

Indiana Bureau of Mines

# Considerations for Emergency Response Plans for Underground Coal Mines



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## ***PREAMBLE***

This document entitled Considerations for Emergency Response Plans for Underground Coal Mines is a guide for use by mine management and mine rescue teams in forming an Emergency Response Plan. It can also be used by the media to help understand the roles of MSHA, the Bureau of Mines, mine rescue teams and the mine involved in a mine emergency. Mine emergencies range from explosions, fires, inundations, roof falls, or other hazards that may arise that pose a danger to human life. This guide is not a template for a complete Emergency Response Plan required by MSHA, but can be used as a resource and a firm foundation for drafting a plan. Mines are further encouraged to review the requirements the Mine Improvement and New Emergency Response Act of 2006 (<http://ftp.resource.org/gpo.gov/laws/109/publ236.109.pdf>), as well as the Program Policy Letter No. P10-V-01 (<http://www.msha.gov/regs/complian/ppls/2010/PPL10-V-01.asp>), and any amendments thereto. Success in any mine emergency endeavor is accomplished by the discipline to prepare and the continual review of existing plans. This plan is one step in the preparation for all those who may be involved should a mine emergency occur.

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# **Part I: Mine Emergency Management**

## **I. Introduction**

When an emergency occurs at a mine, the first few hours after the emergency are the most critical and will determine the success of the mine rescue and recovery operations in saving miners and mine property. The level of organization and preparation of mine management and mine rescue teams determines the success of any mine rescue and recovery operation.

Because time is critical, decisions need to be based upon as many facts as possible. Nevertheless, often assumptions must also be made. Having clear directions and knowing what other personnel in a rescue operation are doing according to a written plan, will be an advantage to the entire operation.

Teamwork is essential not only between the mine rescue teams themselves, but also among those on the surface including the company administrators, mine personnel, and federal and state officials. They all represent an entire rescue network designed to direct and support the entire operation, particularly the rescue teams, during a mine emergency.

A chain-of-command must be in place and an emergency notification plan established to designate which personnel must be contacted during a mine emergency. MSHA now requires an approved Emergency Response Plan by each mine.

By the time the mine rescue teams arrive on-site, rescue and recovery operations may already be underway on the surface. Several officials and mine personnel will have been called to the mine to assume their duties as part of the chain-of-command. There must be a Responsible Person on site at all times to get this system of notification underway pursuant to federal regulations. The Responsible Person is that person designated by the mine under federal law.

## **II. Notification of a Mine Emergency**

### **Callout Procedure**

When an operator first becomes aware of a mine emergency requiring mine rescue team deployment, the operator will immediately notify the Indiana Bureau of Mines director and MSHA, and its own necessary mine personnel needed on site.

The Bureau of Mines will notify all other mines which will then call the mine rescue team members from that mine and give them the location of the mine emergency. The mine rescue team members should have their emergency travel pack in readiness to respond immediately. The Bureau of Mines will immediately have the mine rescue vehicle dispatched to the emergency area. The mine rescue vehicle is required to be

within an hour's distance of the mine. Mine rescue personnel should strive to arrive just as soon as possible after notification. Mine rescue team members should have identifying credentials so that they will be permitted to enter secured and guarded mine entrances.

### **III. Notification Plan**

Each mine should have an Emergency Notification Plan for notifying necessary personnel when there is an emergency at the mine. This plan lists the various supervisors, administrators, and government officials who must be notified of the mine emergency. A copy of this plan should be filed with the Indiana Bureau of Mines and updated as necessary. Following is a list of persons who should be notified:

- Company Management
- General Mine Manager/Superintendent
- Director/Indiana Bureau of Mines
- Mine Foreman
- Safety Director
- District Inspector (State and Federal)
- Law Enforcement
- Medical personnel, ambulances, and other emergency responders
- Hospitals should be alerted as necessary

This list should be tailored to meet individual mine job titles. The mine's emergency organization is a plan of action, designed to restore order at the mine site and supervise emergency efforts. The mine's notification plan should also include other support personnel who would provide services at the mine site. Such persons who may be needed could include security personnel, supply clerks, clergy, telephone operators, and the coroner.

