

# Initial Mine Rescue Team Training Coal and Metal/Nonmetal Mines



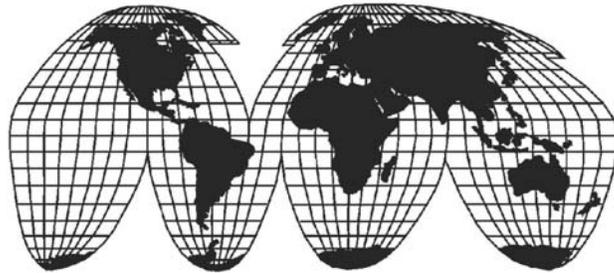
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**Visit the Mine Safety and Health Administration  
website at [www.msha.gov](http://www.msha.gov)**



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## Introduction

Throughout history, miners have traveled underground secure in the knowledge that if disaster strikes and they become trapped in the mine, other miners will make every possible attempt to rescue them. This is the mine rescue tradition.

Today's mine rescue efforts are highly organized operations carried out by groups of trained and skilled individuals who work together as a team.

Regulations require all underground mines to have fully-trained and equipped professional mine rescue teams available in the event of a mine emergency.

MSHA's Mine Rescue Instruction Guide (IG) series is intended to help mine operators develop mine rescue team training required under 30 CFR Part 49.

The materials in this series are divided into self-contained units of study called "modules." Each module covers a separate subject and includes suggestions, handouts, visuals, and text materials to help develop training.

Instructors and trainers may wish to use these materials to either supplement existing mine rescue training, or tailor a program to fit their specific training needs.

Since regulations, policy and mining technology can change, check for information that could supersede this material. Visit MSHA's website at <http://www.msha.gov> for additional information and updates.

# Overview

As part of the mine rescue series, this guide contains introductory training modules designed to help instructors provide initial (20-hour) mine rescue team training required under 30 CFR Part 49 for both coal and metal/nonmetal mines.

The modules in this IG include:

## 1) Introduction to Mine Rescue

- Qualifications for Mine Rescue Team Members
- The Mine Rescue Tradition
- Mine Rescue Team Procedures and Practices
- Roles of Team Members

## 2) Introduction to the Self-Contained Breathing Apparatus (SCBA)

- How the SCBA works
- Care and Maintenance of the Apparatus
- Donning and Wearing the Apparatus
- Expectations

The modules are organized exactly the same way to help guide you logically through the lessons. Each module includes:

- Training Objectives
- Suggested Course Materials
- Instructor Text
- General Review Questions
- Demonstration Checks

**NOTE TO TRAINER:** Take time to thoroughly review objectives and materials in each section *before* you conduct training activities. Remember to **always** comply with the manufacturer's recommendations for the use care, maintenance, and wearing of an SCBA.

## **The Instructor's Role**

You are about to assume an important responsibility – that of building and maintaining a capable mine rescue team. What the team members learn during these training sessions could very well help to save a miner's life, and even one's own life. Keep this in mind as you proceed, and be sure to let the team members know that this program was developed with their health and safety in mind.

These training materials have been designed to be as complete and self-contained as possible so that everything you might need to train your team is included. Be flexible and tailor the materials to the needs of your team. This might mean omitting some sections on a subject the team already knows, or it might mean spending more time on other subjects. Or you may use the material simply as a guide for a more personalized training program which you could prepare on your own.

Before you teach each module, it's important to study the module so you'll be familiar with what you'll be teaching. You may wish to highlight or underline certain points that you want to stress, or you might want to add notes of your own in the margins. You should also consider how you are going to present each visual. Some visuals may work best as handouts, some as PowerPoint slides. The key to teaching effectively is to become familiar and comfortable with the material.

It is highly recommended that you review the regulations in the parts cited for sections pertinent to the mines for which you are presenting this course.

**Initial Mine Rescue Training**

**Module 1**

**Introduction to  
Mine Rescue**

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# Qualifications for Mine Rescue Team Members

**Objectives** Team members will identify and understand the qualifications and responsibilities necessary to serve as an underground mine rescue team member.

**Materials** *Use the following suggested materials to conduct this training:*

- 30 CFR Part 49
- PowerPoint Presentation
- Photos/Illustrations
- Handouts
- Materials **Specific to Your Mine**

**Methods** *Use the following suggested methods for training:*

- Instructor-led Training
- Group Training
- Review of Relevant Federal Regulations

**Training Assessments**

- Discussion
- Q & A
- Feedback
- Review

## You as a Mine Rescue Team Member

Mine rescue is a very important and serious job. It requires hard work, perseverance, and dedication. The very nature of the work requires a person with unique qualities and capabilities.

