected to do. The same holds true for the emergency responders. At a minimum, miners and response personnel should be trained at least once a year on the plan's contents. This training could be part of the annual refresher training or it could be incorporated into the annual SCSR expectations training.

Soon after the dust has settled from a mine emergency, the mine operator needs to recall the emergency preparedness planning team and conduct a thorough review of how well the plan worked and what needs revised. Who is responsible for making these changes and within what time frame should be established. Weaknesses that may surface in the review include:

- ❍ Shortages of personnel and supplies
- ❍ Unforeseen events
- ❍ Poor coordination of responders
- ❍ Lack of leadership in the command center
- ❍ Poor completion of roles and responsibilities
- ❍ Untimely support/response of external resources

The time to plan for an emergency is not during the emergency. Emergency preparedness planning before a disaster happens is essential to minimizing the risks and

the resulting consequences. Emergency preparedness planning encompasses a proactive approach aimed at preventing such emergencies from happening. It also provides a systematic approach if the preventive measures fail. Emergency preparedness planning is the key to mitigating the potential risks and losses to miners and property. After a mine emergency happens, it is too late to start planning.

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UNITED STATES PUBLIC LAWS
109th Congress - Second Session
Convening January 7, 2005

PL 109-236 (S 2803)
June 15, 2006

MINE IMPROVEMENT AND NEW EMERGENCY RESPONSE ACT OF 2006 (MINER ACT)

An Act To amend the Federal Mine Safety and Health Act of 1977 to improve the safety of mines and mining.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Mine Improvement and New Emergency Response Act of 2006" or the "MINER Act".

SEC. 2. EMERGENCY RESPONSE.

Section 316 of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 876) is amended--

(1) in the section heading by adding at the end the following: "AND EMERGENCY RESPONSE PLANS";

(2) by striking "Telephone" and inserting "(a) IN GENERAL.--TELEPHONE"; and

(3) by adding at the end the following:

"(b) ACCIDENT PREPAREDNESS AND RESPONSE.--

"(1) IN GENERAL.--Each underground coal mine operator shall carry out on a continuing basis a program to improve accident preparedness and response at each mine.

"(2) RESPONSE AND PREPAREDNESS PLAN.--

"(A) IN GENERAL.--Not later than 60 days after the date of enactment of the Mine Improvement and New Emergency Response Act of 2006, each underground coal mine operator shall develop and adopt a written accident response plan that complies with this subsection with respect to each mine of the operator, and periodically update such plans to reflect changes in operations in the mine, advances in technology, or other relevant considerations. Each such operator shall make the accident response plan available to the miners and the miners' representatives.

"(B) PLAN REQUIREMENTS.--An accident response plan under subparagraph (A) shall--

"(i) provide for the evacuation of all individuals endangered by an emergency; and

"(ii) provide for the maintenance of individuals trapped underground in the event that miners are not able to evacuate the mine.

"(C) PLAN APPROVAL.--The accident response plan under subparagraph (A) shall be subject to review and approval by the Secretary. In determining whether to approve a

particular plan the Secretary shall take into consideration all comments submitted by miners or their representatives. Approved plans shall--

"(i) afford miners a level of safety protection at least consistent with the existing standards, including standards mandated by law and regulation;

"(ii) reflect the most recent credible scientific research;

"(iii) be technologically feasible, make use of current commercially available technology, and account for the specific physical characteristics of the mine; and

"(iv) reflect the improvements in mine safety gained from experience under this Act and other worker safety and health laws.

"(D) PLAN REVIEW.--The accident response plan under subparagraph (A) shall be reviewed periodically, but at least every 6 months, by the Secretary. In such periodic reviews, the Secretary shall consider all comments submitted by miners or miners' representatives and intervening advancements in science and technology that could be implemented to enhance miners' ability to evacuate or otherwise survive in an emergency.

"(E) PLAN CONTENT-GENERAL REQUIREMENTS.--To be approved under subparagraph (C), an accident response plan shall include the following:

"(i) POST-ACCIDENT COMMUNICATIONS.--The plan shall provide for a redundant means of communication with the surface for persons underground, such as secondary telephone or equivalent two-way communication.

"(ii) POST-ACCIDENT TRACKING.--Consistent with commercially available technology and with the physical constraints, if any, of the mine, the plan shall provide for above ground personnel to determine the current, or immediately pre-accident, location of all underground personnel. Any system so utilized shall be functional, reliable, and calculated to remain serviceable in a post-accident setting.

"(iii) POST-ACCIDENT BREATHABLE AIR.--The plan shall provide for--

"(I) emergency supplies of breathable air for individuals trapped underground sufficient to maintain such individuals for a sustained period of time;

"(II) in addition to the 2 hours of breathable air per miner required by law under the emergency temporary standard as of the day before the date of enactment of the Mine Improvement and New Emergency Response Act of 2006, caches of self-rescuers providing in the aggregate not less than 2 hours per miner to be kept in escapeways from the deepest work area to the surface at a distance of no further than an average miner could walk in 30 minutes;

"(III) a maintenance schedule for checking the reliability of self rescuers, retiring older self-rescuers first, and introducing new self-rescuer technology, such as units with interchangeable air or oxygen cylinders not requiring doffing to replenish airflow and units with supplies of greater than 60 minutes, as they are approved by the Administration and become available on the market; and

"(IV) training for each miner in proper procedures for donning self-rescuers, switching from one unit to another, and ensuring a proper fit.

"(iv) POST-ACCIDENT LIFELINES.--The plan shall provide for the use of flame-resistant directional lifelines or equivalent systems in escapeways to enable evacuation. The flame-resistance requirement of this clause shall apply upon the replacement of existing lifelines, or, in the case of lifelines in working sections, upon the earlier of the replacement of such lifelines or 3 years after the date of enactment of the Mine Improvement and New Emergency Response Act of 2006.

"(v) TRAINING.--The plan shall provide a training program for emergency procedures described in the plan which will not diminish the requirements for mandatory health and safety training currently required under section 115.

"(vi) LOCAL COORDINATION.--The plan shall set out procedures for coordination and communication between the operator, mine rescue teams, and local emergency response personnel and make provisions for familiarizing local rescue personnel with surface functions that may be required in the course of mine rescue work.

"(F) PLAN CONTENT-SPECIFIC REQUIREMENTS.--

"(i) IN GENERAL.--In addition to the content requirements contained in subparagraph (E), and subject to the considerations contained in subparagraph (C), the Secretary may make additional plan requirements with respect to any of the content matters.

"(ii) POST ACCIDENT COMMUNICATIONS.--Not later than 3 years after the date of enactment of the Mine Improvement and New Emergency Response Act of 2006, a plan shall, to be approved, provide for post accident communication between underground and surface personnel via a wireless two-way medium, and provide for an electronic tracking system permitting surface personnel to determine the location of any persons trapped underground or set forth within the plan the reasons such provisions can not be adopted. Where such plan sets forth the reasons such provisions can not be adopted, the plan shall also set forth the operator's alternative means of compliance. Such alternative shall approximate, as closely as possible, the degree of functional utility and safety protection provided by the wireless two-way medium and tracking system referred to in this subpart.

"(G) PLAN DISPUTE RESOLUTION.--

"(i) IN GENERAL.--Any dispute between the Secretary and an operator with respect to the content of the operator's plan or any refusal by the Secretary to approve such a plan shall be resolved on an expedited basis.

"(ii) DISPUTES.--In the event of a dispute or refusal described in clause (i), the Secretary shall issue a citation which shall be immediately referred to a Commission Administrative Law Judge. The Secretary and the operator shall submit all relevant material regarding the dispute to the Administrative Law Judge within 15 days of the date of the referral. The Administrative Law Judge shall render his or her decision with respect to the plan content dispute within 15 days of the receipt of the submission.

"(iii) FURTHER APPEALS.--A party adversely affected by a decision under clause (ii) may pursue all further available appeal rights with respect to the citation involved, except that inclusion of the disputed provision in the plan will not be limited by such appeal unless such relief is requested by the operator and permitted by the Administrative Law Judge.

"(H) MAINTAINING PROTECTIONS FOR MINERS.--Notwithstanding any other provision of this Act, nothing in this section, and no response and preparedness plan developed under this

section, shall be approved if it reduces the protection afforded miners by an existing mandatory health or safety standard.".

SEC. 3. INCIDENT COMMAND AND CONTROL.

Title I of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 811 et seq.) is amended by adding at the end the following:

"SEC. 116. LIMITATION ON CERTAIN LIABILITY FOR RESCUE OPERATIONS.

"(a) IN GENERAL.--No person shall bring an action against any covered individual or his or her regular employer for property damage or an injury (or death) sustained as a result of carrying out activities relating to mine accident rescue or recovery operations. This subsection shall not apply where the action that is alleged to result in the property damages or injury (or death) was the result of gross negligence, reckless conduct, or illegal conduct or, where the regular employer (as such term is used in this Act) is the operator of the mine at which the rescue activity takes place. Nothing in this section shall be construed to preempt State workers' compensation laws.

"(b) COVERED INDIVIDUAL.--For purposes of subsection (a), the term 'covered individual' means an individual--

"(1) who is a member of a mine rescue team or who is otherwise a volunteer with respect to a mine accident; and

"(2) who is carrying out activities relating to mine accident rescue or recovery operations.

"(c) REGULAR EMPLOYER.--For purposes of subsection (a), the term 'regular employer' means the entity that is the covered employee's legal or statutory employer pursuant to applicable State law.".

SEC. 4. MINE RESCUE TEAMS.

Section 115(e) of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 825(e)) is amended--

(1) by inserting "(1)" after the subsection designation; and

(2) by adding at the end the following:

"(2)(A) The Secretary shall issue regulations with regard to mine rescue teams which shall be finalized and in effect not later than 18 months after the date of enactment of the Mine Improvement and New Emergency Response Act of 2006.

"(B) Such regulations shall provide for the following:

"(i) That such regulations shall not be construed to waive operator training requirements applicable to existing mine rescue teams.

"(ii) That the Mine Safety and Health Administration shall establish, and update every 5 years thereafter, criteria to certify the qualifications of mine rescue teams.

"(iii)(I) That the operator of each underground coal mine with more than 36 employees--

"(aa) have an employee knowledgeable in mine emergency response who is employed at the mine on each shift at each

underground mine; and

"(bb) make available two certified mine rescue teams whose members--

"(AA) are familiar with the operations of such coal mine;

"(BB) participate at least annually in two local mine rescue contests;

"(CC) participate at least annually in mine rescue training at the underground coal mine covered by the mine rescue team; and

"(DD) are available at the mine within one hour ground travel time from the mine rescue station.

"(II)(aa) For the purpose of complying with subclause (I), an operator shall employ one team that is either an individual mine site mine rescue team or a composite team as provided for in item (bb)(BB).

"(bb) The following options may be used by an operator to comply with the requirements of item (aa):

"(AA) An individual mine-site mine rescue team.

"(BB) A multi-employer composite team that is made up of team members who are knowledgeable about the operations and ventilation of the covered mines and who train on a semi-annual basis at the covered underground coal mine—

"(aaa) which provides coverage for multiple operators that have team members which include at least two active employees from each of the covered mines;

"(bbb) which provides coverage for multiple mines owned by the same operator which members include at least two active employees from each mine; or

"(ccc) which is a State-sponsored mine rescue team comprised of at least two active employees from each of the covered mines.

"(CC) A commercial mine rescue team provided by contract through a third-party vendor or mine rescue team provided by another coal company, if such team—

"(aaa) trains on a quarterly basis at covered underground coal mines;

"(bbb) is knowledgeable about the operations and ventilation of the covered mines; and

"(ccc) is comprised of individuals with a minimum of 3 years underground coal mine experience that shall have occurred within the 10-year period preceding their employment on the contract mine rescue team.

"(DD) A State-sponsored team made up of State employees.

"(iv) That the operator of each underground coal mine with 36 or less employees shall—

"(I) have an employee on each shift who is knowledgeable in mine emergency responses; and

"(II) make available two certified mine rescue teams whose members—

"(aa) are familiar with the operations of such coal mine;

"(bb) participate at least annually in two local mine rescue contests;

"(cc) participate at least semi-annually in mine rescue training at the underground coal mine covered by the mine rescue team;

"(dd) are available at the mine within one hour ground travel time from the mine rescue station;

"(ee) are knowledgeable about the operations and ventilation of the covered mines; and

"(ff) are comprised of individuals with a minimum of 3 years underground coal mine experience that shall have occurred within the 10-year period preceding their employment on the contract mine rescue team.".

SEC. 5. PROMPT INCIDENT NOTIFICATION.

(a) IN GENERAL.--Section 103(j) of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 813(j)) is amended by inserting after the first sentence the following: "For purposes of the preceding sentence, the notification required shall be provided by the operator within 15 minutes of the time at which the operator realizes that the death of an individual at the mine, or an injury or entrapment of an individual at the mine which has a reasonable potential to cause death, has occurred.".

(b) PENALTY.--Section 110(a) of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 820(a)) is amended—

(1) by striking "The operator" and inserting "(1) The operator"; and

(2) by adding at the end the following:

"(2) The operator of a coal or other mine who fails to provide timely notification to the Secretary as required under section 103(j) (relating to the 15 minute requirement) shall be assessed a civil penalty by the Secretary of not less than $5,000 and not more than $60,000.".

SEC. 6. NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH.

(a) GRANTS.--Section 22 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 671) is amended by adding at the end the following:

"(h) OFFICE OF MINE SAFETY AND HEALTH.—

"(1) IN GENERAL.--There shall be permanently established within the Institute an Office of Mine Safety and Health which shall be administered by an Associate Director to be appointed by the Director.

"(2) PURPOSE.--The purpose of the Office is to enhance the development of new mine safety technology and technological applications and to expedite the commercial availability and implementation of such technology in mining environments.

"(3) FUNCTIONS.--In addition to all purposes and authorities provided for under this section, the Office of Mine Safety and Health shall be responsible for research, development, and testing of new technologies and equipment designed to enhance mine safety and health. To carry out such functions the Director of the Institute, acting through the Office, shall have the authority to—

"(A) award competitive grants to institutions and private entities to encourage the development and manufacture of mine safety equipment;

"(B) award contracts to educational institutions or private laboratories for the performance of product testing or related work with respect to new mine technology and equipment; and

"(C) establish an interagency working group as provided for in paragraph (5).

"(4) GRANT AUTHORITY.--To be eligible to receive a grant under the authority provided for under paragraph (3)(A), an entity or institution shall—

"(A) submit to the Director of the Institute an application at such time, in such manner, and containing such information as the Director may require; and

"(B) include in the application under subparagraph (A), a description of the mine safety equipment to be developed and manufactured under the grant and a description of the reasons that such equipment would otherwise not be developed or manufactured, including reasons relating to the limited potential commercial market for such equipment.

"(5) INTERAGENCY WORKING GROUP.—

"(A) ESTABLISHMENT.--The Director of the Institute, in carrying out paragraph (3)(D) shall establish an interagency working group to share technology and technological research and developments that could be utilized to enhance mine safety and accident response.

"(B) MEMBERSHIP.--The working group under subparagraph (A) shall be chaired by the Associate Director of the Office who shall appoint the members of the working group, which may include representatives of other Federal agencies or departments as determined appropriate by the Associate Director.

"(C) DUTIES.--The working group under subparagraph (A) shall conduct an evaluation of research conducted by, and the technological developments of, agencies and departments who are represented on the working group that may have applicability to mine safety and accident response and make recommendations to the Director for the further development and

eventual implementation of such technology.

"(6) ANNUAL REPORT.--Not later than 1 year after the establishment of the Office under this subsection, and annually thereafter, the Director of the Institute shall submit to the Committee on Health, Education, Labor, and Pensions of the Senate and the Committee on Education and the Workforce of the House of Representatives a report that, with respect to the year involved, describes the new mine safety technologies and equipment that have been studied, tested, and certified for use, and with respect to those instances of technologies and equipment that have been considered but not yet certified for use, the reasons therefore.

"(7) AUTHORIZATION OF APPROPRIATIONS.--There is authorized to be appropriated, such sums as may be necessary to enable the Institute and the Office of Mine Safety and Health to carry out this subsection.".

SEC. 7. REQUIREMENT CONCERNING FAMILY LIAISONS.

The Secretary of Labor shall establish a policy that--

(1) requires the temporary assignment of an individual Department of Labor official to be a liaison between the Department and the families of victims of mine tragedies involving multiple deaths;

(2) requires the Mine Safety and Health Administration to be as responsive as possible to requests from the families of mine accident victims for information relating to mine accidents; and

(3) requires that in such accidents, that the Mine Safety and Health Administration shall serve as the primary communicator with the operator, miners' families, the press and the public.

SEC. 8. PENALTIES.

(a) IN GENERAL.--Section 110 of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 820) is amended--

(1) in subsection (a)--

(A) by inserting "(1)" after the subsection designation; and

(B) by adding at the end the following:

"(2) Any operator who willfully violates a mandatory health or safety standard, or knowingly violates or fails or refuses to comply with any order issued under section 104 and section 107, or any order incorporated in a final decision issued under this title, except an order incorporated in a decision under paragraph (1) or section 105(c), shall, upon conviction, be punished by a fine of not more than $250,000, or by imprisonment for not more than one year, or by both, except that if the conviction is for a violation committed after the first conviction of such operator under this Act, punishment shall be by a fine of not more than $500,000, or by imprisonment for not more than five years, or both.

"(3)(A) The minimum penalty for any citation or order issued under section 104(d)(1) shall be $2,000.

"(B) The minimum penalty for any order issued under section 104(d)(2) shall be $4,000.