### **IV. Establishing a Chain-of-Command**

Because many persons will be doing many different jobs during rescue and recovery operations, it is important to establish a clear chain-of-command in order that surface arrangements can be handled smoothly and rescue and recovery work is well coordinated.

Located at the top of the list of the chain-of-command is the Person in Charge (PIC) at each mine (mine superintendent, mine manager, general manager, or other designee) who may delegate the responsibility of other jobs to other company employees. Employees assigned these responsibilities must understand in advance and be trained regarding their specific duties and responsibilities, to whom they are to report, and who is to report to them.

## V. Making Surface Arrangements

Each mine must have a plan in place to locate the necessary facilities and personnel listed herein. Each mine should pre-plan and coordinate such assistance with third party providers as part of their individual mine ERP.

**A. Suggested facilities and arrangements** – Surface arrangements cover a wide range of activities and require the coordinated efforts of many persons. Surface arrangements include such tasks as establishing a Command Center where all of the decisions are made, providing an adequate information center for releasing information to news media, a family waiting area, and a location for obtaining the necessary supplies and equipment.

**1. Command Center** – The Command Center is the most important surface facility and will be the hub of the mine rescue operation and is a top priority. Those in charge will be stationed at the Command Center to plan and direct the rescue and recovery operation. The Command Center will house communications equipment connected to the underground phones and to other surface phone lines and communication equipment. It will maintain mine maps to follow the progress of the teams and to mark findings and plan rescue strategy. Secure communications should be used rather than cell phones.

**2. Staging area for teams** – A waiting area for the incoming rescue teams is required so that the team members have a central location to prepare for rescue operations. As the mine rescue teams arrive at the mine site, they are to check in and be assigned to a team area. If team members carry mine rescue team identification cards, they should present their cards when checking in at the mine site. A rotation schedule for deploying all of the rescue teams who are called to the mine site will be prepared by a mine rescue supervisor or trainer and the schedule will designate which teams are to serve as the exploration team, backup team, and standby team. The rotation schedule is to be posted in the staging area, and list each team's status during the rescue or recovery operation.

**3. Benching area for apparatus** – The bench area, where water and electricity is available, should be set aside as an apparatus room where the mine rescue apparatus can be cleaned, tested, and prepared by the bench person or by the mine rescue team members. If convenient, the mine rescue vehicle can be used as a benching area for the apparatus.

**4. Security** – Establishing good 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 or get injured while on mine property. All roads and paths leading to the mine should be secured and guarded. (Security at the mine site should be established with local or private authorities prior to an actual situation.) Incoming traffic on the roads leading to the mine property should be controlled by

authorized personnel so that essential personnel, needed supplies, and emergency vehicles will have ready access.

5. ***Waiting/Information area for families and friends*** – A family waiting room should be away from any rescue activity and away from the briefing room. Information should be released to the families on a need to know basis. Families should be informed of important information prior to release to the media.

6. ***Briefing area for the media*** – The briefing area is the only area where the news media should be allowed and is where the media will be given information. News reporters should be restricted to this room or area for their safety and the efficient operation of mine rescue efforts. Statements given out should be brief, written out and not subject to speculation. Copies of all news releases should be given to the news media to prevent any confusion or misconstrued information from being released as facts. Additionally, a copy of each news release bearing the date and time of issuance is to be kept on file for future reference and as a record. News releases should be coordinated between mine management, MSHA and the Indiana Bureau of Mines prior to release. If a Joint Information Center (“JIC”) is established, protocols for authorization and release of information should be followed.

7. ***Food and sleeping quarters*** – Often it is necessary to feed and house mine personnel during a mine emergency. Arrangements should be made for a caterer or nearby restaurant to bring in food. Sleeping quarters can be arranged at a nearby motel, or if none are available, sleeping quarters may be set up at the mine.