To do a good job, you'll need to spend many hours practicing. The work is hard; at times, you may find this discouraging.

However, as you become more and more proficient, you'll gain confidence in your own and your team's abilities. You'll also gain increased self-respect, and the respect of others.

As a team member, you'll be responsible for rescuing miners and recovering a mine, often under very hazardous conditions. The lives of trapped miners, those of your fellow team members, and even your own life, will depend on how well you do your job.

The training program you're beginning is not just another mining course. It is a demanding pursuit, involving careful study and strenuous physical activity. It also requires a personal commitment from you to work hard, practice, and become the best team member you can possibly be.

You'll also be charged with the most important responsibility a person can have – saving lives. During a disaster or other emergency, miners will depend on you.

This is why mine rescue is so serious, and why it demands your special commitment. It may be the most demanding work you've ever done, but, by its very nature, it must be. Mine rescue has no room for second best.

## Legal Qualifications

**NOTE TO TRAINER:** For this topic, refer to the regulations included in the appendix:

Underground Metal and Nonmetal Mine Rescue Teams – <b>30 CFR Parts 49.2 and 49.7</b> Underground Coal Mine Rescue Teams – <b>30 CFR Parts 49.12 and 49.17</b>
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According to Federal regulations, you must have worked in an underground mine for at least one year within the past five years to be eligible for team membership. You also qualify if you're employed on the surface but regularly work underground.

In order to ensure that you're fit enough to withstand the rigors of mine rescue work, Federal regulations require that you pass a physical examination 60 days prior to your initial training and annually thereafter.

The regulations also specify conditions and other criteria the physician must take into consideration during this physical.

**NOTE TO TRAINER:** Allow time for questions, comments, feedback, and review if necessary.

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# The Mine Rescue Tradition

**Objectives** The team members will gain understanding of the history and development of mine rescue.

**Materials** *Use the following suggested materials to conduct this training:*

- PowerPoint Presentation
- Photos/Illustrations
- Handouts
- Materials **Specific to Mine(s) Covered by the Team**

**Methods** *Use the following suggested methods for training:*

- Instructor-led Training
- Group Training

**Training Assessments**

- Discussion
- Q & A
- Feedback
- Review

# The History and Development of Mine Rescue Training

## Early Disasters and Rescue Efforts

In one form or another, mine rescue has been around as long as underground mining. But it wasn't always the well-organized "team" effort that we know today.

In its earliest days, mine rescue was a haphazard effort at best. Rescue "parties" were little more than groups of miners and other volunteers who happened to be at the mine site at the time of the disaster.

As heroic and well-intentioned as their efforts may have been, these people were ill-equipped for the work at hand. They had no mine rescue training, no equipment, and no reliable breathing gear.

The odds were against them. All too often, their names were added to the already large list of those who died in the disasters.

In the United States, the turn of the century was a particularly hazardous time to be a miner, as is reflected by the numbers of miners who died in disasters at that time.

Besides being a time marked by great disasters, the early 1900s also ushered in some important events which marked the origins of mine rescue as we know it today.

## The Self-Contained Breathing Apparatus

The introduction of self-contained breathing apparatus (SCBAs) meant that, for the first time, those entering mines filled with irrespirable air could carry their own breathing air along with them.

Of course, the amount of time the rescuers could stay underground was naturally limited by the amount of oxygen their gear provided, but it was a start.

**NOTE TO TRAINER:** Allow time for questions, comments, feedback, and review if necessary.

# Mine Rescue Team Procedures and Practices

**Objectives**            The team members will identify and define core mine rescue team concepts, tasks, practices, and procedures associated with mine rescue and recovery operation.

**Materials**            *Use the following suggested materials to conduct this training:*

- 30 CFR Part 49
- PowerPoint Presentation
- Photos/Illustrations
- Handouts
- Materials **Specific to Mine(s) Covered by the Team**

**Methods**            *Use the following suggested methods for training:*

- Instructor-led Training
- Group Training
- Problem/Solution Exercises
- Exploration “Walk-Through” Exercises

**Training Assessments**

- Discussion
- Q & A
- Feedback
- Review

## **Mine Rescue Defined**

Mine rescue is the practiced response to a mine emergency situation that endangers life, property, and the continued operation of the mine.

The primary objective of mine rescue is preventing loss of life. The secondary objective is the safe recovery of the mine and its return to normal production.

## **Team Objectives**

Without the team, there would be no rescue and no recovery; therefore, team safety – even the safety of an individual member – always comes first.