"(4) Nothing in this subsection shall be construed to prevent an operator from obtaining a review, in accordance with section 106, of an order imposing a penalty described in this subsection. If a court, in making such review, sustains the order, the court ***501** shall apply at least the minimum

penalties required under this subsection."; and

(2) by adding at the end of subsection (b) the following: "Violations under this section that are deemed to be flagrant may be assessed a civil penalty of not more than $220,000. For purposes of the preceding sentence, the term 'flagrant' with respect to a violation means a reckless or repeated failure to make reasonable efforts to eliminate a known violation of a mandatory health or safety standard that substantially and proximately caused, or reasonably could have been expected to cause, death or serious bodily injury.".

(b) REGULATIONS.--Not later than December 30, 2006, the Secretary of Labor shall promulgate final regulations with respect to penalties.

SEC. 9. FINE COLLECTIONS.

Section 108(a)(1)(A) of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 818(a)(1)(A)) is amended by inserting before the comma, the following: ", or fails or refuses to comply with any order or decision, including a civil penalty assessment order, that is issued under this Act".

SEC. 10. SEALING OF ABANDONED AREAS.

Not later than 18 months after the issuance by the Mine Safety and Health Administration of a final report on the Sago Mine accident or the date of enactment of the Mine Improvement and New Emergency Response Act of 2006, whichever occurs earlier, the Secretary of Labor shall finalize mandatory heath and safety standards relating to the sealing of abandoned areas in underground coal mines. Such health and safety standards shall provide for an increase in the 20 psi standard currently set forth in section 75.335(a)(2) of title 30, Code of Federal Regulations.

SEC. 11. TECHNICAL STUDY PANEL.

Title V of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 951 et seq.) is amended by adding at the end the following:

"SEC. 514. TECHNICAL STUDY PANEL.

"(a) ESTABLISHMENT.--There is established a Technical Study Panel (referred to in this section as the 'Panel') which shall provide independent scientific and engineering review and recommendations with respect to the utilization of belt air and the composition and fire retardant properties of belt materials in underground coal mining.

"(b) MEMBERSHIP.--The Panel shall be composed of—

"(1) two individuals to be appointed by the Secretary of Health and Human Services, in consultation with the Director of the National Institute for Occupational Safety and Health and the Associate Director of the Office of Mine Safety;

"(2) two individuals to be appointed by the Secretary of Labor, in consultation with the Assistant Secretary for Mine Safety and Health; and

"(3) two individuals, one to be appointed jointly by the majority leaders of the Senate and House of Representatives and one to be appointed jointly by the minority leader of the Senate and House of Representatives, each to be appointed ***502** prior to the sine die adjournment of the second session of the 109th Congress.

"(c) QUALIFICATIONS.--Four of the six individuals appointed to the Panel under subsection (b) shall possess a masters or doctoral level degree in mining engineering or another scientific field demonstrably related to the subject of the report. No individual appointed to the Panel shall be an employee of any coal or other mine, or of any labor organization, or of any State or Federal agency primarily responsible for regulating the mining industry.

"(d) REPORT.—

"(1) IN GENERAL.--Not later than 1 year after the date on which all members of the Panel are appointed under subsection (b), the Panel shall prepare and submit to the Secretary of Labor, the Secretary of Health and Human Services, the Committee on Health, Education, Labor, and Pensions of the Senate, and the Committee on Education and the Workforce of the House of Representatives a report concerning the utilization of belt air and the composition and fire retardant properties of belt materials in underground coal mining.

"(2) RESPONSE BY SECRETARY.--Not later than 180 days after the receipt of the report under paragraph (1), the Secretary of Labor shall provide a response to the Committee on Health, Education, Labor, and Pensions of the Senate and the Committee on Education and the Workforce of the House of Representatives containing a description of the actions, if any, that the Secretary intends to take based upon the report, including proposing regulatory changes, and the reasons for such actions.

"(e) COMPENSATION.--Members appointed to the Panel, while carrying out the duties of the Panel shall be entitled to receive compensation, per diem in lieu of subsistence, and travel expenses in the same manner and under the same conditions as that prescribed under section 208(c) of the Public Health Service Act.".

SEC. 12. SCHOLARSHIPS.

Title V of the Federal Mine Safety and Health Act of 1977 (30 U.S.C. 951 et seq.), as amended by section 11, is further amended by adding at the end the following:

"SEC. 515. SCHOLARSHIPS.

"(a) ESTABLISHMENT.--The Secretary of Education (referred to in this section as the 'Secretary'), in consultation with the Secretary of Labor and the Secretary of Health and Human Services, shall establish a program to provide scholarships to eligible individuals to increase the skilled workforce for both private sector coal mine operators and mine safety inspectors and other regulatory personnel for the Mine Safety and Health Administration.

"(b) FUNDAMENTAL SKILLS SCHOLARSHIPS.--

"(1) IN GENERAL.--Under the program under subsection (a), the Secretary may award scholarship to fully or partially pay the tuition costs of eligible individuals enrolled in 2-year associate's degree programs at community colleges or other colleges and universities that focus on providing the fundamental skills and training that is of immediate use to a beginning coal miner.

"(2) SKILLS.--The skills described in paragraph (1) shall include basic math, basic health and safety, business principles, management and supervisory skills, skills related to electric circuitry, skills related to heavy equipment operations, and skills related to communications.

”(3) ELIGIBILITY.--To be eligible to receive a scholarship under this subsection an individual shall--

"(A) have a high school diploma or a GED;

"(B) have at least 2 years experience in full-time employment in mining or mining-related activities;

"(C) submit to the Secretary an application at such time, in such manner, and containing such information; and

"(D) demonstrate an interest in working in the field of mining and performing an internship with the Mine Safety and Health Administration or the National Institute for Occupational Safety and Health Office of Mine Safety.

"(c) MINE SAFETY INSPECTOR SCHOLARSHIPS.--

"(1) IN GENERAL.--Under the program under subsection (a), the Secretary may award scholarship to fully or partially pay the tuition costs of eligible individuals enrolled in undergraduate bachelor's degree programs at accredited colleges or universities that provide the skills needed to become mine safety inspectors.

"(2) SKILLS.--The skills described in paragraph (1) include skills developed through programs leading to a degree in mining engineering, civil engineering, mechanical engineering, electrical engineering, industrial engineering, environmental engineering, industrial hygiene, occupational health and safety, geology, chemistry, or other fields of study related to mine safety and health work.

"(3) ELIGIBILITY.--To be eligible to receive a scholarship under this subsection an individual shall—

"(A) have a high school diploma or a GED;

"(B) have at least 5 years experience in full-time employment in mining or mining-related activities;

"(C) submit to the Secretary an application at such time, in such manner, and containing such information; and

"(D) agree to be employed for a period of at least 5 years at the Mine Safety and Health Administration or, to repay, on a pro-rated basis, the funds received under this program, plus interest, at a rate established by the Secretary upon the issuance of the scholarship.

"(d) ADVANCED RESEARCH SCHOLARSHIPS.--

"(1) IN GENERAL.--Under the program under subsection (a), the Secretary may award scholarships to fully or partially pay the tuition costs of eligible individuals enrolled in undergraduate bachelor's degree, masters degree, and Ph.D. degree programs at accredited colleges or universities that provide the skills needed to augment and advance research in mine safety and to broaden, improve, and expand the universe of candidates for mine safety inspector and other regulatory positions in the Mine Safety and Health Administration.

"(2) SKILLS.--The skills described in paragraph (1) include skills developed through programs leading to a degree in mining engineering, civil engineering, mechanical engineering, electrical engineering, industrial engineering, environmental engineering, industrial hygiene, occupational health and safety, geology, chemistry, or other fields of study related to mine safety and health work.

"(3) ELIGIBILITY.--To be eligible to receive a scholarship under this subsection an individual shall--

"(A) have a bachelor's degree or equivalent from an accredited 4-year institution;

"(B) have at least 5 years experience in full-time employment in underground mining or mining-related activities; and

"(C) submit to the Secretary an application at such time, in such manner, and containing such information.

"(e) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated such sums as may be necessary to carry out this section.".

SEC. 13. RESEARCH CONCERNING REFUGE ALTERNATIVES.

(a) IN GENERAL.--The National Institute of Occupational Safety and Health shall provide for the conduct of research, including field tests, concerning the utility, practicality, survivability, and cost of various refuge alternatives in an underground coal mine environment, including commercially-available portable refuge chambers.

(b) REPORT.--

(1) IN GENERAL.--Not later than 18 months after the date of enactment of this Act, the National Institute for Occupational Safety and Health shall prepare and submit to the Secretary of Labor, the Secretary of Health and Human Services, the Committee on Health, Education, Labor, and Pensions of the Senate, and the Committee on Education and the Workforce of the House of Representatives a report concerning the results of the research conducted under subsection (a), including any field tests.

(2) RESPONSE BY SECRETARY.--Not later than 180 days after the receipt of the report under paragraph (1), the Secretary of Labor shall provide a response to the Committee on Health, Education, Labor, and Pensions of the Senate and the Committee on Education and the Workforce of the House of Representatives containing a description of the actions, if any, that the Secretary intends to take based upon the report, including proposing regulatory changes, and the reasons for such actions.

SEC. 14. BROOKWOOD-SAGO MINE SAFETY GRANTS.

(a) IN GENERAL.--The Secretary of Labor shall establish a program to award competitive grants for education and training, to be known as Brookwood-Sago Mine Safety Grants, to carry out the purposes of this section.

(b) PURPOSES.--It is the purpose of this section, to provide for the funding of education and training programs to better identify, avoid, and prevent unsafe working conditions in and around mines.

(c) ELIGIBILITY.--To be eligible to receive a grant under this section, an entity shall--

(1) be a public or private nonprofit entity; and

(2) submit to the Secretary of Labor an application at such time, in such manner, and containing such information as the Secretary may require.

(d) USE OF FUNDS.--Amounts received under a grant under this section shall be used to establish and implement education and training programs, or to develop training materials for employers and miners, concerning safety and health topics in mines, as determined appropriate by the Mine Safety and Health Administration.

(e) AWARDING OF GRANTS.--

(1) ANNUAL BASIS.--Grants under this section shall be awarded on an annual basis.

(2) SPECIAL EMPHASIS.--In awarding grants under this section, the Secretary of Labor shall give special emphasis to programs and materials that target workers in smaller mines, including training miners and employers about new Mine Safety and Health Administration standards, high risk activities, or hazards identified by such Administration.

(3) PRIORITY.--In awarding grants under this section, the Secretary of Labor shall give priority to the funding of pilot and demonstration projects that the Secretary determines will provide opportunities for broad applicability for mine safety.

(f) EVALUATION.--The Secretary of Labor shall use not less than 1 percent of the funds made available to carry out this section in a fiscal year to conduct evaluations of the projects funded under grants under this section.

(g) AUTHORIZATION OF APPROPRIATIONS.--There are authorized to be appropriated for each fiscal year, such sums as may be necessary to carry out this section.

Approved June 15, 2006.

PL 109-236, 2006 S 2803

Mine Rescue Handbook

Emergency Response Procedures, Practices and Responsibilities

Preface

In the aftermath of the tragic underground coal mine disasters that occurred in early 2006, the U.S. coal industry, under the auspices of the Bituminous Coal Operators' Association and the National Mining Association and in conjunction with representatives of the U.S. Department of Labor's Mine Safety and Health Administration and the U.S. Department of Health and Human Services' National Institute for Occupational Safety and Health, initiated a review of existing mine rescue procedures to determine if existing practices and protocols remain operative given the structural changes that have occurred across the industry.

The multi-faceted review process culminated in the development of the following generic mine rescue handbook, which can serve as a guide for those developing mine rescue protocols and procedures as well as a review tool for those who have established procedures in place.

The industry extends its thanks and sincere appreciation to the following dedicated mine safety professionals, whose cumulative years of safety experience and commitment to the safety and health of miners has resulted in the development of a recommended mine rescue organizational structure that should culminate in the expeditious delivery of mine rescue services, should that become necessary:

Andy Anunson, Alpha Natural Resources
David Beerbower, Peabody Energy
Ronnie Biggerstaff, Arch Coal
William K. Blackwell, CONSOL Energy
Jerry Bledsoe, Alpha Natural Resources
Michael Brnich, NIOSH
Alvin Brown, MSHA
Jurgen Brune, NIOSH
Dale Byram, Jim Walter Resources
Sam Cario, Foundation Coal
Joseph Cerenzia, CONSOL Energy
Elizabeth Chamberlin, CONSOL Energy
Linda L. Chasko, NIOSH
Doug Conaway, Arch Coal
Alan Dupree, MSHA
Harvey Ferrell, Peabody Energy
Frank Foster, Magnum Coal
John Gallick, Foundation Coal
John Higgins, CONSOL Energy
Terry Hudson, Peabody Energy
Tim Kirkpatrick, Murray Energy
Joe Lamonica, Bituminous Coal Operators' Association
Chuck Lazzara, NIOSH
Tommy McNider, Jim Walter Resources
Norman Page, MSHA
Wayne Persinger, Massey Energy
James Poynter, MSHA
Ed Rudder, Foundation Coal
Mitchell Salyers, Alpha Natural Resources
Woodrow Slone, Excel Mining
John Small, Alliance Coal
Jim Steadman, Jim Walter Resources
Bill Tolliver, CONSOL Energy
Kathleen Trakofler, NIOSH
Bruce Watzman, National Mining Association
David Welch, Murray Energy
Perry Whitley, Foundation Coal
Steve Willis, Murray Energy

It is the industry's sincere hope that the continued adoption of enhanced safety practices in companies' operating procedures, coupled with the safety benefits derived from today's generation of new mining equipment, will significantly reduce, if not entirely eliminate, the necessity for mine rescue services. In the event that such services are required, this handbook can serve as a pre-event planning template that will expedite the delivery of mine rescue services in an efficient, effective manner.

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Activities Center

Multi-Function Group

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Mine Rescue Equipment & Training

Guidance for Establishing, Equipping and Training Mine Rescue Teams

Command Center

I. Organization
II. Function
III. Resource Needs
IV. Recommendations

Command Center needs to be based on:

A. Initial/Immediate and;
B. Extended work/projects

I. Organization

Secure the Command Center

- Physically secure the area.
- Law enforcement should be contacted for assistance, if needed.
- Secure communications flow.
- Keep information in command center.
- Communications to and from the command center must remain protected from outside monitoring.
- Restrict personal outside calls (cell phones will be prohibited in the command center).
- Restrict phone/speaker system/access except to persons designated by the command center to receive information.
- Command Center should be isolated from outside interference (i.e. political visitors should be limited/restricted and referred to Multifunctional Centers).

Limit the number of persons in a Command Center

The following titles are recommended to be present in the Command Center. It is recommended that only one representative for each title is allowed in the working Command Center. The person representing the individual groups will have the latitude to ask for assistance when and if needed to make a decision. The consensus, however, is to reduce the number of Command Center personnel to the absolute minimum necessary to meet the needs of the event.

- Command Center Communications Person – (1)
  - Should be experienced
  - Should be undisturbed
  - Should talk directly to the working teams
  - Facilitate information flow to others in the Command Center
- State Inspections Representatives – (1)
- MSHA Representatives – (1)
- UMWA/Miner's Rep. – (1)
- Mine Rescue Team Trainer (Communications Person) (of working teams underground) – (1)
- Company Representatives – (1)
- Recorder – (1)
  - Notes should be taken verbatim of what is said (not paraphrased)

Command Center

Communication issues

- Designate the primary underground communications system to be used by Mine Rescue Teams and Fresh Air Base (FAB).
- Identify backup communications available during the emergency.
- Designate Command Center phone number for the teams and FAB. Designate an outside line for Command Center use only, which is routed through the Activity Center. (number of phone lines is not an issue – control of information is).
- Control entrance and exit of Command Center personnel. Leaving Command Center creates confusion.
- Designate an individual who will communicate from the Command Center to the Activities Center.

Scheduling Recommendations

In the initial phase of a mine emergency there is a need for knowledgeable personnel available at the mine site. Until adequately staffed, or until the initial phase of the emergency is under control, these decision makers should be limited to one 12 hour shift per day. To insure the continuance of appropriate decision making, the Command Center has a goal to establish its rotation schedule (i.e. eight to nine hour rotation schedule) within the first twenty-four hours of the emergency.

- Schedule Command Center team rotations (i.e. A, B, C). (Template would be useful).
- Shifts suggested were from eight to 12, depending on number of persons available and their level of training.
- Within 24 hours of the emergency, develop and post a Command Center shift rotation schedule.

Shift rotation schedules facilitate progress and prevent Command Center personnel from becoming fatigued. Command Center rotations should also be designed with a one hour overlap for transferring information from one shift to another. During shift transition, Command Center personnel should be exchanged one at a time. All Command Center personnel should not be engaged in briefing/exchanging activities at the same time. They should be staggered to ensure that information being received from the teams is not overlooked or compromised.

Shift hours

Command Center: 8-9 hour shift with an hour overlap for communication with replacement before and after shift.

Mine Rescue Teams: If resources permit, 8-9 hours shift with an hour overlap for communication, briefing and debriefing. Teams need to be assured that they are provided with enough rest to resume activities during their next scheduled shift.

Comments:

Stress and fatigue are key issues affecting mine rescue teams and Command Center personnel influencing concentration, decision-making, and physical abilities. Appropriate scheduling can facilitate the best results in these areas.

Command Center

Briefing before a mine rescue project followed by debriefing the team(s) after their shift adds value to the planning as well as providing psychological release for the team members. It is recommended that, when possible, the entire team is included in the briefings and debriefings rather than only the team captain or a couple of representatives from the team. Including everybody in this exchange of information can be invaluable to the success of the project.