8. ***Laboratory*** – It will be necessary to test samples of the mine air during the rescue and recovery operation. A laboratory with suitable air analysis equipment should be set up at the mine to quickly obtain the results of the samples taken from the mine atmosphere. If it is not possible to set up a laboratory on-site, mine rescue vans with mobile laboratories can be called in to do quick air analysis. As a last resort, air samples can be sent off-site to a commercial laboratory. MSHA has a Temp Lab that is usually brought to the area and this lab should be called to the site as part of the organizing efforts.

9. ***Medical facilities*** – Medical services and facilities must be available and may be basic to advanced, depending on the nature of the emergency. If no one is trapped underground, a simple first aid station for rescue and recovery personnel who may get injured may be sufficient. However, in an emergency where several miners are trapped underground, or where injuries are substantial after an explosion, roof fall, or fire, it may be necessary to staff a temporary hospital. Stand-by ambulances and emergency medical technicians may also be required.

10. ***Temporary morgue*** – In situations where bodies are being recovered from the mine, a temporary morgue will be necessary. The local coroner’s office should be contacted when necessary.

**11. Cleaning area** - The area must have water available for cleaning of the equipment, and 120 volt electrical outlet for drying of the equipment.

**12. Supply Storage** - An area where supplies are to be stored as they arrive on site will be necessary. Supplies may include timbers, drilling rigs, concrete, rock dust, etc.

## **VI. Other Mine Management Organization**

Many people will be required to perform various rescue tasks, and providing for each one will make the operation proceed smoothly. Assignments will range from ordering necessary supplies and seeing that they are provided where needed, to actual rescue procedures.

We suggest that a set of instructions be kept on laminated cards in a water proof container and stored with the mine emergency items that will be needed in case of a mine emergency. These cards will have written instructions for jobs that must be done routinely in an emergency, such as gas monitoring at the fan, guards at the gates, control of electrical power, etc. The use of these written instructions eliminates the miscommunication errors that may arise in a stress filled situation where verbal instructions can be misunderstood.

Listed below is a suggested plan for delegating emergency tasks and suggested personnel for certain tasks:

**A. Person in Charge** – The Person in Charge (“PIC”) is the ultimate authority in charge of the entire mine emergency operation. The PIC is responsible for establishing the Command Center and overseeing all aspects of the rescue and recovery operation. There should be multiple people trained in this duty because most situations will be on a day to day basis and not hour to hour. The PIC should have mine rescue experience and be knowledgeable in how the team works as a unit. The PIC cannot be expected to work longer than 10 consecutive hours, or the possibility of unclear decision making can result. The PIC also:

1. Delegates responsibility for various aspects of the operation as necessary according to a prearranged plan.
2. Establishes an advisory committee (the “Committee”) comprised of company, federal and state representatives to serve and advise during each shift at the Command Center. This Committee, along with the PIC, could act as a briefing and debriefing committee to inform teams entering the mine and gather information from teams exiting the mine and advise the PIC during each shift at the Command Center.



3. Designates an individual to serve as the Fresh Air Base Coordinator for each shift.
4. Designates an individual to direct the information center and issue news releases for mine management in conjunction with other officials present.
5. Designates a liaison to work with affected family members.
6. Establishes a communications system for all communications coming into and out of the Command Center.
7. Identifies electric switches controlling electricity to the mine that must be locked out.
8. Checks all ventilation systems, including exhaust fans, explosion doors, etc.
9. Implements security at the mine entrance and any entrance to the underground mine.
10. Records each person's name and time they enter the underground mine for rescue operations.
11. Prepares and maintains a rotation schedule for all mine rescue teams. Adequate time for testing, cleaning, and repairs of any apparatus must be provided prior to deployment of any mine rescue teams into the mine.
12. Ensures that the Command Center has available copies of maps identifying air flow and all ventilation controls. The maps should also show personnel doors, pumps, substations, machinery, the electrical system with all control switch locations, firefighting equipment, SCSR caches and emergency chamber locations, and any other pertinent information useful for rescue and recovery operations. The mine engineers, in most cases, should have this responsibility.
13. Notifies any adjoining, or adjacent mines, where necessary.
14. Arranges for drilling rig equipment where necessary.
15. Ensures that any equipment necessary for recovery operations is available. It is suggested that an inventory of dispatched equipment be recorded for control purposes.
16. Provides for a landing area and emergency lighting for a life line helicopter or one that potentially could bring in needed supplies.