The three objectives of mine rescue in the order of their importance are:

- 1) **Team safety**
- 2) **Locating trapped miners and returning them to safety**
- 3) **Protecting the mine property and recovering the mine**

## **Team Principles**

Four key elements that go hand-in-hand with the team concept of mine rescue are:

- 1) **Cooperation**
- 2) **Coordination**
- 3) **Communication**
- 4) **Discipline**

### **Cooperation**

It's important for each team member to cooperate with others on the team. Cooperation is what makes your team a functioning unit, rather than just a disorganized group.

### **Coordination**

Coordination is another key element. It's important to coordinate what you do with what other team members are doing. This may seem difficult at first, since each team member has specific tasks, but at the same time all of them must work toward a common goal.

## Communication

You must never forget the importance of good communication in mine rescue. Whether you're working with verbal or non-verbal commands or instructions, it's very important that you receive and interpret them properly. It is absolutely essential that everyone on the team knows what to do at all times.

Listening and understanding are also important elements of communication, especially during a briefing. Learn to listen effectively so you pick up everything you need to know the first time around. During an emergency, there may be no time to repeat instructions.

If you listen carefully during a briefing and still don't understand something, or if some information has been left out, don't hesitate to ask questions.

During an actual emergency, the lack of a single fact could be crucial in determining how well your team functions. It could even mean the difference between life and death.

## Discipline

Discipline keeps the team working together, and it establishes a set method for doing things so that **how** the team functions becomes almost second nature.

The automatic, disciplined response of a well-trained team is especially beneficial during an emergency because it frees the team to concentrate on the work at hand.

Mine rescue and recovery work involves a wide variety of different tasks. The way your team responds will vary according to the type of mine emergency and the type of mine they are entering. Conditions within the area you plan to enter will also determine what your team will be required to do.

Here are some of the duties that may be required during an actual emergency:

- Exploring the affected area of the mine.
- Searching for and rescuing survivors.
- Performing first aid.
- Determining the extent of damage.
- Determining gas conditions.
- Mapping the team's findings.
- Locating and fighting fires.
- Building temporary and/or permanent stoppings/bulkheads.
- Erecting seals in a fire area.
- Clearing debris, pumping water, and installing or erecting temporary roof supports.

## **Procedures for Rescue and Recovery Operations**

A typical rescue or recovery operation begins on the surface with an information-gathering session known as a “briefing.”

During the briefing, you’ll learn what happened in the mine, what has already been done, and what your team is expected to do.

While you’re on the surface, you’ll also prepare your apparatus and check your equipment.

When it’s time for your team to enter the affected area, you don your apparatus and make all functional checks.

Next, you’ll proceed inside the mine to an area known as the “fresh air base.” This is a base of operations established as close as possible to the affected area of the mine, but situated where it’s assured a supply of good air.

The fresh air base is the point from which you’ll begin your exploration of the affected area. It’s also here that communication is maintained between the team members and those outside the mine.

There is a coordinator stationed at the fresh air base specifically to handle this important team-to-base communications link.

The fresh air base is the point from which you’ll begin your exploration of the affected area. It’s also here that communication is maintained between the team members and those outside the mine.

There is a coordinator stationed at the fresh air base specifically to handle this important team-to-base communications link.

Then you’ll proceed into the mine beyond the fresh air base, carrying your supplies.

As your team advances, you maintain communication with the coordinator at the fresh air base, who keeps track of your progress and communicates relevant data and information to the Command Center.

When the team returns to the fresh air base after carrying out operations, the captain of your team should brief both the coordinator of the fresh air base and the captain of the backup team to exchange information.

Then your team proceeds to the surface where you’ll be “debriefed.” During the debriefing session, you will report and discuss what your team did, saw, and found in the mine.

## Roles of Team Members

As members of a mine rescue team, each of you will be assigned specific tasks that will be your responsibility during every rescue and recovery operation.

For example, if you're skilled in a particular area of mining such as mapping or gas detection, you may be assigned to do related work on the team. Experience you've gained outside the mine, such as firefighting or emergency medical work, may also qualify you to do related work on the team.

### Specific Positions

As we've seen so far, most of the positions within a mine rescue team are fairly flexible. This allows your trainer to distribute work to members according to what they do best.

However, two of the team's members – the captain and the co-captain – have very clearly defined responsibilities in **addition** to whatever tasks they've been assigned.

The captain and co-captain positions are key organizational elements for the team. Because these roles are more clearly defined than the others, let's take a look at precisely what these jobs entail.

### The Team Captain

Every team has a captain. This is the person who leads the team and directs the actions of the other members. As we mentioned earlier, the team captain functions as an on-the-field leader.