Training

Pre-disaster training for command center personnel is important and highly recommended. Some suggested content includes:

- Command Center Protocol
- Judgment decision-making under stress
- Leadership in emergency situations
- Information and Communication (with mine rescue teams and with Activity Center) personnel
- Human behavior during stress (Flight or Fright)
- Critical Incident Stress Management
- Mine Emergency Response

II. Functions

- Consider Team Safety at all times.
- Coordinate and direct mine rescue activities.
- Coordinate and track team's underground activities. This includes continuous tracking and location of teams at all times.
- Maintain constant communications with fresh air base.
- Send and receive information as needed. Communicate clearly! Ensure accuracy of the information being sent or received. Accurate information from teams, fresh air base (FAB) and Command Center is required.
- Respond to needs of teams.
- Communicate with Activity Center on a regular basis.

Note: Due to the nature of the event, the following two bullets require a different approach or strategy.

- Coordinate the rescue of survivors and recovery of victims.
- Recovery of mine.

III. Resource Needs

- Mine map for Command Center communications person
- Develop visual support for mine maps to identify location of working teams (i.e. magnetic backing on map and icons to represent team locations) (Use of maps with entries numbered as A, B, C, etc. and crosscuts numbered as 1, 2, 3, etc. in a grid system would eliminate confusion when referring to mine locations during communications with team members and Activities Center personnel.) (Three methods were mentioned: Grid System, Spad Nos., and Block Nos.) (Place visual examples of these methods in final document)(Where possible interactive communications between the Command Center and Activities Center would be very useful, e.g. Barometric Readings, Gas Readings, Team

Locations, etc.)
- Continuous update of maps for teams/projects
- Activities Center Committee will identify and supply resources to teams.

IV. Recommendations

- Prepare for communicating with multiple teams or FABs.
- FAB person(s) with experience.
- Backup communications system readily available.

Activities Center

I. Recommended Areas of Focus and Responsibilities

Activities Center

1. Evaluate information and communicate with the Command Center.
2. Insure proper record keeping of all activities.
3. Direct purchase/supply coordination.
4. Direct engineer support coordination.
5. Direct maintenance support coordination.
6. Direct gas analysis coordination.
7. Direct mine rescue-personnel coordination.
8. Direct Command Center liaison.

Communications

1. Ensure timely and accurate communication between the Command Center, Multifunctional Center and the Activities Center.
2. Coordinate all information shared with the Command Center and Multifunctional Center.

Recording/Mapping

1. Maintain confidentiality of operations within the Activities Center.
2. Serve as general secretary.
3. Collect and keep complete, accurate and permanent record of communications with the Command Center and Multifunctional Center.
4. Update mine map of any changes made by the mine rescue teams.
5. Track mine rescue team rotation.
6. Track bench rotation.

Mine Rescue-Personnel Coordination

1. Provide sufficient number of mine rescue teams to complete task at hand.
2. Schedule rotation of mine rescue teams to complete task at hand.
3. Provide adequate housing, meals and clothing for all mine rescue teams.
4. Provide necessary parts, supplies and support for mine rescue equipment.
5. Provide mine rescue expertise to assist emergency responders deal with unexpected events.
6. Oversee briefing and debriefing of mine rescue teams.
7. Provide mine rescue team's debriefing information, comments and suggestions to Activities Center Chief to assist the Command Center with the safe direction of the mine rescue teams and their activities.

Engineering Support Coordination

1. Provide engineering support services during emergency operations as requested by Center Chief.
2. Provide requested engineering maps and plans of mining systems to assist in emergency planning and decision making.

3. Update engineering plans as required as emergency operations unfold.
4. Provide engineering expertise to assist emergency responders deal with unexpected events.

Gas Analysis and Data Coordination

1. Provide gas analysis and data gathering during emergency operations as requested by the Activities Center Chief.
2. Provide necessary equipment for gas sampling, analysis and calibration and data analysis to complete task at hand.
3. Provide gas analysis and data gathering expertise to assist emergency responders deal with unexpected events.

Maintenance Support Coordination

1. Provide maintenance support services during emergency operations as requested by Center Chief.
2. Provide requested maintenance logs of mining equipment and systems to assist in emergency planning and decision making.
3. Update maintenance plans as required as emergency operations unfold.
4. Provide maintenance and repair expertise to assist emergency responders deal with unexpected events.

Purchasing Coordination

1. Ensure legal compliance with company purchasing policies.
2. Direct the distribution of supplies ordered.
3. Insure proper record keeping of all supplies ordered.
4. Direct the vendors on deliveries of supplies.
5. Direct all purchases.

II. Recommended Personnel and Responsibilities

Mine Rescue-Personnel Coordinator

Plans, directs and implements all facets of the Emergency Activities Center Mine Rescue-Manning Sub-group. Coordinates mine rescue-manning activities and needs of the Emergency Activities Center by interacting with the Activities Center Chief and the other Activities Center coordinators and directing any personnel assigned to the Mine Rescue-Manning Sub-group.

1. Provides mine rescue-manning services during emergency operations as requested by the Activities Center Chief.
2. Works with other Activity Center coordinators as needed to achieve Activity Center objectives.
3. Provides sufficient number of mine rescue teams to complete task at hand.
4. Schedules rotation of mine rescue teams to complete task at hand.
5. Provide adequate housing, meals and clothing for all mine rescue teams.
6. Provide necessary parts, supplies and support for mine rescue equipment.
7. Provides mine rescue expertise to assist emergency responders deal with unexpected events.

8. Provides mine rescue team's comments and suggestions to Activities Center Chief to assist the Command Center with the safe direction of the mine rescue teams and their activities.
9. Directs individuals assigned to the Mine Rescue-Manning Sub-group.
10. Reports findings of Mine Rescue-Manning Sub-group to Activities Center Chief

Purchasing Coordinator

Plans, directs and controls all facets of the purchasing process. Coordinates the needs of the recovery effort by directing personnel in the purchasing and distribution process.

1. Ensure legal compliance with company purchasing policies.
2. Direct the distribution of supplies ordered.
3. Insure proper record keeping of all supplies ordered.
4. Directs the vendors on deliveries of supplies.
5. Direct all purchases.

Recorder/Mapper

Collects information and keeps a complete, accurate and permanent record of all communications between the activities center, command center and multifunctional center.

1. Maintains confidentality of inter-workings of the Activities Center.
2. Serve as general secretary.
3. Collects and keeps complete, accurate and permanent record of communications with the Command Center and Multifunctional Center.
4. Updates mine map of any changes made by the mine rescue teams.
5. Tracks mine rescue team rotation.
6. Tracks benchmen rotation.

Gas Analysis and Data Coordinator

Plans, directs and implements all facets of the Emergency Activities Center Gas Analysis and Data Sub-group. Coordinates gas analysis and data gathering activities and needs of the Emergency Activities Center by interacting with the Activities Center Chief and the other Activities Center coordinators and directing any personnel assigned to the Gas Analysis and Data Gathering Sub-group.

1. Provides gas analysis and data gathering services during emergency operations as requested by the Activities Center Chief.
2. Works with other Activity Center coordinators as needed to achieve Activity Center objectives.
3. Provides necessary equipment for gas sampling, analysis and calibration and data analysis to complete task at hand.
4. Provides gas analysis and data gathering expertise to assist emergency responders deal with unexpected events.
5. Directs individuals assigned to the Gas Analysis and Data Sub-group.
6. Reports findings of analysis of gas analysis and data gathering Sub-group to Activities Center Chief.

Activities Center

Activities Center Chief

Plans, directs and controls all facets of the Emergency Activities Center. Coordinates activities and needs of the Emergency Command Center by directing personnel in the Emergency Activities Center.

1. Ensure safe and legal compliance of activities of the Emergency Activities Center.
2. Evaluate information and communicate with the command center.
3. Insure proper record keeping of all activities.
4. Plan and coordinate Emergency Activities Center.
5. Direct purchase supply coordinator.
6. Direct engineer support coordinator.
7. Direct maintenance support coordinator.
8. Direct gas analysis coordinator.
9. Direct manning coordinator.
10. Direct command center liaison.

Maintenance Support Coordinator

Plans, directs and implements all facets of the Emergency Activities Center Maintenance Support Sub-group. Coordinates maintenance activities and needs of the Emergency Activities Center by interacting with the Center Chief and the other Activities Center coordinators and directing any personnel assigned to the Maintenance Support Sub-group.

1. Provides maintenance support services during emergency operations as requested by Center Chief.
2. Works with other Activity Center coordinators as needed to achieve Center objectives.
3. Provides requested maintenance logs of mining equipment and systems to assist in emergency planning and decision making.
4. Updates maintenance plans as required as emergency operations unfold.
5. Provides maintenance and repair expertise to assist emergency responders deal with unexpected events.
6. Directs individuals assigned to the Maintenance Support Sub-group.
7. Reports findings of Maintenance Support Sub-group to Center Chief.

Liaison Officer

Plans, directs and controls all facets of the communication between the Command Center, Multifunctional Center and the Emergency Activities Center.

1. Ensure timely and accurate communication between the Command Center, Multifunctional Center and the Activities Center.
2. Coordinate all information shared with the Command Center and Multifunctional Center.
3. Responsible for communications between Command Center, Multifunctional Center, and other parties.

Activities Center

Engineering Support Coordinator

Plans, directs and implements all facets of the Emergency Activities Center Engineering Support Sub-group. Coordinates engineering activities and needs of the Emergency Activities Center by interacting with the Center Chief and the other Activities Center coordinators and directing any personnel assigned to the Engineering Support Sub-group.

1. Provides engineering support services during emergency operations as requested by Center Chief.
2. Works with other Activity Center coordinators as needed to achieve Center objectives.
3. Provides requested engineering maps and plans of mining systems to assist in emergency planning and decision making.
4. Updates engineering plans as required as emergency operations unfold.
5. Provides engineering expertise to assist emergency responders deal with unexpected events.
6. Directs individuals assigned to the Engineering Support Sub-group.
7. Reports findings of Engineering Support Sub-group to Center Chief.

Multi-Function Group

Responsibilities

I. PRELIMINARY ACTIVITY

Logistical

- Update and maintain current list of key internal and external contacts.
- Identify various off-site locations near all operations to house family members, news media or other outsiders.
- Initiate and maintain contact with key, local medical facilities and personnel, emergency response teams and public safety staff, including mental health professionals, counselors and the America Red Cross.
- Train and equip site spokespersons to gather current information to initially update family members and media until relieved by corporate communications staff, if available and appropriate.
- Identify potential spokesperson from among executive management for possible press briefings.
- Identify adequate nearby food and lodging facilities for staff, mine rescue teams and family members.
- Coordinate with local emergency response personnel, including police and fire officials, on potential evacuation of nearby commercial, civic and residential areas.
- Become acquainted with various relief services offered by local county or municipal governments and the procedure for alerting them in the event of an emergency.

Technical

- Maintain copies of current maps of underground operations.
- Identify and train potential experts/spokespersons from various engineering, mine and corporate management, safety and support staff.
- In the event of an emergency situation at another operation, set policy to decline comments on specifics of the emergency and limit any public statements to the media to strictly general information on the industry.
- Establish policy with workforce that comments and statements related to any mine emergency should be left to trained and designated corporate personnel.
- Compile and maintain a list of initial responders in addition to mine rescue personnel, such as mine safety, corporate communications, government affairs and human resources staff to aid with emergency and also to notify family members in best available manner, preferably in person or by phone, if necessary.
- Cache adequate log books for cataloging events; visitors; family member names, information and briefings; media statements, (spell out), etc.
- Compile advanced list of potential action items and assigned areas of responsibility to consider in an emergency situation and have copies available for appropriate mine management and staff.
- Identify staging and triage area on the surface property for use by emergency response personnel, including air ambulances.
- Identify on- or off-site facility as temporary morgue for any possible decedents.
- Maintain updated list and information on any previous incident, safety performance and any violations in order to explain reasons.

- Ensure that operations have adequate phone and data communications services available, including wireless communications, if required.
- Identify and become acquainted with various agency communications personnel through personal visits or phone conversations, if possible.

II. REACTIONARY

Initial Emergency

- Ensure that all necessary mine and corporate management are apprised of the situation and given regular updates as they become available.
- Identify individual(s) who will contact federal and state regulatory personnel, including those agencies mandated by law.
- Notify local emergency response and public safety personnel for immediate aid or for possible evacuation of nearby areas.
- Contact local and/or regular corporate spokesperson(s) or alternates to be available at the operations either for temporary or on-going duty.
- Coordinate with various regulatory agencies the release of statements to the media and also updates to family members.
- Post company and/or public safety personnel at main and alternate entrances to the operation to coordinate and limit access to the site, and consider providing company personnel with photo identification cards. Maintain log of any visitors arriving at or departing the site. Enlist the aid of state and local public safety personnel for security.
- Along with appropriate personnel, spokesperson gathers and maintains current and pertinent information to compose regular statements for family members and the media, either hourly or more frequently, if necessary.
- Spokesperson makes immediate, initial contact with any gathered family members and media and plans regularly scheduled briefings for both groups, with family members getting priority and more detailed information.
- Include representatives from regulatory agencies and any other pertinent personnel as either participants or observers at all press briefings, if possible and appropriate.
- Direct or escort arriving family members to identified facilities, and keep them as isolated as possible from other company staff and media.
- Make arrangements for medical, emotional, financial and any other vital or comfort needs identified by family members.

On-Going Emergency

- Maintain cycle of regular briefings for family members and news media.
- Coordinate and schedule group press briefings which would include corporate spokesperson(s) including experts and executive management, as well as representatives from pertinent regulatory agencies, if possible and appropriate.

- Coordinate family and media briefing statements with federal and state regulatory, emergency response and public safety personnel.
- Ensure that food and other comfort needs are made available for family members, company staff, mine rescue teams, other responders, etc.
- Coordinate food and comfort needs with American Red Cross, if responding.
- Ensure that clergy, grief counselors and mental health professionals are available, if necessary, and provide them supervised access to family members or company staff, if necessary.
- Be prepared to respond to potentially hostile family members if emergency situation continues for several hours or days.

Post-Emergency

- Gather personal belongings of deceased or injured personnel and place them in an adequate container.
- Coordinate financial needs of family members with human resources personnel.
- If necessary, aid family with possible hospital or funeral arrangements, including financial support.
- Coordinate disposal of possible decedents with local coroner or state medical examiner, including deliberations on "cause of death."
- Determine how and when to confirm names and other information on deceased personnel.
- Due to current privacy laws, defer any reports on condition of injured personnel to family members or hospital staff.
- Meet with individual families, if necessary and warranted.
- Provide access to operations for grieving family members, if appropriate.
- Identify and provide area for public grieving, such as gatherings of friends and family members, displays of condolences, etc.
- Consider providing access for de-briefing for the media involving mine rescue team members in a controlled manner.
- Coordinate with MSHA Public Affairs Officer on briefing with family, company, press briefings, etc.

Note: Defining specific personnel types and responsibilities may be helpful in this section.

Checklist would be helpful to ensure that all areas have been covered.

Mine Rescue Equipment & Training

Guidance for Establishing, Equipping and Training Mine Rescue Teams

I. Introduction

This portion addresses a variety of issues related to establishing a mine rescue team including a summary of current federal regulations governing mine rescue teams, needed equipment, training requirements, training methodologies, the psychological aspects of mine rescue.

II. Summary of Federal Regulations

Title 30 Code of Federal Regulations, Part 49 stipulates requirements for mine rescue teams for all underground mines in the United States. 30 CFR 49 covers important elements including availability of mine rescue teams (§ 49.2); alternative mine rescue capability for small and remote mines (§ 49.3); alternative mine rescue capability for special mining conditions (§ 49.4); mine rescue station designation (§ 49.5); equipment and maintenance requirements (§ 49.6); physical requirements for mine rescue team members (§ 49.7); and mine rescue team training (§ 49.8). Interpretation of selected portions of 30 CFR 49 can be found in the corresponding portions of MSHA's Program Policy Manual, Volume III (MSHA, 2003). Additional requirements for training and mine rescue competitions have also been spelled out in the 2006 MINER Act.

III. Equipment and Maintenance

Underground mine rescue teams must be adequately staffed and equipped with all necessary equipment in order to comply with applicable federal regulations. As stated in 30 CFR §49.2(2)(b), each rescue team is to be comprised of five members and at least one alternate who are properly qualified, trained, and equipped for undertaking mine rescue service. Based criteria set forth in 30 CFR §49.6(a), Table 1 presents an itemized list of the minimal equipment and materials that would be needed to equip a typical mine rescue team comprised of five members plus an alternate (adapted from Conti, 2003). Estimated costs (2006 dollars) are also included.

Table 1 – Mine rescue equipment list and estimated cost

Equipment/Material (cf. 30CFR49.6)	No.	Est. cost each	Est. total cost
SCBAs			
Self-contained breathing aparatus (SCBA) (Typically Dräger BG4 or BioMarine*)	6	$8,000	$48,000
Soda Sorb for canisters (per year)	12	$110	$1,320
Spare oxygen cylinders	6	$700	$4,200
Oxygen pump/cascade system	1	$7,500	$7,500
SCBA testing kit	1	$500	$500
Repair/replacement parts		$1,000	$1,000
Other equipment and supplies			
Cap lamps and chargers	12	$500	$6,000
Multi-gas detectors	4	$1,200	$4,800
Lightweight, collapsible and/or wheeled stretcher	1	$800	$800
First aid bag and supplies	1	$400	$400
Personal protective equipment (hard hats, boots, etc.)	6	$200	$1,200
Portable communication system	1	$2,000	$2,000
Misc. tools, replacement parts and other materials		$2,500	$2,500
Mine rescue trailer for equipment transport	1	$8,000	$8,000
			$85,220
SCBA maintenance per year (parts only)	6	$1,000	$6,000
		Estimated total	**$94,220**
* *Mention of a specific product or brand name does not constitute endorsement by NIOSH.*			

As mentioned above, this is the minimal equipment that a five member team would need. Costs for this equipment will vary depending on the type and quantity selected. There is also a cost associated with training of teams. This will be covered in the section on training and education.