## **VII. Requirements of Federal Law**

Mine Operators must confirm and comply with current requirements of federal law, including the Mine Improvement and New Emergency Response Act of 2006, final rules and Program Policy Letter No. P10-V-01, Emergency Evacuation Final Rule, Refuge Alternatives Final Rule, and Post Accident Two-way Communications and Electronic Tracking PPL. Requirements will include wireless two-way communication systems or alternatives, post-accident breathable air (SCSRs and Refuge Chambers), post accident lifelines, training for post-accident evacuations, and protocols for local coordination. See federal MSHA resources for more details on the precise requirements of an ERP, and the protocol for MSHA approval.

## **Part II: Mine Rescue Operations**

### **I. Objective**

The objective of Part II of this document is to clearly list out the principles, requirements, and background for a mine rescue team. It is assumed that this part of the document is not used at the time of the emergency, but rather that these matters have been taken into account in the selection, practices and training of mine rescue teams. The information herein may also be useful for the media or public to understand what a mine rescue team is doing during a rescue operation.

### **II. Mine Rescue Principles**

Most people associate “mine rescue” with “saving lives.” Although saving lives is the most important part of mine rescue work, there is more work involved. A more complete definition of mine rescue is:

*The practiced response to a mine emergency situation that endangers life, property, and the continued operation of the mine.*

Mine rescue and recovery work involve a wide variety of tasks, but there are only three fundamental principles for an effective mine rescue operation:

1. Ensure the safety of the Mine Rescue Team;
2. Make every effort to rescue or secure the safety of involved miners; and
3. Protect mine property from further damage caused by fire, cave in, or other accident.

### **III. Mine Rescue Team Emergency Notification**

- A. Callout Procedure** – When an emergency occurs at a mine site, if the mine has its own mine rescue team(s), it shall notify its team members to report immediately. When an emergency occurs at a mine site using the state team as a composite or contract team, it should immediately notify the director of the Indiana Bureau of Mines. When the Bureau is notified by a mine operator that the mine rescue teams should be called out, the Bureau will notify the mines at which each member works and the mines will notify the mine rescue team member of the location of the emergency with orders to respond immediately. All mines must have emergency call lists updated and posted on site. In either case, both MSHA and the Bureau of Mines must be notified immediately.

- B. Travel to emergency site** – Team members should inform the mine of their status, and when they expect to be en route. Although an emergency may be occurring in a mine, at no time should a team member speed or violate motor vehicle codes while in route to the emergency.
- C. Arrival at emergency site** – Mine Rescue team members should have their individual identification cards to show upon arrival at the mine site. This will save time at the mine entrances and cause less confusion for the security at the entrances. Upon arrival at the scene, team members shall be directed by the mine concerning checking in or reporting to the designated staging area
- D. Staging Area** -- Once a team member has arrived on site, he or she should be directed by mine personnel to the rescue staging area where they are to station themselves and their equipment (the Staging or Benching area). All team members from one team may not arrive at the same time so team members need not wait for all members to arrive but as each arrives individually report to the designated area. As soon as two teams are fully assembled then explorations can be started under the direction of the Command Center. All team members are trained under the same guidelines for mine rescue work and members from different teams can be used to comprise one mine rescue team and function together.

Careful consideration by the Command Center must be given to: the method and extent of work a team is expected to perform; how the team wearing breathing apparatuses can best be utilized; weighing the benefits of the operation against the hazards the team will encounter; the best way to perform the work safely; and what offers the best chance of saving trapped workers.