The captain is also the team's chief decision maker. For this reason, it's important for the captain to have a general knowledge of everything that's involved in mine rescue.

Other team members may be more skilled in specific areas, but it's the captain's job to know enough about all the other areas to make effective decisions and direct the work of the entire team.

Basically, the team captain oversees all the team's activities from the moment they arrive at the disaster site until they leave the final debriefing session.

It is the team captain who decides what tools, materials, and equipment the team will need. The captain also makes sure the materials are procured, and that all equipment is tested and checked before it's used.

It is the captain's job to delegate responsibility and distribute the workload among team members prior to and during the operation.

The captain is also responsible for the team's safety. This involves checking the team members' condition at regular intervals to make sure they're fit enough to continue and their apparatus are functioning properly.

These team checks are made immediately after the team members put on their units, just after leaving the fresh air base, and at every rest stop during the operation.

The captain takes the first place in line, leading the team as it advances through the mine.

The captain's duties also include giving signals and checking roof and rib conditions (or back and side conditions in metal/nonmetal mines) as the team progresses.

The captain also regulates the pace at which the team works throughout the entire operation.

## **REVIEW & EVALUATION**

- Quiz team members to determine retention and lessons learned.
- Team members should demonstrate knowledge gained from training.
- Encourage team members to ask questions and to discuss subjects covered.
- Ensure team members that **all** questions and comments are important and could illuminate important points for the entire team.

## **END OF MODULE 1**

**Initial Mine Rescue Training**

**Module 2**

**The Self-Contained  
Breathing Apparatus  
SCBA**

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# Care, Maintenance, and Use of the Self-Contained Breathing Apparatus (SCBA)

**Objectives** The team members will gain a thorough working knowledge of how the self-contained breathing apparatus (SCBA) functions, and **demonstrate** proficiency in the care, maintenance, and use of the apparatus.

**NOTE TO TRAINER: Remember to follow all manufacturers' recommendations for care, maintenance, and use of the apparatus used by your teams.**

**Materials** *Use the following suggested materials to conduct this training:*

- Self-Contained Breathing Apparatus Used by the Team
- Carbon Dioxide Absorbent
- Apparatus Testing Equipment
- Checklists for Inspecting and Testing the Apparatus
- Cleaning Solutions, Water, Dryer
- Handouts and Other Technical Information for the Apparatus  
**(FOLLOW MANUFACTURER'S RECOMMENDATIONS)**

**Methods** *Use the following suggested methods for training:*

- Instructor-led Training
- Demonstrations
- Hands-On Apparatus Training
- Group Training
- Problem/Solution Exercises

**Training Assessments**

- Proficiency Checks
- Demonstration
- Q & A
- Feedback
- Review/Written Examination

## How the SCBA Works

It is very important that you understand how your apparatus works and that you trust it to be in perfect condition because when you wear the apparatus in unsafe air, you are depending on every part of it to keep you in your own zone of safe air.

A self-contained breathing apparatus is a completely portable unit that supplies you with oxygen or air independently of the surrounding atmosphere.

When your team is called out to a mine emergency and enters the mine to explore it, you can expect to enter air which is not safe to breathe – air which could have high concentrations of carbon monoxide (CO), a deadly, odorless gas – or simply air that does not have enough oxygen to keep you alive. There might also be other dangerous gases in the mine.

Normal air contains approximately 21 percent oxygen, 78 percent nitrogen, and 1 percent carbon dioxide and other gases.

The apparatus is essentially a second pair of lungs to act with your lungs to create a “closed circuit.” A closed circuit system does not release the exhaled air. Rather, it recirculates the air through the apparatus and purifies the air, taking out the carbon dioxide and adding fresh oxygen to the air. You are then supplied with the air that has been oxygen enriched.

The self-contained breathing apparatus (SCBA or simply “the apparatus”) supplies you with **safe air** to breathe and **removes the carbon dioxide from your exhaled breath** so that you can continue to inhale from and exhale into the apparatus independent of the surrounding air.

## Components and Function of the Apparatus

### Suggested Training Activities

- Describe the process of how the apparatus works.
- Describe the basic components such as face-pieces, breathing hoses, straps, valves, springs, breathing bag, carbon dioxide absorbent canisters, scrubber, etc.
- Thoroughly describe each part and its function.
- Describe the oxygen pressure reducing valve and the oxygen demand valve for regulating the flow of oxygen from the high-pressure cylinder.

**NOTE TO TRAINER:** Team members should have their own apparatus in front of them while you are covering this topic. Make sure team members identify and describe the major components and their functions.