All equipment must be adequately maintained to make certain that it is ready for immediate use. According to 30 CFR §49.6(b), all apparatus must be tested and inspected every 30 days by a person trained in the use and care of the apparatus. Written records of each inspection must be kept.

IV. Training and Education

Before undertaking any mine emergency response activity, rescue team member must be adequately trained. For the purposes of this document, training will be addressed from several perspectives. These are: 1) the minimum training requirements as specified in 30 CFR §49.8; 2) suggestions for supplemental training; and 3) methodologies for enhanced mine rescue training. Training costs will also be discussed.

Mine Rescue Equipment & Training

Training requirements

Before serving on a mine rescue team, each member must complete at least 20 hours of instruction in the use, care, and maintenance of the type of SCBA and other equipment used by the mine rescue team. Besides in-depth training on SCBAs, rescue team members must receive at least 40 hours of refresher training each year. This training is to be given at least four hours each month or in eight-hour blocks every two months. This 40 hour refresher training must include the following elements:

1) At least one underground training session every six months.
2) Wearing of the team's SCBAs under oxygen by all members for at least two hours every two months
3) Mine map training and ventilation procedures.
4) If applicable, the use, care and limitations of auxiliary mine rescue equipment or different breathing apparatus.
5) Advanced mine rescue as prescribed by the MSHA Office of Educational Policy and Development.

While 30 CFR 49 specifies broad content domain that must be covered in mine rescue team training, the law does not prescribe specific methodologies for conduct mandated training. In a parallel vein, the law also does not specify content for supplemental and/or training or methodologies for conducting the training.

Supplemental training

In 2006, members of the Mine Emergency Task Force on Emergency Preparedness looked into selected issues in mine rescue including training. Among other things, the group suggested mine rescue training be conducted to better represent real mine emergency situations. The task force suggested the use of non-toxic smoke in rescue team training. The group also suggested team members should be training in using fire extinguishers to put out real fires.

If a mine does not have a fire brigade, mining companies should also consider additional, more in-depth fire fighting training for their rescue team members. This would include training in fighting conveyor belt and other large structure and equipment fires using fire hoses, nozzles and other related equipment. Should a mine operator want to conduct this more intense training, they will need to equip rescue team members with appropriate personal protection equipment including fire fighter turnout gear, hoods, gloves and other related items.

Enhanced mine rescue training

Beginning in the 1990s, researchers from the NIOSH Pittsburgh Research Laboratory began looking at mine rescue related issues including potential new technologies for rescue teams and the viability of realistic training simulations. Working initially through cooperative training efforts with the Pennsylvania Bureau of Deep Mine Safety and expanding to several cooperating mining companies, PRL researchers have conducted a number of realistic training simulations at the NIOSH Lake Lynn Laboratory experimental mine (Conti, et al, 1998; Conti, 2000). While this type of training has been done by NIOSH at the Lake Lynn Experimental Mine facility, simulations of the type described below can by conducted by operators at their own mines.

For each training event, a typical problem scenario is developed. The problem is then presented to mine rescue

teams who work the problem underground and, if possible, in smoke. Teams are exposed to nontoxic theatrical smoke that limits visibility to less than three feet to provide a realistic environment for working in mine fires. The mining section or a suitable mock-up is set up with various props, mining equipment and obstacles such as water, roof falls and other impediments similar to those a team would encounter during exploration at a real emergency. Teams must search for and locate victims, render first aid and emergency care as required, map the problem area, take gas readings, re-establish proper ventilation, set roof support, communicate to the briefing officer at the fresh air base and make decisions regarding how to reach a solution.

The training should be developed and guided by experienced mine safety and emergency management professionals who will be able to provide the rescue team members with all necessary support and expertise to make the training meaningful and effective. It is important that teams learn from mistakes in a constructive environment and that they understand how their decisions affect the safety of the team members as well as the safety of the victims that are being rescued.

At the end of each training simulation, the team members should provide feedback to the trainers by answering a series of questions that included demographics, usefulness of the fresh air base briefing, evaluating how the team members made decisions and describing anxiety levels and physical demands of the rescue operation. The rescue team is then debriefed by the mine rescue trainer in charge of the exercise, who will analyze the performance of the team, reinforce things that were done well and provide assistance with weaknesses that need to be addressed. Conducting the debriefing in an open forum atmosphere offers an opportunity for team members to engage in lively and productive conversation about the simulation and the lessons learned.

Mine rescue team members, company personnel and state officials all agree that simulations of this type are extremely beneficial. Several mining companies whose teams have participated in underground training at the NIOSH Lake Lynn Experimental Mine, have credited these simulation exercises as having been beneficial in helping their teams manage actual events that occurred after training. Underground mine operators should consider developing similar simulations for use in teaching important concepts to rescue teams at their respective operations. While this kind of training has been done by NIOSH at its Lake Lynn facility, simulations of the type describe can by conducted by companies at their own mines.

In 2007, researchers at NIOSH PRL plan to package and disseminate a suite of three mine rescue training exercise modules which include specific teaching points, instructor's guides with a "how to" conduct the exercise and background material, plus team and solution maps. These exercises have been developed in cooperation with several coal mine operators, MSHA and state mining agencies.

Training costs

As mentioned earlier, there are costs associated with training a mine rescue team that are in addition to the costs of equipping a team. Table 2 lists estimated yearly costs for training a six person mine rescue team. It is assumed that the rescue team will participate in two mine rescue competitions each year – this is typically done to provide the team members with opportunities to gauge their performance against other teams, to learn from other mining companies and to network with neighboring mine rescue teams who might be called for help in an emergency.

Table 2 – Estimated yearly costs for mandated training

Item	Est. cost
Monthly training (based on 6 members, avg. hourly rate of $25, 8 hours per day, 12 days per year)	$14,400
Competition training (based on 6 members, avg. hourly rate of $25, 8 hours per day, 3 days and 2 competitions)	$7,200
Competition travel (based on 6 members traveling to two competitions per year for 3 days each)	$4,500
Estimated total	**$26,100**

V. A Word about Psychological Aspects

Emergency response can pose substantial psychological and emotional challenges for the responders, their families and the support personnel assigned to the rescue operation. Mental health is becoming a central issue in emergencies with recent examples in the United States of the aftermath of 9-11 and the 2004 and 2005 hurricane seasons in Florida and the Gulf Coast, most notably the dramatic events in New Orleans. Globally, the issue of mental health in disasters became prominent after the 2004 tsunami in Southeast Asia and the 2005 earthquakes in Pakistan. Similar trends have been identified in the mining community as well, especially after the Quecreek inundation of 2002, the 2001 explosions at Jim Walters Resources No. 5 Mine and the events in 2006.

There is increasing recognition that the psycho-social consequences, (particularly stress) of major emergency events may adversely impact individuals, their families, communities and work organizations. When pursuing the assembly of a mine rescue team, mine operators need to consider the psychological component of mine rescue. Kowalski (1995) presented a rationale for considering stress as a significant factor in the management of emergencies. It is proposed that critical incident stress debriefing in a disaster can improve the effectiveness of response teams on site, their turnaround time on site and post-disaster time off the job.

VI. Resources

A number of web-based resources are available that may be useful to companies forming new mine rescue teams. One excellent source is the Mine Safety and Health Administration's Mine Rescue Home Page (http://www.msha.gov/MineRescue/rescue.HTM). The page offers links to mine rescue contest problems, various mine rescue associations and a link to the Mine Emergency Operations (MEO) database. The database contains information about mine emergency services, mine emergency teams and federal, state and local contacts in proximity to a specific mine. The United States Mine Rescue Association website (http://www.usmra.com/) has links to a variety of resources including equipment manufacturers, training materials and numerous reference sources. NIOSH has a selection of mine rescue resources available including publications that discuss much of the relevant research. These can be accessed through the NIOSH Mining Web Site at http://www.cdc.gov/niosh/mining. Mine operators should also consult their respective state mine safety agency about mine rescue resources.

VII. Summary

This document was designed to look at issues related to establishing a mine rescue team. It addressed a variety of issues related to establishing a mine rescue team including a summary of current federal regulations governing mine rescue teams, needed equipment, training requirements, training methodologies, and the psychological aspects of mine rescue. This document addresses some of the basics of assembling a mine rescue team and it is hoped that it will serve to enlighten mine operators regarding issues they need to consider.

VIII. References

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Conti RS [2000]. Mine rescue and response. Proceedings of the 12th International Conference on Coal Research - Coal the Future (Sep 12-15, 2000; Sandton, Republic of South Africa). Symposium Series S26, International Committee for Coal Research, Washington, DC; pp 127-136.

Kowalski KM [1995]. A Missing Component in Your Emergency Plans: The Critical Incident Stress Factor. Safety Science, 20(1), pp 115-123.

MSHA [2003] Program Policy Manual, Vol. III , Interpretation and Guidelines on Enforcement of the 1977 Act, Part 49, Mine Rescue Teams

Responding to a Mine Emergency

Training Responsible Persons at Underground Coal Mines

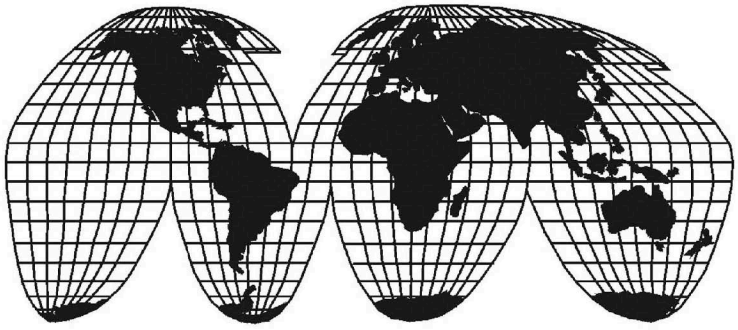
U.S. Department of Labor
Mine Safety and Health Administration

Instruction Guide Series
IG 110

2008

Visit the Mine Safety and Health Administration website at

www.msha.gov



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Scope

30 CFR Part 75.1501

(a) For each shift that miners work underground, there shall be in attendance a responsible person designated by the mine operator to take charge during mine emergencies involving a fire, explosion, or gas or water inundation.

(1) The responsible person shall have current knowledge of the assigned location and expected movements of miners underground, the operation of the mine ventilation system, the location of the mine escapeways, the mine communications system, any mine monitoring system if used, locations of firefighting equipment, the mine's Emergency Response Plan, the Mine Rescue Notification Plan, and the Mine Emergency Evacuation and Firefighting Program of Instruction.

(2) The responsible person shall be trained annually in a course of instruction in mine emergency response, as prescribed by MSHA's Office of Educational Policy and Development. The course will include topics such as the following:

(i) Organizing a command center;
(ii) Coordinating firefighting personnel;
(iii) Deploying firefighting equipment;
(iv) Coordinating mine rescue personnel;
(v) Establishing fresh air base;
(vi) Deploying mine rescue teams;
(vii) Providing for mine gas sampling and analysis;
(viii) Establishing security;
(ix) Initiating an emergency mine evacuation;
(x) Contacting emergency personnel; and
(xi) Communicating appropriate information related to the emergency.

(3) The operator shall certify by signature and date after each responsible person has completed the training and keep the certification at the mine for 1 year.

(b) The responsible person shall initiate and conduct an immediate mine evacuation when there is a mine emergency which presents an imminent danger to miners due to fire or explosion or gas or water inundation. Only properly trained and equipped persons, essential to respond to the mine emergency may remain underground.

(c) The mine operator shall instruct all miners of the identity of the responsible person designated by the operator for their workshift. The mine operator shall instruct miners of any change in the identity of the responsible person before the start of their workshift.

(d) Nothing in this section shall be construed to restrict the ability of other persons in the mine to warn of an imminent danger which warrants evacuation.

Training Overview

Mine emergencies such as fires, explosions, and gas or water inundations require prompt action and efficient management of emergency operations.

Responsible persons (and others who are training to become responsible persons) will need to know how to perform and delegate a variety of tasks during a mine emergency.

This Instructional Guide (IG) is designed to be used in conjunction with the mine's Emergency Response Plan (ERP), associated plans, and procedures required during a mine emergency.

The materials in this guide must be tailored with the mine's existing plans to create an effective program of site-specific instruction that will provide the mine's responsible persons with the knowledge to act quickly, effectively, and appropriately in the event of a mine emergency.

This guide is divided into eleven sections which correspond with the training topics as prescribed in 30 CFR Part 75.1501. These sections are arranged in the following order:

- Initiating an Emergency Mine Evacuation
- Contacting Emergency Personnel
- Organizing a Command Center
- Establishing Security
- Communicating Appropriate Information Related to the Emergency
- Coordinating Firefighting Personnel
- Deploying Firefighting Equipment
- Coordinating Mine Rescue Personnel
- Deploying Mine Rescue Teams
- Establishing a Fresh Air Base
- Providing for Mine Gas Sampling and Analysis

It is suggested that these training topics be integrated into regularly scheduled training activities, safety talks, and mine managers' meetings if possible. This additional training will benefit the responsible person, as well as other personnel at the mine.

Since regulations, policy, and mining technology can change, it is important that mine operators keep their Mine Emergency Response Training current and up-to-date. Visit MSHA's website at http://www.msha.gov for additional information.

Course Training Objectives

Responsible persons must demonstrate a working knowledge of the following:

- Initiating an Emergency Mine Evacuation
- Contacting Emergency Personnel
- Organizing a Command Center
- Establishing Security
- Communicating Appropriate Information Related to the Emergency
- Coordinating Firefighting Personnel
- Deploying Firefighting Equipment
- Coordinating Mine Rescue Personnel
- Deploying Mine Rescue Teams
- Establishing a Fresh Air Base
- Providing for Mine Gas Sampling and Analysis

Materials and Instructional Resources

In addition to this Instruction Guide, use the following to conduct this training:

- 30 CFR
- Pencils, notepads, notebooks, highlighters, etc. for participants.
- Audiovisual aids: PowerPoint, projectors, whiteboards, blackboards, flipcharts or handouts are all examples of effective instructional aids.
- The mine's:
    - Emergency Response Plan (ERP)
    - Emergency Notification Plan
    - Emergency Evacuation and Firefighting Plan
    - Mine Maps – with ventilation system and escapeway systems
    - Information or training materials for mine-specific Atmospheric Monitoring System (AMS), if applicable
    - SCSR Storage Plan
    - Ventilation Plan
- Any other site-specific training plans, materials, and/or policies related to mine emergency preparedness and readiness training.

Training Assessments

Review and assessment will both improve retention of the material and allow and show areas needing improvement.

- Review Questions
- Discussion/Feedback/Q&A (if applicable)

Section 1

Initiating an Emergency Mine Evacuation

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of their mine's emergency evacuation plans and procedures including all necessary duties associated with initiating an emergency mine evacuation.

Mine-Specific Training Materials

In addition to this Instruction Guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP)
- Mine Emergency Evacuation and Firefighting Program of Instruction
- Mine Maps (with ventilation system, escapeway systems, and location of firefighting equipment)
- AMS mine-specific system (if applicable)
- SCSR Storage Plan
- Ventilation Plan
- Any other applicable mine-specific plans and/or policies

Introduction

30 CFR Part 75.1501(a)

For each shift that miners work underground, there shall be in attendance a responsible person designated by the mine operator to take charge during mine emergencies involving a fire, explosion, or gas or water inundation.

In accordance with this regulation, responsible persons designated by the mine operator may be required to initiate an immediate mine evacuation in the event of a mine emergency.

NOTE: Refer to **Appendix B** "Critical Item Checklist for Mine Emergencies" (make copies as handouts, if needed).

Responsible persons must maintain current knowledge of the mine's Emergency Response Plan (ERP), Emergency Evacuation and Firefighting Plan, and the mine's notification protocols.

NOTE: Federal regulations state that the mine operator shall instruct all miners of the identity of the responsible person designated for their workshift. Miners on all working sections of the mine and on the surface should be instructed to **immediately** contact the responsible person in the event of an emergency.

An up-to-date list of responsible persons must be posted in obvious locations. Any changes shall be promptly reviewed with all mine personnel prior to the start of their shift.

Evacuation Plans

Evacuation plans provide the road map which miners must use during an emergency. The mine should have evacuation plans for working sections and outby areas.

Responsible persons (and all miners) must know the location of escapeways and should be aware of their surroundings during evacuation. Responsible persons need to:

- ☐ Know the mine's ERP, notification plan, and evacuation procedures.
- ☐ Be familiar with the mine maps, areas of the highest and lowest elevations.
- ☐ Know the locations of SCSR storage units, refuge alternatives, and mine phones.
- ☐ Know the location of primary and secondary escapeways from all assigned work areas.
- ☐ Know the locations of emergency response materials if applicable.
- ☐ Know the approximate travel time to working sections (walking and mantrip).
- ☐ Have a check in/out system to track personnel.
- ☐ Have a plan to debrief evacuated personnel to obtain critical information.
- ☐ Be prepared to delegate duties to other competent personnel.

Escapeways and Evacuation Drills

Responsible persons must be familiar with primary and secondary escapeways at the mine. Maps designating these escapeways should be displayed on each working section and at surface facilities.

It is extremely important that **all** miners know how to get out of the mine using the most direct escapeway. Evacuation drills help to familiarize miners with escapeway routes, even if filled with smoke. Practice prompt and efficient evacuation procedures when drills are conducted to reinforce the instruction outlined in the plan.

Emergency Evacuation Warning Systems

Responsible persons need to know the location of miners working underground, and they need to have a working knowledge of the mine's monitoring and evacuation warning systems.

Such systems include Atmospheric Monitoring Systems (AMS), voice pager systems, Personal Emergency Device (PED) systems, and other types of warning signals which are essential to an effective mine evacuation. Responsible persons need to be trained and knowledgeable in the particular system used at the mine.