The Command Center must ensure that the mapping in the Command Center is coordinated with the mapping used by each mine rescue team. The entries and crosscuts must coincide so that there is no miscommunication as to how and where the teams are traveling. It is the obligation of each team's map man as well as the Command Center, to ensure that the maps are all using identical designations.

#### **IV. Mine Rescue Team Members**

Each mine rescue team will have the following trained team members:

- A. One Captain
- B. One Map Person
- C. Two Gas Persons
- D. A Briefing Officer
- E. One Tail Captain

Each team member must be physically fit and trained to handle emergency situations. As a team, the team watches out for each team member to reduce the chances any team member suffering injury or distress. If something is amiss, be it apparatus malfunction or a team member not able to continue, the team will immediately withdraw from the mine to correct the situation. Team safety is the first concern in rescue operations.

**Team Captain** – The team captain is the leader in charge of the team when it goes underground. The Captain’s responsibility is to lead and direct the team as it explores the mine. The Captain makes visual and physical inspections of the roof conditions and all areas of the mine that the team enters. The Captain is the first to enter any unexplored area and the team is always physically behind him. His decision is the last and final one when discussions are ended on any problem. He is ultimately responsible for team safety. The Team Captain leads the way when a team is advancing on foot and acts as the chief decision maker when the team is on a mission. Other duties of the Team Captain include leading and directing the team members, responsibility for discipline, general safety, being knowledgeable in all facets of mine rescue theory and procedures, and ability to utilize team knowledge, skills and resources on the rescue operation.

**Map Person** – The map person has a comprehensive map of the mine that the team is exploring. As the team advances, the map person designates on the map the conditions the team encounters and any information pertinent for the team and any following teams. Examples of pertinent information would be fires, cave in areas, water, location of victims or survivors, smoke, low oxygen, methane, carbon monoxide, barricades, etc.

**Gas Person** -- The gas person’s job is to take gas readings at every team stop to make sure the team is not encountering atmospheres of any kind that could endanger the team or survivors as they exit the mine. The Gas Person is also in charge of carrying the stretcher, the gear needed to extinguish a fire, an extra breathing apparatus to put a survivor under air, and self-contained self-rescuer.

**Tail Captain** --The Tail Captain (or #5 Person) is in constant radio communication with the Fresh Air Base. He communicates with the briefing officer at the Fresh Air Base. He gives the briefing officer any important or significant information that may affect the team should they try to ventilate or bring a survivor out of the mine such as roof fall location, water that may affect the team’s travel, unsafe atmospheres, etc. The Tail Captain should also know and understand the hand or pull rope signals if radio communication fails and the signals would be needed to be relayed by use of a communication line to which the tail captain is connected. The team members are always connected together by a life line, a line that connects each member to the other whenever they travel. Team members only disconnect when they make team stops and only in clear air.

**Briefing Officer** – The Briefing Officer is the person located in the Fresh Air Base and is in communication with the Tail Captain. The Briefing Officer makes sure that the team makes proper checks on its breathing apparatuses every 20 minutes, and records each member’s oxygen gauge reading. The Briefing Officer is in charge of helping the team to

ventilate the mine should any gases or other dangers in the mine atmosphere need removed. He has a map of the mine identical to the map in the possession of the Map Person, and he records all conditions that the Tail Captain relays to him. Any ventilation changes are discussed between the team and Fresh Air Base before air is moved. Other duties include being in communication with the PIC in the Command Center and acting on those orders, informing the Team Captain of all relevant data and giving instructions on the work to be done, accurately marking the progress and actions of the team on the mine plan, and ensuring the team is properly equipped and well briefed before leaving the base.

## **V. Communication**

It is important that the mine rescue team stay in close contact with the Fresh Air Base to report the team's progress and to receive further instructions. It is also essential that communication be established between teams working ahead of the Fresh Air Base and the base itself. The teams are trained to do mine exploration in a safe manner, so the Command Center can and should let the teams explore as they are trained to do and the team should notify the Command Center when it encounters a situation that is of immediate concern. The Fresh Air Base, however, must always stay in constant communication with the Command Center.

The Tail Captain is the rescue team member wearing the communication equipment and is responsible for staying in contact with the Fresh Air Base. The Briefing Officer is stationed at the Fresh Air Base and will have someone stationed with him to communicate to the command center as information is relayed to him from the team.

The teams should advance and tie back and across as they explore the mine and should report their movements to the Fresh Air Base as they move ahead from intersection to intersection, unless something is found that should be relayed to the Fresh Air Base immediately, such as high gas readings, a fire, a victim, etc.

When wearing a breathing apparatus, communication may be carried on by telephone, two-way radios or other suitable means. A microphone on the face-piece can help boost the sound to provide effective communication over the phone.

A wired telephone system is another method of communicating with the Fresh Air Base. The communications systems used in the mine and by the mine rescue team can vary from the use of a 1000 foot hard cable communication between the team and the Fresh Air Base to wireless communication. The teams will use what is available at that particular mine and what is best suited for that exploration.

One team member wears the equipment and is responsible for staying in contact with the Fresh Air Base while another is in charge of winding and unwinding the telephone line. This method is suitable only when the exploration involves short distances.

There is less anxiety and a more efficient overall rescue operation if the Captain reports to the Fresh Air Base at every convenient opportunity. This also enables the PIC to follow the progress of the team and plot it on the mine plan.

A speaker phone works well at the Fresh Air Base because it permits all concerned personnel at the base to listen in on the two-way conversation. Two-Way radios can be used if the proper aerial system is in place underground. New technology will enhance this communication system, and the Command Center should understand what communication is available in the mine.

## **VI. Record Keeping**

Information the rescue team relays to the Fresh Air Base is known as the “progress report.” Progress reports keep the Fresh Air Base and Command Center up-to-date on what the team is doing, where it is and what it has found. This information is used as a basis for making further rescue and recovery plans.

These reports not only inform the Fresh Air Base and Command Center on the whereabouts and conditions of the team, but also provide information on the conditions found in the mine. These reports, as they are phoned up from the mine, confirm or disprove the suspected problems and conditions. Whenever the Captain reports anything, it is important to log the location and time that the information is obtained.

As the team advances through the mine, all events and conditions encountered are marked on the Captain’s mine map. When the Captain makes a progress report to the Fresh Air Base, this information is recorded on the mine map on the surface. This mapping provides the Fresh Air Base and Command Center with a visual record of what is happening underground. It is imperative that the maps on the surface and the maps used by the teams be identical and that the Command Center is marking its map in the same way as the teams. This must be discussed and confirmed prior to going underground in the teams’ briefing sessions.

If lack of communication technology is an issue, the teams could work entries in a skirmish line type procedure using permissible walkie-talkies and keeping in site of each other. Teams could proceed up individual entries feeding information to the center entry to be communicated back to the Fresh Air Base and Command Center. This decision would need to be discussed and approved by the Command Center and team approval.

## **VII. Team Preparation:**

### **A. Briefing the team – Directives**

Team members must be fully briefed on mine conditions and the work expected of them before the team leaves the Fresh Air Base. The team briefing should only take place after

all decisions about the operation have been made. This prevents argument about the proper steps to be taken once the briefing has begun. If possible, the briefing should take place in a quiet room where questions may be answered and the work expected of the team thoroughly explained without confusion.

The Captain takes direction from the Fresh Air Base Coordinator. All pertinent instructions should be issued in writing.