The ideal system would notify all miners simultaneously so that they can immediately begin their evacuation. If miners working in remote areas away from the main communications system do not receive the warning to evacuate at the same time as others, these miners could be placed at risk.

Evacuation Procedures

A responsible person may have to initiate an evacuation when a mine emergency occurs. In addition to knowing the location of miners working underground, the responsible person must also have current knowledge of how to initiate, conduct, and/or delegate the following required duties:

- ☐ Ensure that all underground and surface personnel are notified and made aware of an emergency as soon as possible.
- ☐ Initiate the mine's emergency notification plan.
- ☐ Account for all underground miners.

- ☐ Gather miners not dealing directly with the emergency at strategic locations.
- ☐ Verify that electrical power has been deenergized to the affected area (when the situation warrants).
- ☐ Determine the number of miners in the group and the evacuation route to be traveled.
- ☐ To the extent possible, the responsible person should help determine the safest and quickest route to the surface.

NOTE: Only trained and equipped persons, essential to respond to the mine emergency may remain underground.

Personnel evacuating the mine should stay in contact with the surface if possible. Give regular updates concerning:

- ☐ Transportation means being used (travel by mantrip or utilize other equipment for transportation if at all possible)
- ☐ Location
- ☐ Conditions encountered
- ☐ Status of miners

NOTE: If miners have donned their SCSRs, they <u>MUST NOT</u> remove their mouthpieces to communicate.

 **Log all activities and information related to the emergency.**

Maintain a log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Monitor Atmospheric Conditions

Responsible persons need to ensure that mine atmospheric conditions are continuously monitored for oxygen deficiency, methane content, and elevated carbon monoxide levels.

Gas testing and sampling provide critical information to mine rescue teams and the Command Center during rescue/recovery operations. Accurate gas-trending information is extremely important during a mine emergency. Responsible persons must conduct and/or delegate the following:

- ☐ Instruct personnel evacuating the mine and others **not to make ventilation changes**.
- ☐ Initiate sampling of mine gases from mine fans, boreholes, and other locations.
- ☐ Continue to monitor the fans and returns for mine gases, during and after evacuation.
- ☐ Make every attempt to record the date, time, and locations of gas readings – indicate the type of gas detectors used.
- ☐ Do not permit the fan to be stopped, reversed, or speed to be changed.
- ☐ Debrief persons coming out of the mine to obtain and log information on the conditions underground.
- ☐ Collect all notes and maps from miners when they have reached the surface.

Mines Using Atmospheric Monitoring Systems (AMS)

If a mine has an Atmospheric Monitoring System (AMS), the responsible persons at that mine needs to be knowledgeable in the functions and capabilities of the system. The AMS will provide the responsible persons with valuable information concerning the event and provides mine rescue personnel critical information needed for effective mine emergency operations.

Responsible persons should be knowledgeable of the properties of the mine gases that may be present during the operation and how these mine gases will react under certain conditions

NOTE: Refer to **Appendix E** "Gas Detection Chart" (make copies as handouts, if needed).

Section 2

Contacting Emergency Personnel

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of their mine's emergency notification plans and procedures for contacting emergency personnel, in the event of a mine emergency.

Mine-Specific Training Materials

In addition to this Instruction Guide, an instructor will need the following mine-specific materials to conduct this training:

- Mine Emergency Notification Plan – on-site and off-site
- Notification lists
- Any other applicable mine-specific plans and/or policies

Notification Plan

As part of the mine's emergency response procedures, the responsible person is required to contact all emergency personnel.
The mine is required to have an Emergency Notification Plan and procedures for notifying necessary personnel when there is an emergency at the mine. This plan lists the various mine management personnel, administrators, government officials, and other key personnel who must be notified.

The responsible person may need to delegate to other personnel on the surface the responsibility of contacting key emergency response personnel and officials.

On-Site Notification

If an emergency occurs at the mine, the responsible person will immediately establish contact with:

- ☐ Personnel in the affected area
- ☐ Personnel inby the affected area who may be in danger
- ☐ Personnel in outby areas (mine-wide evacuation) as conditions warrant
- ☐ Personnel on the surface responsible for notification of key personnel off-site

Off-Site Notification

An up-to-date list of emergency contact phone numbers and key personnel must be readily available and visible at specified locations at the mine. This list must include telephone numbers of:

- ☐ MSHA **(Toll Free Number: 1-800-746-1553)**
- ☐ State Mine Regulatory Agency
- ☐ Appropriate Mine Management Personnel
- ☐ Mine Rescue Teams
- ☐ Fire Brigades (if applicable)
- ☐ Readily-available suppliers of mine emergency and rescue equipment
- ☐ Local Emergency Responders:
    - Emergency Services
    - Local Hospital
    - Fire Department
    - Police (local, county, and state)

Also notify any adjoining, or adjacent mines, when necessary, and local telephone company to provide additional communication lines.

 **Log all activities and information related to the emergency.**

Record and log all calls. Maintain an accurate log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Local Coordination

Familiarize local emergency response personnel with the services and activities that they may be called upon to provide during a mine emergency, such as security, medical assistance, staging locations, logistics, traffic control, supplies, and the layout of surface facilities, etc.

Mine Emergency Response Development (MERD) Exercise.

A well-defined MERD exercise provides additional training opportunities for mine management personnel, mine rescue teams, government officials, and local emergency responders. Try to arrange in advance for rescue and response personnel to take part when the mine is conducting a MERD or any other mine emergency training activities.

NOTE: Refer to **Appendix B "**Critical Item Checklist for Mine Emergencies" (make copies as handouts, if needed).

Section 3

Organizing a Command Center

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of organizing a Command Center in the event of an emergency at the mine.

Mine-Specific Training Materials

In addition to this Instruction Guide, an instructor will need the following mine-specific materials to conduct this training:

- Any mine-specific plans regarding surface layout and facilities required for establishing a Command Center
- Inventory of available equipment and resources necessary for Command Center operations
- Any other applicable mine-specific plans and/or policies

Introduction

It is extremely important that responsible persons have a general knowledge of the structure, functions, and duties of the Command Center during mine rescue and recovery efforts. The Command Center is an essential and integral part of the Mine Emergency Command System.

The Mine Emergency Command System is based on the standardized Incident Command System (ICS) which has been adopted by fire departments, search and rescue organizations, and other government agencies. The Mine Emergency Command System establishes a common framework and practical procedures for controlling all aspects of a mine emergency.

NOTE: Refer to **Appendix A** “Mine Emergency Command System” (make copies as handouts, if needed).

Command Center Operations

The Command Center, an integral part of the Mine Emergency Command System, is typically staffed and controlled by the Mine Emergency Command Group. This group is generally comprised of mine management personnel, federal and state officials, and union representatives.

The Command Center, which receives a tremendous amount of information, will require secure communications equipment connected to underground phones and to other surface phones which will enable the Command group to communicate vital information during the rescue/recovery operations.

All decisions concerning the mine rescue teams (scheduling, assignments, tracking, rotations, and methods of exploration or firefighting are made by the Command Center.

The decision process of the Command Center is sometimes time-consuming, but it is important to understand the impact a single decision will have on the entire operation. A hasty or wrong decision could mean disaster and the loss of life.

> **NOTE:** When MSHA issues a 103(k) Order, all rescue and recovery plans must be submitted to MSHA and the state agency for review and approval. Modifications to the plan must also be approved.

Duties and Functions of the Command Center

Many of the following duties may be delegated at the discretion of the responsible person and/or authorized personnel from the Command Center group.

- ☐ Gather and disseminate information from:
  - Persons at the mine-site
  - Persons directly involved in the event
  - Other creditable sources such as engineering and technical support.
- ☐ Maintain a flow of clear, concise, and accurate information between:
  - The Command Center group
  - Mine rescue Teams
  - All other emergency response personnel involved in the effort.

- ☐ Direct mine rescue personnel (initiate and track an accurate team deployment schedule):
    - Establish a work schedule utilizing available resources and designated persons at the mine site.
    - Direct mine rescue/recovery work to be undertaken, as conditions dictate.
    - Know the number of available teams, which can be adjusted as conditions dictate.
    - Know the availability of additional teams and resources.
    - Ensure the availability of resources required by the teams and other essential personnel involved in the effort (food, water, facilities for rest/sleep, sanitary, medical needs, etc.).

Requirements for Efficient Command Center Operations

Secure Location for Command Center

(Consider the mine site's existing facilities and capabilities)

- ☐ Secure against unauthorized entry.
- ☐ Law enforcement should be contacted for assistance, if needed.
- ☐ The Command Center should be as close as possible to the mine rescue team staging area to allow access to the teams.
- ☐ The location must accommodate Command Center personnel and their equipment (computers, printers, fax, additional telephone lines, etc.).
- ☐ The Command Center should be isolated from outside interference.

Authorized Command Center Personnel (Mine Emergency Command Group)

- ☐ Designated Company Personnel
- ☐ MSHA Representatives
- ☐ State Regulatory Representatives
- ☐ Miner's Representative(s)

Procurement of Items Needed in the Command Center

- ☐ Telephone(s) and additional lines (if available)
- ☐ Availability of secure communications with fresh air base (FAB)
- ☐ Electrical outlets for laptop computers, printers, copiers, plotters, etc.
- ☐ Current mine and ventilation maps
- ☐ Current escapeway maps

Command Center Communications

- ☐ Designate Command Center phone number for the teams and FAB.
- ☐ Identify backup communications available during the emergency operations.
- ☐ Designate an outside line for Command Center use only.
- ☐ Control entrance and exit of Command Center personnel.
- ☐ Designate an individual who will communicate information to and from the Command Center.
- ☐ Relay accurate information to the Command Center concerning the event and all mine rescue/recovery activities.
- ☐ Ensure all communications to and from the Command Center remain protected from outside monitoring.
- ☐ Restrict personal outside calls.
- ☐ Prohibit or restrict use of cell phones and Blackberries.
- ☐ Restrict phone/speaker systems access except to persons designated by the Command Center to receive information.
- ☐ Notify adjacent mining companies and alert them to any possible dangers and request assistance if needed.
- ☐ Notify mine safety personnel at other mines and arrange for possible backup duty.
- ☐ Advise public relations official regarding any new developments or news occurring at the mine site.

- ☐ Do not allow the release of the names of any miners who may be trapped or injured until it has been determined that the families are notified.
- ☐ Identify family liaisons.
- ☐ Select a media spokesperson to communicate with the news media.
- ☐ Ensure the spokesperson is thoroughly briefed concerning information to be released to the media.
- ☐ Set up scheduling for regular briefings for family members and the media.

NOTE: Adequate space is needed to accommodate Command Center personnel and necessary equipment.

Section 4

Establishing Security

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of plans and procedures for establishing security in the event of an emergency at the mine.

Mine-Specific Training Materials

In addition to this Instruction Guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP), if applicable
- Mine Emergency Notification Plan (off-site)
- Notification Lists
- Any other applicable mine-specific plans and/or policies

Introduction

Establishing security at the mine is essential in order to keep the roads open for mine or emergency personnel, and to ensure that curious bystanders do not hinder rescue efforts.

Incoming traffic on the roads leading to the mine property should be controlled by authorized personnel to keep unnecessary vehicles off the roads, and keep these roads open for essential personnel, needed supplies, and emergency vehicles.

When establishing security, ensure the following:

- ☐ Enlist local law enforcement personnel for security.
- ☐ Post company and/or public safety personnel at main and alternate entrances to the operation to coordinate and limit access to the site.
- ☐ Provide company personnel with photo identification cards, if possible.

- ☐ Maintain log of any visitors arriving at or departing the site.
- ☐ Limit or remove from mine property those persons not actively involved in the rescue or recovery operations.
- ☐ Designate and area (press information center) for reporters.
- ☐ Direct all reporters to the designated press information center regarding questions concerning the emergency.
- ☐ Establish secure staging areas for mine emergency response personnel (EMTs, ambulance, and equipment, i.e., drilling rig)
- ☐ Establish secure communication line between security and Command Center.
- ☐ Establish and secure a designated location for family members**.**

NOTE: Add any other items that will be necessary based on the mine's location and existing facilities. Refer to **Appendix B** "Critical Item Checklist for Mine Emergencies."

 **Log all activities and information related to the emergency.**

Record and log all calls. Maintain an accurate log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Section 5

Communicating Appropriate Information Related to the Emergency

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of communicating appropriate information related to a mine emergency.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP), if applicable
- Mine Emergency Notification Plan
- Notification Lists
- Any other applicable mine-specific plans and/or policies

Introduction

Communicating relevant information is **crucial** in the event of a mine emergency. Responsible persons must be knowledgeable and familiar with their mine's Emergency Response Plans (ERP), notification plans, and communication protocols in order to respond appropriately to a mine emergency.

It is essential that appropriate information related to an emergency is accurate and reported timely to the necessary personnel and regulatory agencies. The mine's listing of emergency contacts must be kept up-to-date.

Communication Protocol

One of the most important elements of an emergency plan is a communication protocol that includes notification of key officials—and especially responders—**immediately** after discovery of an emergency.

A good communication protocol is essential to responsible persons at the mine, since they will have to relay valuable information during mine emergency operations.

Training Suggestion: Communication, protocol, and leadership skills can be taught. Assessing those skills occurs either through simulated practice or real events.

First Response Communications

Miners who first encounter an emergency situation will have to assume their expected duties in dealing with the emergency, based on a pre-arranged plan of action.

Responsible persons need to be knowledgeable of first response procedures, as well as the capabilities, skills, and expected duties of the miners who may be first to encounter an emergency situation. In carrying out their respective assigned duties, these first responders will also need clear and concise direction on how to proceed.

Remember, TIME IS YOUR ENEMY in the initial phase of responding to an emergency such as a mine fire. The key is to minimize the time it takes to respond. Emergency preparedness and readiness training will benefit responsible persons, first responders, as well as *all* personnel at the mine.

Communicating with Emergency Response Personnel

In the event of a mine emergency, responsible persons must be prepared to relay information concerning the extent and nature of the emergency. It is essential that appropriate information related to an emergency is accurate and reported timely to emergency response personnel and regulatory agencies.

NOTE: Effective and functional communications systems and related equipment must be in place at the mine to send and receive instructions and information related to the emergency.

The checklist below contains some of the questions that may be asked regarding the emergency. This list emphasizes the importance of keeping an accurate log of events.

(**NOTE:** Additional information may be needed depending on the specific mine and nature of the emergency. Use the list for emergency response preparedness training or other training scenarios at the mine):

- ☐ When did the event occur?
- ☐ When was the responsible person notified?
- ☐ What was the cause and nature of the emergency?
- ☐ Are all miners accounted for?
- ☐ Is the evacuation complete?
- ☐ Are any miners missing? If so, how many and what are their possible locations?
- ☐ Are any miners trapped?
- ☐ Are there injuries or fatalities?
- ☐ Have federal and state officials been notified?
- ☐ Have all representatives of mine management been notified?
- ☐ Is the ventilation system operating?
- ☐ Is it an intake or exhaust system?
- ☐ Are attendants posted at the surface ventilation controls?
- ☐ Have air samples been taken? If so, what are the results?
- ☐ What conditions are known to exist underground (roof conditions, water, gas, etc.)?
- ☐ Is the mine's communication system operating? Is it being monitored?
- ☐ Is power to the affected area on or off?
- ☐ Is there battery-powered or diesel equipment or a charging station in the affected area?
- ☐ Have mine rescue teams or fire brigades been dispatched?
- ☐ Are guards stationed at all mine entrances?
- ☐ What type of equipment is in the area? Where is it located?
- ☐ Are the mine maps up-to-date?
- ☐ Are mine phones located on the mine maps?
- ☐ Where are compressed air and/or water lines located? Are they in operation?
- ☐ Are valves known to be open or closed?
- ☐ What type of firefighting equipment is located underground? Where is it accurately located on the mine map?
- ☐ What tools and supplies are available underground? Where are they?
- ☐ Are there storage areas for oil or oxygen, acetylene tanks, or explosives in the area to be explored? What are the locations?
- ☐ Are there any gas wells, adjacent mine workings above, below or parallel to the seam being mined?
- ☐ Where are any pumps and compressors located?

NOTE: Refer to **Appendix C "**Communicating and Relaying Critical Information**"** (make copies as handouts, if needed).

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Mine Rescue Teams

Mine rescue teams must receive accurate, concise, and reliable briefing information from the Command Center to perform rescue/recovery duties in a safe, timely, and efficient manner.

Develop a standardized method of reporting gas readings and other critical information to the Command Center and the FAB.

Mine rescue teams will need:

- ☐ Up-to-date mine maps for exploration underground (ensure that extra copies are made)
- ☐ Standardized system for mapping to coordinate with the command center (for example, numbering entries and lettering crosscuts)
- ☐ Air readings and gas-trending data

NOTE: Communications between the fresh air base and the mine rescue teams must be maintained at all times.

✍ **Log all activities and information related to the emergency.**

Maintain an accurate log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Section 6

Coordinating Firefighting Personnel

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of plans and procedures associated with coordinating firefighting personnel in the event of a mine fire.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP)
- Mine Emergency Evacuation and Firefighting Program of Instruction
- Mine Maps (with ventilation system, escapeway systems, and location of firefighting equipment)
- AMS mine-specific system (if applicable)
- Ventilation Plan
- Any other applicable mine-specific plans and/or policies

Introduction

At the first indication of a fire, everyone in the mine must be made aware that a fire exists and the responsible person may need to initiate a mine-wide evacuation. It is essential that a responsible person be knowledgeable in the mine's emergency evacuation and firefighting program of instruction and the mine's firefighting capabilities.