During the briefing, the team must be given all relevant information available. The team should be briefed regarding the following matters before exploration:

- Is the evacuation complete?
- Are any workers missing and where is their likely location?
- Has the tag board been checked and secured?
- What is known about the cause of disaster?
- Is this team the first team in the mine? Are other teams in the mine?
- Are guards stationed at all mine entrances?
- What is the team's mode of travel?
- What is the extent of the exploration and work performed by previous teams?
- Is the ventilation system operating?
- Will the team's travel be in the intake or exhaust?
- What are the gas concentrations and the amount of airflow?
- What is the team's objective?
- What is team's time limit for the operation?
- What conditions are known to exist underground?
- Is the mine communication system operating?
- Is the power to the affected area on or off?
- What is the condition of the air and water lines?
- Is there diesel or battery-powered equipment or charging stations in the affected area?
- What equipment is needed or available? Where is it located?
- What tools, rescue equipment, and supplies are available underground?
- What is their location?
- Are there storage areas of oil, fuel, oxygen, acetylene or explosives in the areas to be explored?
- Are there any conditions or equipment that may be pertinent?

All important information should be marked on an updated mine map and given to the Captain. The communication points or telephones that the Captain will use to make reports to the Fresh Air Base should also be agreed upon and marked on the mine map.



## **B. Familiarization with mine workings**

- Rescue Team Guides – In a major fire, it may be necessary to bring in rescue teams who are not familiar with the mine workings. If possible, a qualified member familiar with the mine and in mine rescue should go with the team.

## **C. Check and guard mine openings**

- The mine's exhaust air should be checked for gases.
- The shafts should be guarded so no unauthorized persons enter the area.
- Care must be taken that no one is exposed to toxic gases that may be discharging from the shafts.

## **D. Before going underground**

The Mine Rescue Team Coordinator must be certain the Team Captain has:

- Confirmed all members of the team have been deemed fit by a physician to undertake the job.
- Field tested all primary, secondary and back-up breathing apparatus to ensure air tightness and proper functioning of the working parts.
- Had each team member complete the bench or field tests on the apparatus and any self-rescuers each may need to wear.
- Checked (or had team members check) the gas detectors, signal whistles, communication devices, link lines, cap lamps, and any other equipment or tools that the team will take.
- Discussed the instructions with the team to make sure each member understands them and what is expected.
- Noted the time the team has been given for the trip and synchronized watches with the Mine Rescue Team Coordinator. The time limit of the trip must be understood by all.
- Checked that the required tools and materials are on hand.
- Make sure a mine map, notebook, pencil, chalk, and paint are available to take underground.
- Inspected head-straps, buckles, face-pieces, gauge readings, and the overall condition of team members and apparatus after the team puts on the apparatus and "gets under oxygen" when ready to proceed.
- Reports to Command Center
- Notes time of departure
- The Tail Captain makes a similar check of the Captain's apparatus and ensures the Captain has all necessary equipment.
- The Tail Captain and Briefing Officer shall confirm that standard communication equipment is operable before advancing into the mine.

### **E. Team Readiness required for mine rescue and recovery work**

Oxygen breathing apparatus should be used only when there are enough trained people available to form a five-person team to carry out the operation.

The deployment of the first team is dictated by the urgency of the situation during the early stages of an emergency. However, a second team must be preparing for back-up before the first team can proceed. There must be a back-up mine rescue team available before a team goes underground.

Generally, teams at the Fresh Air Base should be organized in the following manner:

1. First team – on a mission in the mine.
2. Second team – at the Fresh Air Base in a state of readiness as a “back-up” team.
3. Third team – on standby in support of the first and second teams until they are needed as a back-up team.

The “back-up” team should field test their breathing apparatus and equipment at the same time as the first team so they are ready for immediate back-up if needed. The safety of the team always remains the top priority.

### **F. Time limits for rescue trips**

A team should ordinarily allow twice the amount of time for the return trip it plans to use on the in-going trip. The Captain should record the time of departure before the team leaves the Fresh Air Base. It should be made clear that if the team fails to return to the Fresh Air Base, or fails to make contact as scheduled, the back-up team will be sent to search for it. All instructions about time limits must be obeyed.

### **G. Duration of rescue operations in high temperatures**

Experience shows that mine rescue teams have less endurance in hot and humid conditions. A four-hour rotation in high heat and humidity may be impossible. In that case, additional teams will be required to make up for the shorter work period. Teams may be put on a two hour rotating schedule.

After being exposed to extreme temperatures and humidity for even a short time, the team should rest for at least four hours.

In temperatures of approximately 45 degrees C (110 degrees F) dry bulb reading and 38 degrees C (100 degrees F) wet bulb reading, the amount of time team members spend under oxygen may have to be reduced to 20 minutes or less because of heat exhaustion.

## **H. Team/equipment checks**

Team checks should be done as soon as practicable after the team leaves the Fresh Air Base, when it enters into a bad atmosphere and at regular intervals of fifteen minutes. These checks help make sure each team member is fit and ready to continue and that their apparatus is functioning properly.

Usually the Captain or Tail Captain checks the team by halting the team briefly and asking each team member how they feel. The Captain or Tail-Captain also records the time of the check and the cylinder pressures.

## **I. Team Safety**

The safety of the team is of utmost importance. It is the first principle of mine rescue. The Captain's top priority is always team safety. Excessive talking should be discouraged. All team members must concentrate on the job at hand.

Teams entering a mine in an emergency are taking a calculated risk. Captains must give each situation careful thought before proceeding. Team safety comes first. The Captain should lead the team through the mine cautiously. The Captain should pay very close attention to the roof, ribs and to the condition of the mine atmosphere. The team must be rested regularly and members constantly checked for signs of distress. All work must be assigned as evenly as possible so that no team member becomes too tired. Excessive rushing or running tires the team unnecessarily and, in some circumstances, may endanger lives.

## **J. Route of travel**

The rescue team should explore a mine via the fresh air route, whenever possible. There are two good reasons for this practice. First the danger to the exploring team is reduced and the Fresh Air Base can be located closer to the emergency.

Circumstances may make it impossible to travel by a fresh air route. The Team Captain must always ensure the team has a safe route of retreat. If traveling underground via the exhaust shaft, ensure the hoist-man is equipped with, and trained in the use of, breathing apparatus where necessary.

The preferred method of exploration, provided conditions allow it, is that the teams work entries in a skirmish line type procedure using permissible walkie-talkies and keeping in site of each other. Teams could proceed up individual entries feeding information to the center entry to be communicated back to the Fresh Air Base and Command Center. This type of exploration consumes less time and covers more territory. This decision would need to be discussed and approved by the Command Center and Team Captain.

A rescue team should always properly mark the route it uses going in so that the team can retrace its travel route without getting lost on the way out of the mine if working in poor

visibility or in complicated mine workings. If the team gets into trouble and cannot get out of the mine, the back-up team coming to its rescue can find it by following the marked route.

The route should be clearly marked by whatever method the rescue operation chooses. The method should be understood by everyone before entering the mine. Methods include:

- Fencing off the un-traveled (or side) entries with physical barriers.
- Drawing an arrow with a chalk or spray paint in the entry the team has taken from the intersection pointing towards the Fresh Air Base. The arrow should be about 12 inches in length and drawn on the right wall about eye level in height.
- Trailing communication lines or life lines.
- Opening the rail switch in the direction of travel.

The mine rescue teams are equipped and can use fluorescent light sticks to mark their route and any condition that is to be noted and to help other mine rescue teams be aware of any change in mine conditions.

Short stub intersections need not be marked with route markers if the face of the stub has been explored, dated and initialed by the Captain. All places of the team's retreat should also be marked, dated and initialed. This could be the end of the entry, caved areas, seals, doors, or just the team's turn around in a long entry.

If the team retraces its steps, route markers should be cancelled. The details and method of route markings must be understood by all back-up teams.

All team members must remain in close proximity and in contact with each other at all times. If this is not possible due to poor visibility, the members must keep in physical contact by using life lines.

Extreme caution must be used when traveling under conditions of poor visibility. All members must be attached to a link line.

When any work is being done by the team (e.g. building stoppings, timbering, scaling, etc.) the Captain and all team members must always be on guard against hazards or risks to the team's health and safety.