The responsible person needs to know:

- ☐ The types, locations, and capacities of the mine's firefighting equipment
- ☐ Water sources
- ☐ Location of pumps
- ☐ Power source for pumps

In the event of a mine fire, the responsible person should ensure the following duties are carried out:

- ☐ Obtain air quality (gas readings) at or near the fire area and returns near the fire area as soon as possible.
- ☐ Test and evaluate the mine roof prior to approaching a fire area.
- ☐ Plan to approach a fire area from the intake air side, if possible (air moving from you toward the fire area).

Log all activities and information related to the emergency.

Maintain a log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Fire Brigades

Responsible persons may be required to direct underground fire brigades in the event of a fire at the mine. Fire brigades are sometimes composed of specially trained and equipped miners that work at the mine site and can rapidly respond to a fire.

If a mine does not have a fire brigade, mining companies should also consider additional, more in-depth fire fighting training for their rescue team members. This includes training in fighting conveyor belt and other large structure and equipment fires using fire hoses, nozzles, and other related equipment.

Hazards of Direct Firefighting

During direct firefighting, there are certain hazards that may be encountered of which the responsible person should be aware. These hazards include electric shock and electrocution, toxic and asphyxiating gases, oxygen deficiency, explosive gases, and heat, smoke, and steam.

Electric Shock and Electrocution

Electric shock and electrocution are hazards to firefighters using water, foam, or other conductive agents to fight a fire. For this reason, **ensure that the power to the fire area is OFF regardless of the type of fire.**

Toxic and Asphyxiating Gases

The extremely toxic gas, carbon monoxide, is produced by all fires because of the incomplete combustion of carbon materials during the burning process.

Carbon dioxide is also produced by fires, though it is a product of **complete** combustion. Carbon dioxide is an asphyxiate. Breathing large amounts of carbon dioxide causes rapid breathing and insufficient intake of oxygen. Too much of it in the bloodstream can cause unconsciousness and even death.

Other gases such as hydrogen sulfide are even more toxic than carbon monoxide. Some toxic gases are produced by burning rubber, neoprene, or polyvinyl chloride (PVC). These materials are frequently found in electrical cables, conveyor belts, or tires on machinery. Even small fires that involve burning rubber, neoprene, or PVC can be extremely toxic.

Because all of these gases are harmful, it is extremely important that breathing apparatus is worn at all times when dealing with underground fires.

Explosive Gases

The buildup of explosive gases, such as methane and hydrogen, are very real hazards for teams during direct firefighting. That is why it is so important to maintain a sufficient and consistent flow of air over the fire area.

> **NOTE:** Refer to **Appendix E** “Gas Detection Chart” (make copies as handouts, if needed).

Heat, Smoke, and Steam

Heat, smoke, and steam are other hazards of direct firefighting and will determine how close firefighters can get to a fire and how long they can work. Working in a hot, smoky, or steamy atmosphere can be extremely uncomfortable and dangerous.

Keep in mind that during firefighting, smoke and steam will be less dense near the floor of the mine and worse near the roof of the mine. Adequate ventilation over the fire area should help to carry the smoke, heat, and steam away from the team.

Section 7

Deploying Firefighting Equipment

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of the deployment of firefighting equipment in the event of a mine fire.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP)
- Mine Emergency Evacuation and Firefighting Program of Instruction
- Atmospheric Monitoring System (AMS): mine-specific system (if applicable)
- Ventilation Plan
- Any other applicable mine-specific plans and/or policies

Introduction

Responsible persons need to know that fires in underground mines are particularly hazardous not only because they produce toxic gases and heat, but also because they produce smoke, pose an explosion hazard, and create oxygen-deficient atmospheres.

Detection

Initial detection of an emergency such as a mine fire is often by miners or by mine-wide detection systems. Responsible persons should be knowledgeable in the type of fire detection systems in place at the mine. If the mine uses an Atmospheric Monitoring System (AMS), the responsible person should have a thorough working knowledge of the system.

Types of Firefighting Equipment

The following is a general overview of most types of firefighting equipment at found at mines. Responsible persons should also have a thorough knowledge of the types of firefighting equipment used at their mine.

Dry Chemical Extinguishers

Dry chemical extinguishers put out fires by stopping the chemical reaction between the fuel and oxygen (which produces the flame). The dry chemical agents work to inactivate the intermediate products of the flame reaction, resulting in a decreased combustion rate (rate of heat evolution) and thus extinguishing the fire.

There are basically two sizes of dry chemical extinguishers: hand-held extinguishers and larger wheeled extinguishers. Hand-held extinguishers range in size from about 2 to 55 pounds.

Wheeled extinguishers can weigh from 75 to 350 pounds. These extinguishers consist of a large nitrogen cylinder, a dry chemical chamber, and a hose with an operating valve at the nozzle.

Multi-purpose dry chemical extinguishers contain monoammonium phosphate, and are effective on Class A, B, or C fires.

Hand-Held Extinguishers

Hand-held extinguishers may be available at the mine. Responsible persons should instruct miners to use the appropriate extinguisher for the fire they may be fighting. Using the wrong type of extinguisher could result in spreading a fire rather than extinguishing one.

Rock Dust

Rock dust is a fire extinguisher material that is readily available in most areas of the mine. It is used to put out a fire by smothering it or by eliminating oxygen from the fire. Rock dust can be used on Class A, B, or C fires and is most successfully used to fight a fire by applying it by hand to the fire or by shoveling it onto the fire.

NOTE: It is not recommended that rock dusting machines be used to fight any type of mine fire. Rock dusting machines generate air to disperse the rock dust, and the air could then move over the fire area to possibly increase the fire's intensity.

Water

Water can also be used to put out fires. Water acts to cool the fire, removing heat from the fire triangle. Water is an effective extinguishing agent on Class A fires.

Waterlines

Waterlines are required to extend to each section loading point and to be equipped with enough fire hose to reach each working face.

Fire Cars

Fire cars (or water cars or chemical cars) are available in some mines. These may be mounted on tires or flanged wheels and can be pushed or pulled to the fire area. The components of a fire car can vary from a water tank, pump, and hose to a more elaborate version that contains a wider selection of firefighting equipment such as water, large chemical extinguishers, hand tools, brattice cloth, and rock dust.

High Expansion Foam

High expansion foam is used mainly to contain and control fire by removing two legs of the fire triangle—oxygen and heat. The tremendous volume of the foam acts to smother and cool the fire at the same time. Foam is useful only in fighting Class A or B fires. Because the foam is light and resilient it can travel long distances to a fire without breaking down. High expansion foam is normally used just to control a fire. Once conditions permit, teams are usually sent in to fight the fire more directly. It is generally recommended not to travel through foam-filled areas.

Foam Generators

The high expansion foam is made by mixing water, air, and a foam concentrate or detergent in a foam generator. Foam generators are portable and come in different sizes with different foam-producing capacities. The smaller models may be hand-carried by two people or wheeled into position. Larger models may be mounted on rubber tires or may be transported on a track-mounted mine car.

Inert Gas Generators

Coal fires can be extinguished by depriving them of oxygen. Flooding the mine with inert gases such as nitrogen (in sufficient quantities) can suffocate and extinguish the fire.

Section 8

Coordinating Mine Rescue Personnel

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of coordinating mine rescue personnel in the event of a mine emergency at the mine.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP)
- Contact list for mine rescue teams and mine emergency personnel
- Any other applicable mine-specific plans and/or policies

Introduction

Responsible persons may be required to direct many persons who will be performing various tasks during rescue/recovery operations during a mine emergency.

It is important to establish a clear chain-of-command so that all emergency operations can be well coordinated and handled efficiently. Under the direction of a responsible person, employees assigned specific duties in the event of an emergency must know in advance what their duties and responsibilities are, to whom they report, and who reports to them.

> **NOTE:** Refer to **Appendix A** for details on the “Mine Emergency Command System” and its associated functions (make copies for handouts, if needed).

Responsible persons need to ensure the following:

- ☐ Evaluate mine conditions and determine how many teams are necessary to complete the operation.
- ☐ Continue to check return air for mine gases and smoke.
- ☐ Make preparations for communicating with multiple teams or fresh air base (FAB).
- ☐ Designate the primary underground communications system to be used by mine rescue teams and the FAB.
- ☐ Identify backup communications available during the emergency.
- ☐ Designate an individual who will communicate with mine rescue teams and the Command Center.
- ☐ Consider team safety at all times.
- ☐ Teams need enough rest to resume activities during their next scheduled shift.

Section 9

Deploying Mine Rescue Teams

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge deploying mine rescue teams in the event of an emergency at the mine.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Emergency Response Plan (ERP)
- Mine Maps
- Ventilation Plan
- Inventory list of supplies and equipment for mine rescue teams at the mine
- Any other applicable mine-specific plans and/or policies

Introduction

Responsible persons need to be knowledgeable in the proper procedures of mine rescue team deployment. The primary purposes of a mine rescue team are to rescue survivors or recover a mine in the event of a mine emergency. However, the first priority is the **safety** of the mine rescue team members.

Mine rescue teams are called upon to provide a variety of functions that may include:

- ☐ Firefighting
- ☐ Exploration
- ☐ Removing or isolating ignition sources
- ☐ Building ventilation structures
- ☐ Setting roof support
- ☐ Implementing ventilation plans
- ☐ Providing air quality and quantity readings to the Command Center

In addition, teams often have skilled first-aid providers (often certified Emergency Medical Technicians) and firefighters, who may also perform their associated functions.

Mine Rescue Exploration

Before any team begins exploration in a mine where an explosion has occurred, or is suspected of having occurred, make sure that the mine is relatively safe to enter and that as many hazards as possible have been eliminated.

NOTE: When a team goes into a mine to explore or fight a fire, it must be concerned with two main things—spreading of the fire and the possibility of an explosion. Before going underground, the team should make sure that the **main fan is running and is being monitored for gases**.

- ☐ Designate the primary underground communications system to be used by mine rescue teams, the fresh air base (FAB), and the Command Center.
- ☐ Ensure mine rescue teams have certifications.
- ☐ Teams should have a thorough briefing from the Command Center.
- ☐ Provide the team with a current copy of the mine map of areas to be explored.
- ☐ Provide any special supplies for the mine rescue team.
- ☐ Provide the teams a copy of the approved plan of their phase of operation.
- ☐ Make sure a backup team is at the FAB.
- ☐ Make sure a backup team is standing by on the surface.
- ☐ Ensure adequate communications before teams travel inby the FAB.
- ☐ Follow established procedures.
- ☐ Compare map with the FAB coordinator.
- ☐ Share information with the backup team

NOTE: This list is not intended to be exhaustive and should be expanded upon, if necessary.

Ensure that the mine rescue teams have facilities and adequate accommodations for preparing and benching their apparatus.

Section 10

Establishing a Fresh Air Base (FAB)

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of establishing a fresh air base should it become necessary during an emergency at the mine.

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Mine Map (with ventilation system and escapeway systems)
- Ventilation Plan
- Inventory list of materials at the mine required to establish a fresh air base
- Any other applicable mine-specific plans and/or policies

Introduction

Responsible persons will have to be knowledgeable in the procedures of establishing a fresh air base (FAB). Usually, the FAB is established somewhere underground, and then advanced as the exploration proceeds. But if underground damage is extensive, it may be necessary to establish the initial fresh air base on the surface.

The fresh air base also functions as a base of communications for the operation linking the team, the Command Center, and all support personnel.

Whether the FAB is underground or on the surface, the fresh air base should be located as close as possible to the affected area of the mine, but situated where it's assured a supply of fresh air.

Fresh Air Base Operations

The fresh air base is the base of operations from which rescue and recovery work advances into irrespirable atmospheres. This is where rescue/recovery crews begin their exploration of the affected area.

When the FAB is set up underground, near a contaminated environment, an air lock must be built to isolate it from the unexplored area beyond it. The air lock allows the team to enter and exit the unexplored area without contaminating the air at the fresh air base.

Supplies

Ensure that secure and reliable communications are established between the FAB and the Command Center.

Ensure that mine rescue teams have up-to-date mine maps of the areas to be explored. The fresh air base is normally outfitted with supplies and other equipment to be used during the operation. For example, a typical fresh air base is equipped with gas testing devices, equipment for detecting oxygen deficiency, and firefighting equipment.

There should also be first aid supplies such as oxygen therapy equipment and a stretcher at the fresh air base, as well as tools and replacement parts for self-contained breathing apparatus.

If possible, the fresh air base should be supplied with benches, canvas, or brattice cloth on which the backup team can set their apparatus.

Key Points to Remember:

- ☐ Designate the primary underground communications system to be used by mine rescue teams and fresh air base (FAB).
- ☐ The exploration teams must be able to communicate with the FAB at all times.
- ☐ Efficient operation of the FAB is essential to the operation. Teams will be entering into and exiting from irrespirable atmospheres at the FAB. Teams will be arriving from and exiting to the surface from the FAB.
- ☐ The backup team(s) must be stationed at the FAB, and it is recommended that the backup team(s) remain prepared to enter an irrespirable atmosphere at all times when a team or teams are inby the FAB.
- ☐ When a backup team prepares to enter an irrespirable atmosphere each member should have apparatus on their back, (oxygen and facepiece off) communications ready, and gas detecting instruments ready for use.
- ☐ The backup team must remain at the FAB and not venture away while they are in the backup position. With so much activity in and around the FAB, congestion and confusion can easily interrupt the operation.

Location of the Fresh Air Base

If the fresh air base is located underground, ensure that it has positive ventilation and a fresh air travelway to the surface. This travelway will be used to safely move people and supplies to and from the fresh air base. If possible, there should also be transportation available.

The location should be:

- ☐ Situated where it can be linked to the command center by means of a communication system.
- ☐ Large enough to accommodate all the people who will be using it and allow enough space for them to work efficiently.

Recordkeeping and Tracking

The importance of accurate recordkeeping at the fresh air base cannot be overstated. A person should be assigned at the fresh air base to record and track the activities of the teams as they explore the mine. An example would be the “briefing officer” of the team that may be exploring inby the FAB.

 **Log all activities and information related to the emergency.**

Maintain a log to track all times, conditions, activities, locations of personnel, and any other information which is crucial during mine emergency operations.

Section 11

Providing for Mine Gas Sampling and Analysis

Training Objective

Using the information in this section as a guide, responsible persons will demonstrate knowledge of mine gas sampling and analysis.

> **NOTE:** Refer to the **Appendix** for mine gas charts (make copies as handouts, if needed).

Mine-Specific Training Materials

In addition to this instructional guide, an instructor will need the following mine-specific materials to conduct this training:

- Gas detectors used at the mine
- Gas sampling bottles, bags, and syringes
- Any other mine-specific materials relating to gas sampling and analysis
- Any other applicable mine-specific plans and/or policies

Gas Sampling and Analyzing Equipment

Responsible persons should be knowledgeable of mine gas properties and how mine gases will react under certain conditions.

Gas testing and sampling provide critical information to mine rescue teams and the Command Center during rescue and recovery operations.

Accurate information is extremely important in the decision making process of all parties involved. Inaccurate information can have adverse effects on the teams and the entire operation.

Hand-Held Detectors

NOTE: Persons expected to use hand-held detectors should be trained in the proper use of the detector.

- Proper calibration and charging of the instruments before using them cannot be overemphasized. An improperly calibrated instrument can result in incorrect information being communicated to the command center.
- A faulty gas detector, when used in a potentially explosive atmosphere, **can serve as an ignition source**.

Procedures for Gas Testing

Make sure that safety procedures are followed to ensure the safety of the person taking the readings.

- ☐ Ensure that the instruments used are properly charged and calibrated.
- ☐ Ensure that the correct locations are being tested; this includes the correct physical location *of the detector* when testing for a particular gas, as well as the correct location(s) as requested by the Command Center.
- ☐ Ensure that the correct instruments are tested and used correctly.
- ☐ It is recommended that more than one hand-held detector be used to take the readings. This method will allow comparison of gas readings among detectors and will lessen the chances of inaccurate gas readings being reported to the FAB or Command Center.

Gas Analysis

Throughout the operation, mine rescue personnel must deploy gas analysis equipment. The responsible person may need to direct personnel to install gas sample tubing underground, at mine fans, and bore holes. These personnel should be trained in the proper procedures for such installations.

Responsible persons will be expected to have a general knowledge in gas sampling and analysis and should ensure that competent persons collect and deliver samples to the appropriate locations. Associated duties may include:

- ☐ Installing sample lines and associated equipment in support of the gas analysis team
- ☐ Setting up Gas Chronograph and associated components
- ☐ Setting up Infrared Analysis and associated components

- ☐ Establishing procedures for collecting valid gas samples using equipment such as bags, bottles, and syringes
- ☐ Ensuring that competent persons are collecting the samples and delivering the samples to the correct location(s)

NOTE: Refer to **Appendix E** “Mine Gas Detection Chart” (make copies for handouts, if needed).

Appendix

Appendix A

The Mine Emergency Command System

A comprehensive, mine-specific emergency preparedness and response system is critical to effective rescue/recovery operations.

The Mine Emergency Command System establishes a common framework and practical procedures for controlling all aspects of a mine emergency.

Based on the standard Incident Command System (ICS), which has been adopted by fire departments, search and rescue organizations, and other government agencies,

A Mine Emergency Command System:

- Is an organizational structure designed to respond to any mine emergency.
- Establishes a common framework based on the ICS.
- Creates controls in dealing with:
  - Personnel
  - Facilities
  - Equipment
  - Communications
- Can be established and expanded depending upon the changing conditions of the emergency.
- Is staffed and operated by qualified personnel from a variety of agencies.

NOTE: Refer to **Figure 1** on the next page which illustrates the structure of the Mine Emergency Command System.

Mine Emergency Command System

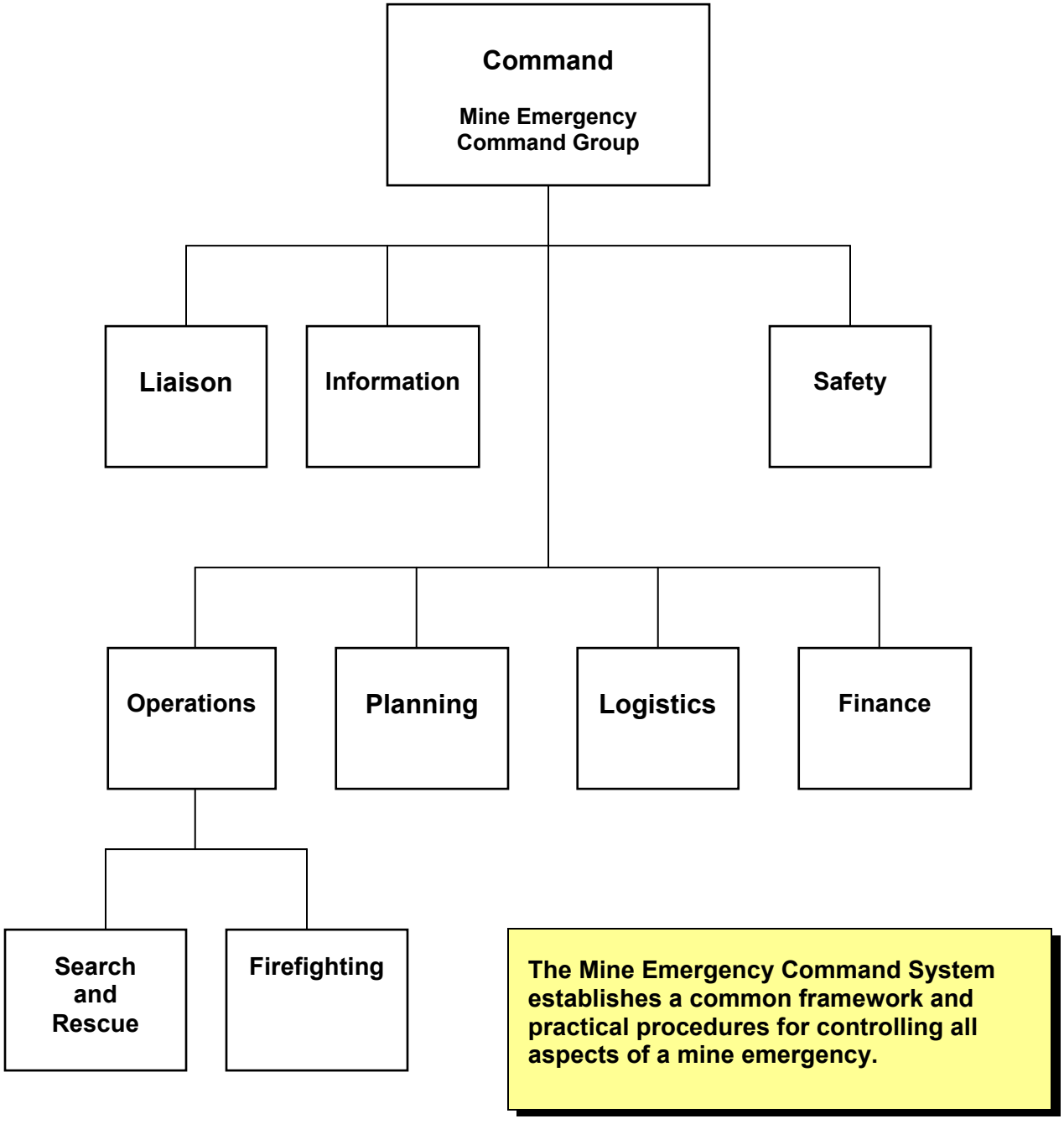


Figure 1

Command Function

The command function is performed and staffed by the Mine Emergency Command Group which usually includes:

- Designated Mine Company Personnel
- MSHA Representatives
- State Representatives
- Miners' Representatives

Some of the primary responsibilities of the Mine Emergency Command Group are to:

- Identify the scope of the emergency and the problems associated with it.
- Determine an overall strategy.
- Order and deploy necessary resources.
- Develop an organizational structure that meets the needs of the emergency.
- Ensure the safety of all emergency response personnel.
- Effectively utilize available "outside" resources.
- Provide appropriate information to the news media and other concerned parties.

Safety Function

The safety function includes identifying, monitoring, and assessing hazardous and potentially unsafe situations and developing practical solutions for ensuring the safety of all emergency response personnel both on the surface and underground.

Operations Function

The operations function encompasses deployment, direction, and coordination of all resources engaged in the emergency operations which may include:

- Search and Rescue
- Firefighting
- Medical Treatment

- Control of Hazardous Materials
- Gas Sampling
- Building In-Mine Structures (Seals and Barricades)
- Surface Operations

The operations function also serves to establish and supervise staging areas used for controlling resource deployment (both personnel and equipment).

Information Function

The information function serves to:

- Collect vital information required by the Mine Emergency Command Group.
- Distribute the information throughout the organization.
- Establish a single point-of-contact for releasing information to the media.
- Maintain an accurate log of all activities during the mine emergency operations.

Liaison Function

The liaison function is related to the information function in that it serves to maintain a point-of-contact between the Command Group and other concerned parties such as:

- Family Members
- Mining Company Representatives
- Legal Representatives
- Local Officials
- Property Owners
- News Media

The information and liaison functions are interrelated and should be carried out according to the organizational structure established by the company and the Command Group**. It is crucial that information related to the emergency be controlled, communicated, and disseminated appropriately.**

Logistics Function

The logistics function serves to provide facilities, services, and materials in support of the mine emergency operations which may include:

- Food and lodging for mine rescue teams and firefighters
- Special rescue equipment and supplies
- Drill rigs and other heavy equipment
- Gas analysis
- Seismic detection/locations systems

Planning Function

Planning is crucial to mine emergency preparedness and readiness. The planning function is also a key factor in the Mine Emergency Command System because of the uncertainty and potential complexities of any mine emergency operations and the possibility of a sustained operation for a prolonged period.

During emergency operations, the planning function serves mine rescue personnel in gathering and analyzing information for making informed and safe decisions, determining the effectiveness of strategy, and developing alternate strategies in managing the emergency operations.

Finance Function

Depending on its severity, a mine emergency can have a great financial impact on the mining company, the labor force, and other entities. The finance function serves to handle all financial aspects of a mine emergency operation including:

- Allocating monies as needed for resources required for the operation
- Tracking expenses
- Financial recordkeeping
- Post-operation audits

Activating the Mine Emergency Command System

The Mine Emergency Command System is activated for any type of emergency like a fire, explosion, gas or water inundations. Ideally, the system should be activated in three logical stages:

Stage 1

First responders (trained, on-the-job miners) report the incident to supervisory personnel; first responders may be directed to attempt to control the situation (depending on severity); evacuation of unaffected areas may be initiated; responsible persons initiate mine's emergency response and notification plans.

Stage 2

Second responders (fire brigade and/or mine rescue teams) are summoned; mine-wide evacuation likely ordered; the Mine Emergency Command Group is fully staffed (Stage 2 expands to Stage 3).

Stage 3

Full-scale mine emergency operations; all functions of the Mine Emergency Command System are activated.

Appendix B

Critical Item Checklist for Mine Emergencies

NOTIFICATION

- ☐ Activate Notification Procedures for Emergency Contacts.
- ☐ Notify MSHA Officials.
- ☐ Notify State Officials.
- ☐ Notify Key Mine Officials.
- ☐ Notify Miners' Representatives.
- ☐ Notify Police.
- ☐ Notify Fire/Rescue Organizations.
- ☐ Notify Neighboring Mines.
- ☐ Notify Family Members.
- ☐ Notify Medical Support Personnel.

SHUTDOWN OPERATION

- ☐ Assemble Employees.
- ☐ Debrief Witnesses.
- ☐ Account for All Persons Known to Be at the Mine.
- ☐ Assign Employees to Tasks.

SECURITY AND SITE MONITORING

- ☐ Establish Security - All Access Roads.
- ☐ Establish Check-in/Check-out System for All Authorized Persons.
- ☐ Assign Site Monitors and Shift Rotation Schedule.
- ☐ Establish Parking Area and Staging Area.

COMMAND CENTER

- ☐ Follow Mine Emergency Response Plan.
- ☐ Set up a Mine Emergency Command System.
- ☐ Staff Emergency Organization.
- ☐ Delegate Authority and Assign Duties.
- ☐ Give Appropriate Orders.
- ☐ Brief Arriving Personnel.
- ☐ Review ALL Mine Maps and Coordinate Reference Points on ALL Maps.
- ☐ Make Extra Copies of Maps
- ☐ Establish Gas Monitoring, Data Analysis, and Trend Analysis.
- ☐ Follow Appropriate Safety Precautions.
- ☐ Request/Dispatch Additional Persons to Mine as Required.
- ☐ Take Appropriate Actions Relative to Site Recovery.
- ☐ Establish a Shift Rotation Schedule for Command Personnel.

COMMUNICATIONS

- ☐ Relay Information to the Command Center.
- ☐ Establish External Communications (Corporate, MSHA, State, Miner's Representatives, Medical, Legal, Etc.).
- ☐ Monitor and Log All Communications.

MEDICAL ARRANGEMENTS

- ☐ Arrange for Ambulance and Medical Services.
- ☐ Set up Temporary Morgue (if required).

ACQUISITION OF EQUIPMENT, MATERIALS, AND SERVICES

- ☐ List All Equipment in the Mine and on the Surface.
- ☐ Locate and Check On-site Equipment for Possible Use.
- ☐ Arrange for Heavy Equipment if Required.
- ☐ Arrange for Portable Radios.
- ☐ Provide Transportation for Equipment.
- ☐ Obtain Personal Protective Equipment.
- ☐ Establish Waiting and Briefing Area for Family/Relatives (Provide Food and Sitting/Sleeping Area).
- ☐ Establish Press Briefing Area.

INFORMATION

- ☐ Appoint a Spokesperson for All Entities.
- ☐ Brief Family Members on a Regular Schedule.
- ☐ Brief the Press and Media on a Regular Schedule.

Appendix C

Communicating and Relaying Critical Information

In the event of a mine emergency, responsible persons should be prepared to relay accurate and up-to-date information concerning the nature of the emergency. The checklist below contains some questions that may be asked regarding the emergency.

- ☐ What was the cause and nature of the emergency?
- ☐ Are all miners accounted for?
- ☐ Is the evacuation complete?
- ☐ Are any miners missing? If so, how many and what are their possible locations?
- ☐ Have federal and state officials been notified?
- ☐ Have all representatives of mine management been notified?
- ☐ Is the ventilation system operating?
- ☐ Is it an intake or exhaust system?
- ☐ Are attendants posted at the surface ventilation controls?
- ☐ Have air samples been taken? If so, what are the results?
- ☐ What conditions are known to exist underground (Roof conditions, water, gas, etc.)?
- ☐ Is the mine's communication system operating? Is it being monitored?
- ☐ Is power to the affected area on or off?
- ☐ Is there battery-powered or diesel equipment or a charging station in the affected area?
- ☐ Have mine rescue teams or fire brigades been dispatched?
- ☐ Are guards stationed at all mine entrances?
- ☐ What type of equipment is in the area? Where is it located?
- ☐ Where are compressed air and/or water lines located? Are they in operation?
- ☐ Are valves known to be open or closed?
- ☐ What type of firefighting equipment is located underground? Where is it accurately located on the mine map?
- ☐ What tools and supplies are available underground? Where are they?
- ☐ Are there storage areas for oil or oxygen, acetylene tanks, or explosives in the area to be explored? What are the locations?
- ☐ Are there any gas wells, adjacent mine workings above, below or parallel to the seam being mined?
- ☐ Where are any pumps and compressors located?

NOTE: It may be necessary to add other mine-specific items to the list.

Appendix D

Mine Gas Chart

Gas	Chemical Symbol	Specific Gravity	Explosive Range	Health Hazards	Solubility	Color	Odor	Taste
Air	---	1.0000	---	---	---	---	---	---
Oxygen	O_2	1.1054	Supports combustion	Oxygen deficiency: 17% panting; 15% dizziness and headache; 9% unconsciousness; 6% death.	Moderate	---	---	---
Nitrogen	N	0.9674	---	Asphyxiant (oxygen depletion).	Slight	---	---	---
Carbon Dioxide	CO_2	1.5291	---	Increases breathing rate. May cause death in high concentrations.	Soluble	---	---	Acid in high concentrations
Carbon Monoxide	CO	0.9672	12.5 to74.2%	Highly toxic. Can be an asphyxiant.	Slight	---	---	---
Nitrogen Dioxide	NO_2 N_2O_4	1.5894	---	Highly toxic. Corrosive effect on lungs. May be asphyxiant.	Only slight	Reddish brown	Blasting powder fumes	Blasting powder fumes
Hydrogen	H_2	0.0695	4.0 to 74.2% Highly explosive	Asphyxiant (oxygen depletion).	---	---	---	---
Hydrogen Sulfide	H_2S	1.1906	4.3 to 45.5%	Highly toxic. Can be an asphyxiant.	Soluble	---	Rotten eggs	Sweetish
Sulfur Dioxide	SO_2	2.2638	---	Highly toxic. Can be an asphyxiant.	Highly	---	Sulfurous	Acid (bitter)
Methane	CH_4	0.5545	5 to 15%	Asphyxiant (rare).	Slight	---	---	---
Ethane	C_2H_6	1.0493	3.0 to 12.5%	Asphyxiant (rare).	Slight	---	---	---
Propane	C_3H_8	1.5625	2.12 to 9.35%	Asphyxiant (rare).	Slight	---	“Gassy” in high concentrations	---
Butane	C_4H_{10}	2.0100	1.86 to 8.41%	Asphyxiant (rare).	Slight	---	“Gassy” in high concentrations	---
Acetylene	C_2H_2	0.9107	2.5 to 80%	Only slightly toxic. Asphyxiant (rare).	Only slight	---	---	Garlic
Radon	Rn	7.5260	---	Exposure to radiation	Highly	---	---	---

Appendix E

Gas Detection Chart

Gas	Detection Method	When to Test
Oxygen (O_2)	Oxygen indicator. Chemical analysis.	During any team exploration.
Nitrogen (N)	Chemical analysis.	When an oxygen deficient atmosphere is suspected. In mines where nitrogen issues from rock strata. In inactive areas where ventilation has been inadequate.
Carbon Dioxide (CO_2)	Carbon dioxide detector. Multi-gas detector. Chemical analysis.	After a fire or explosion. When entering abandoned areas. When reopening sealed areas.
Carbon Monoxide (CO)	Carbon monoxide detector. Multi-gas detector. Chemical analysis.	During any team exploration, especially when a fire is suspected.
Nitrogen Dioxide (NO_2)	Nitrogen dioxide detector. Multi-gas detector. Chemical analysis.	After mine fire or explosion. When diesel equipment is used. After detonation of explosives.
Hydrogen (H_2)	Multi-gas detector. Chemical analysis.	After mine fire or explosion. Near battery charging stations. When steam is produced by water, mist, or foam in fire-fighting.
Hydrogen Sulfide (H_2S)	Hydrogen sulfide detector. Multi-gas detector. Chemical analysis. Eye irritation.	In poorly ventilated areas. During unsealing operations. Following mine fires.
Sulfur Dioxide (SO_2)	Multi-gas detector. Chemical analysis. Odor, taste, and respiratory tract irritation.	When standing water is disturbed. After mine fire or explosion. When opening sealed areas after mine fire.
Methane (CH_4)	Methane detector. Chemical analysis.	During any team exploration. When normal ventilation is disrupted. When entering abandoned workings.
Heavy Hydrocarbons Propane (C_2H_6) Butane (C_3H_8) Acetylene (C_4H_{10})	Multi-gas detector. Chemical analysis.	Following fires or explosions when methane is present. Following accidental entry into adjacent oil or gas well casings.
Acetylene (C_2H_2)	Multi-gas detector. Chemical analysis. Odor	Following a methane explosion in air which is low in oxygen.
Radon (Rn)	Survey meter.	When normal ventilation is disrupted. During unsealing operations.

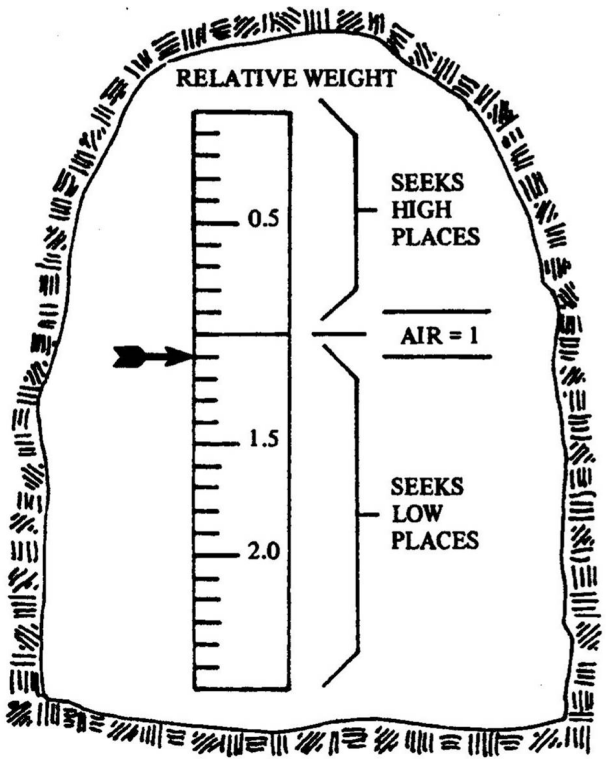
Appendix F

Oxygen Chart

Oxygen (O_2)

SPECIFIC GRAVITY: 0.1054

EXPLOSIVE RANGE: Supports combustion



OTHER PROPERTIES

Color: None

Odor: None

Taste: None

CAUSE

Air contains 21% oxygen. Oxygen is necessary for life. Oxygen deficiency is caused by humans breathing in confined spaces, insufficient ventilation, displacement by other gases, or consumption by fire or explosion.

HEALTH HAZARDS

Oxygen Deficiency: 17% – panting

15% – tightness in forehead, headaches, dizziness

9% – unconsciousness

6% – death

DETECTION

Use either oxygen indicator or chemical analysis. Hold portable detectors at waist height. Test for oxygen deficiency as often as necessary during team exploration.

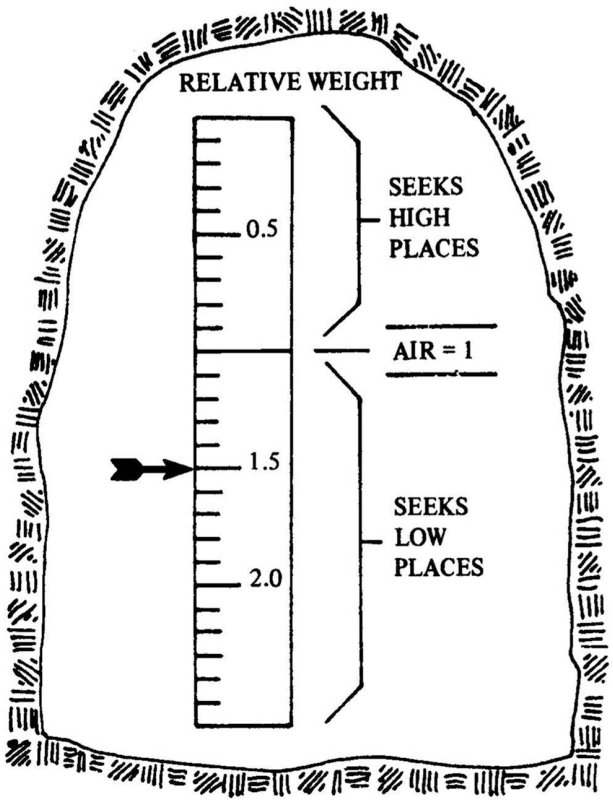
Appendix G

Carbon Dioxide Chart

Carbon Dioxide (CO_2)

SPECIFIC GRAVITY: 1.5291

EXPLOSIVE RANGE: Not explosive



OTHER PROPERTIES

Color: None

Odor: None

Taste: High concentrations can produce an acid taste

CAUSE

CO_2 is normal component of air. Product of complete combustion. Is also produced:

1. By oxidation.
2. By decaying timbers.
3. As a by-product of breathing.
4. During fires, explosions, and blasting.

HEALTH HAZARDS

In high concentrations, CO_2 increases breathing rate. Can cause death.

DETECTION

Use carbon dioxide detector, multi-gas detector, or chemical analysis. Hold detector low. Test after a fire or explosion and when entering an inactive area of the mine or reopening a sealed area.

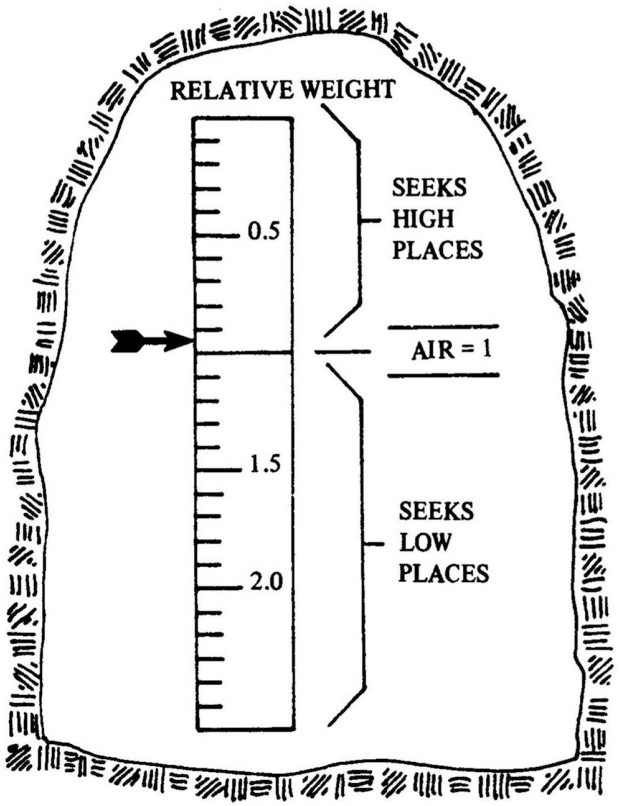
Appendix H

Carbon Monoxide Chart

Carbon Monoxide (CO)

SPECIFIC GRAVITY: 0.9672

EXPLOSIVE RANGE: 12.5 to 74.2 percent in normal air



OTHER PROPERTIES

Color: None

Odor: None

Taste: None

CAUSE

Produced by incomplete combustion of carbon materials. Produced by mine fires and explosions, burning or detonation of explosives, and internal combustion engines.

HEALTH HAZARDS

Extremely toxic even in low concentrations. Interferes with oxygen-carrying capacity of blood. First symptom: tightening across forehead. Effects cumulative over time. If exposed to high concentration, you experience few symptoms before losing consciousness.

DETECTION

Can be detected by means of CO detector, multi-gas detector, chemical analysis. Hold detector at chest level. Test as often as necessary during team exploration, especially if fire is suspected.

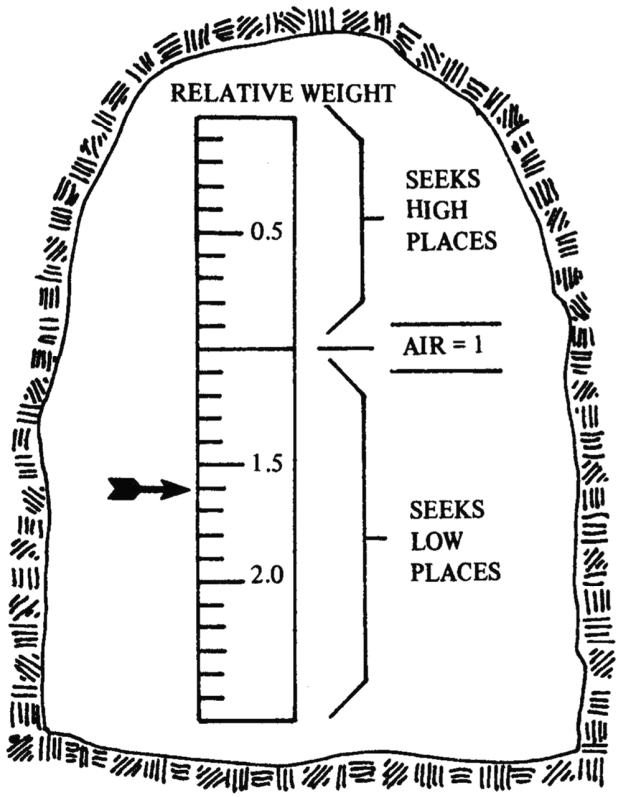
Appendix I

Nitrogen Dioxide Chart

Nitrogen Dioxide (NO_2)

SPECIFIC GRAVITY: 1.5894

EXPLOSIVE RANGE: Not explosive



OTHER PROPERTIES

Color: Reddish brown

Odor: Blasting powder fumes

Taste: Blasting powder fumes

CAUSE

Can be produced:

1. By burning.
2. By detonation and burning of explosives.
3. By diesel engines.
4. In the presence of electrical arcs or sparks, nitrogen in the air combines with oxygen (oxidizes) to form oxides of nitrogen.

HEALTH HAZARDS

Very toxic, even small amounts will irritate throat. Mixes with moisture in lungs to form acids that corrode respiratory passages and cause them to swell. Exposure to .01 to .015% is dangerous. Exposure to .02 to .07% can be fatal.

DETECTION

Nitrogen dioxide detector, multi-gas detector, chemical analysis, color. Hold detectors low. Test following a fire or explosion and after the detonation of explosives. Test in areas where diesel equipment is found.

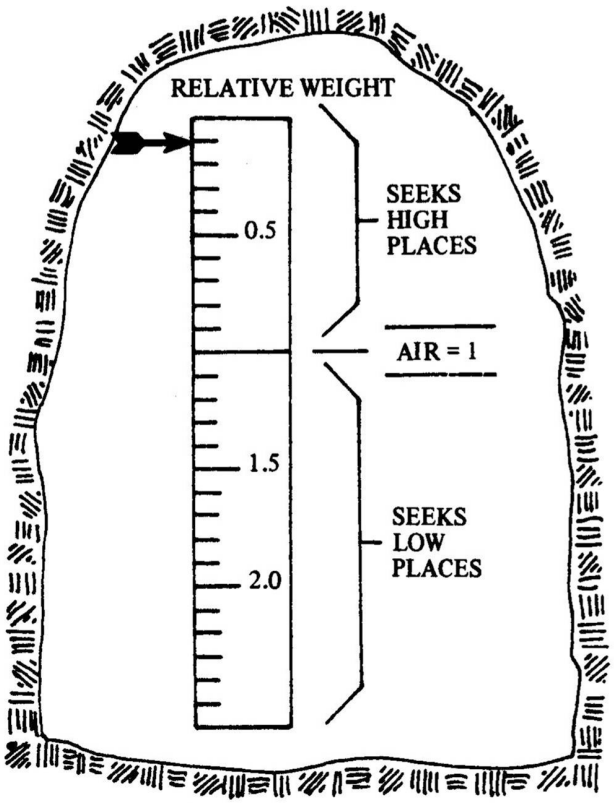
Appendix J

Hydrogen Chart

Hydrogen (H_2)

SPECIFIC GRAVITY: 0.0695

EXPLOSIVE RANGE: 4.0 to 74.2% in air with as little as 5% oxygen



OTHER PROPERTIES

Color: None

Odor: None

Taste: None

CAUSE

Can be produced:

1. By incomplete combustion of carbon materials during fires and explosions.
2. When water or steam comes in contact with hot carbon materials during firefighting.
3. During battery charging.

HEALTH HAZARDS

At high concentrations, hydrogen can replace oxygen in the air and act as an asphyxiant. Also, hydrogen is highly explosive.

DETECTION

Use multi-gas detector or chemical analysis. Hold detector high. Test after any fire or explosion and near battery-charging stations. Also test when water, water mists, or foam are used to fight fires.

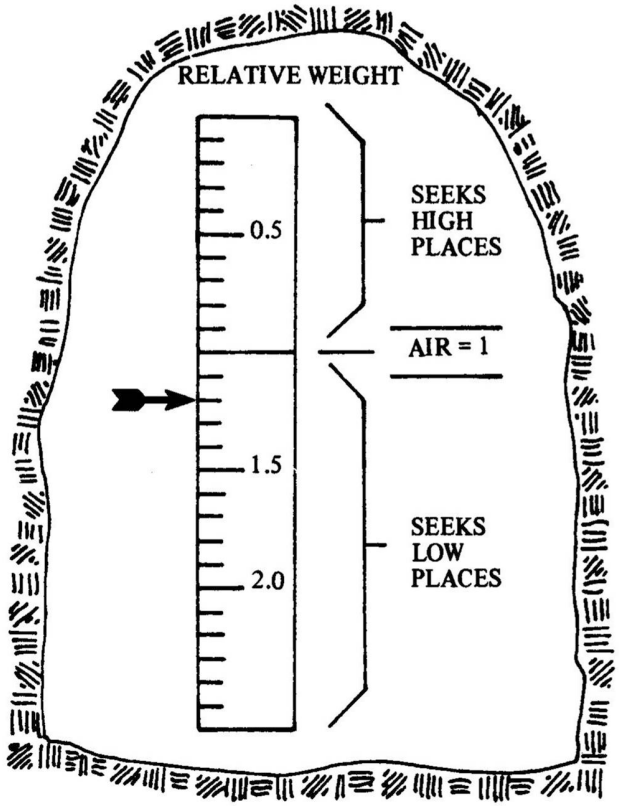
Appendix K

Hydrogen Sulfide Chart

Hydrogen Sulfide (H_2S)

SPECIFIC GRAVITY: 1.1906

EXPLOSIVE RANGE: 4.3 to 45.5% in normal air



OTHER PROPERTIES

Color: None

Odor: Rotten eggs

Taste: Slight sweetish taste

CAUSE

Produced when sulfur compounds decompose. Found in certain oil and gas fields and in some gypsum mines. Can be liberated:

1. From methane feeders.
2. When acid mine water corrodes metallic sulfides.
3. From mine water that contains the gas in solution.
4. When sulfides are heated in the presence of moisture.
5. When sulfide ores are blasted.

HEALTH HAZARDS

Extremely poisonous. .005 to .010% causes inflammation of eyes and respiratory tract. .02 to .07% can lead to bronchitis or pneumonia. .07 to .10% can cause rapid unconsciousness, cessation of respiration, and death. .10 to .20% or more can cause rapid death.

DETECTION

Use hydrogen sulfide detector, multi-gas detector, or chemical analysis. Hold detector low. Test in poorly ventilated areas of mine during unsealing operations, and following mine fires.

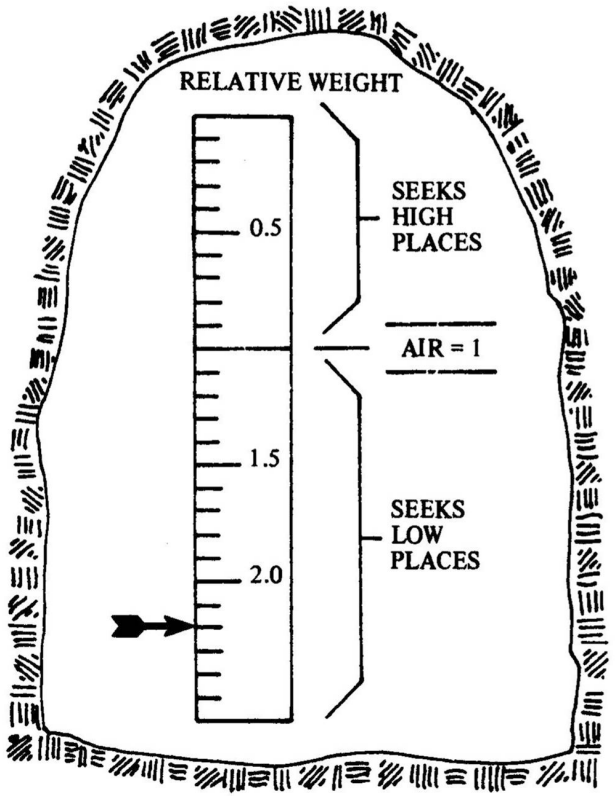
Appendix L

Sulfur Dioxide Chart

Sulfur Dioxide (SO_2)

SPECIFIC GRAVITY: 2.2638

EXPLOSIVE RANGE: Will not burn or explode



OTHER PROPERTIES

Color: None

Odor: Sulfurous

Taste: Bitter, acid

CAUSE

Can be produced:

1. By blasting in sulfide ores and by fires containing iron pyrite.
2. During the burning of some diesel fuels.
3. By sulfide ore dust explosions.

HEALTH HAZARDS

Very toxic, dangerous in even small concentrations.

DETECTION

Use multi-gas detector or chemical analysis. Test in low places and near sumps, following fires or explosions and during unsealing operations. Also, because it's highly soluble in water, test when stagnant water is disturbed.

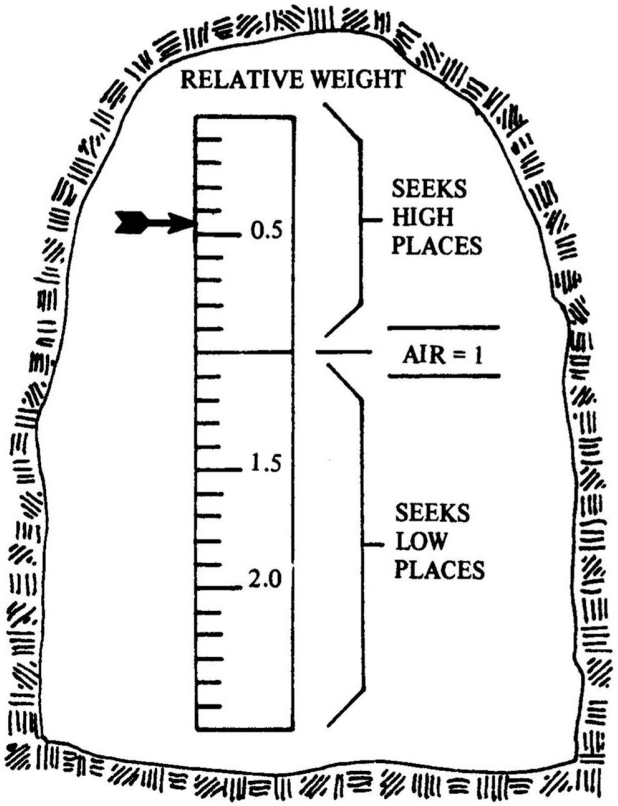
Appendix M

Methane Chart

Methane (CH_4)

SPECIFIC GRAVITY: 0.5545

EXPLOSIVE RANGE: 5 to 15% in air containing at least 12.1% oxygen



OTHER PROPERTIES

Color: None

Odor: None

Taste: None

CAUSE

Can be liberated:

1. From the strata when carbonaceous shale is penetrated.
2. Occasionally when carbonaceous rock is contacted or in vicinity.
3. From feeders or some clay veins.
4. By the decomposition of timbers.
5. When water is removed from mine.

HEALTH HAZARDS

Nontoxic. May cause asphyxiation at high concentrations.

Most dangerous aspect is the fact that it's explosive.

DETECTION

Use methane detector or chemical analysis. Hold portable detectors high. Test as often as necessary during team exploration. Test when normal ventilation is disrupted and when entering abandoned workings.