## Care and Maintenance of the Apparatus

**NOTE TO TRAINER:** For this topic, refer to the regulations included in the appendix:

Underground Metal and Nonmetal Mine Rescue Teams – **30 CFR Part 49.6**

Underground Coal Mine Rescue Teams – **30 CFR Part 49.16**

According to Federal regulations, breathing apparatus must be inspected and tested at intervals not exceeding 30 days. Each manufacturer specifies the testing and maintenance procedures that should be followed on the apparatus.

They must be inspected and tested by a person trained in the use and care of the apparatus in accordance with the manufacturer's recommendations.

Federal regulations also require a record of all the tests and inspections performed on **each** apparatus. This record must be initialed by the person making the tests and inspections, and it must be kept on file at the mine rescue station for a period of **one year**.

### Apparatus Approval

Each apparatus should have the NIOSH/MSHA approval label on it. All approval labels should be read carefully so that the apparatus can be used in an approved manner.

Today, the **testing** of the apparatus is handled by the National Institute for Occupational Safety and Health (NIOSH). The apparatus **approval** is granted jointly by NIOSH and the Mine Safety and Health Administration (MSHA).

To receive NIOSH and MSHA approval, self-contained breathing apparatus must meet specific requirements as to design and construction, and must operate satisfactorily during a specified series of actual wearing tests. The exact requirements for approval are outlined in Title 42 of the **Code of Federal Regulations (CFR 42 Part 84)**.

All approved apparatus are required by regulations to display an approval label on the unit. This label must bear the MSHA label and the seal of NIOSH, an approval number, and the name of the apparatus' manufacturer.

**NOTE TO TRAINER:** Ensure that each team member reads the approval label and thoroughly understands all the specifications and information on the label.

## **Cleaning the Apparatus**

In addition to testing and maintaining the apparatus to make sure that it's okay, it is important to keep the apparatus clean so that all the parts, especially the rubber parts, will last a long time. This means that you need to:

- **Clean and disinfect the apparatus after each use.**
- **Allow it to dry properly and completely.**
- **Store the apparatus in its storage box to protect it from dirt and moisture.**

**NOTE:** Remember to only use cleaning and disinfecting solutions recommended by the manufacturer.

# Donning and Wearing the Apparatus

## Objectives

The team members will correctly don and wear apparatus in order to experience some of the expectations when wearing an SCBA. **For successful completion of this section, each team member should demonstrate the correct procedures.**

**NOTE TO TRAINER:** Remember to follow all manufacturers' recommended specifications.

## Materials

***Use the following materials to conduct this training:***

- Self-Contained Breathing Apparatus Used by the Team
- Carbon Dioxide Absorbent

## Methods

***Use the following suggested methods for training:***

- Instructor-led Training
- Demonstrations
- Hands-On Apparatus Training
- Group Training

**NOTE TO TRAINER:** Use the method(s) best suited for plans and procedures of how the team would respond to an actual emergency.

## Training Assessments

- Proficiency Checks
- Demonstration
- De-brief and discuss areas needing improvement.
- Knowledge Checks
- Q & A
- Feedback
- Review
- Written Examination

## Expectations

Apparatus designed by various manufacturers are all going to be a bit different. You will be practicing wearing and working with your apparatus so that you can get used to the feel of it and how it works.

Your apparatus will protect your lungs from smoke and poisonous gases, and provide safe air for you to breathe.

It is important to note here that there are some conditions under which the apparatus **will not** entirely protect you:

- Toxic amounts of poisonous gases, dusts, or vapors that may injure your skin or be absorbed through your skin into your system. (For example, fairly high concentrations of ammonia will injure your skin and hydrogen cyanide can be absorbed through your skin).
- If you wear your SCBA extensively in petroleum vapors. These vapors will permeate and deteriorate the rubber parts of the apparatus.

**NOTE:** In air which is much above normal atmospheric pressure, be sure to follow the manufacturer's recommendations and/or precautions when using an apparatus under such conditions.

### Time Limit, Work Rate, and Breathing Rate

Any self-contained breathing apparatus that you use will limit the time you'll have in which to work underground. Your apparatus will be approved for a specified amount of time per wearing called the "service time."

The service time is established assuming that you work at a moderate rate. If you work extremely hard, you will be breathing faster and you will be consuming your oxygen or air at a faster rate.

Also, nervousness or excitement can cause you to breathe faster and use more oxygen.

In addition, the roughness of the terrain you must travel and the heat and humidity of the area you will be in can affect your breathing rate and consequently, the service time.

You should try to avoid breathing too quickly while wearing the apparatus. Short, shallow breathing or panting causes you to get an insufficient amount of oxygen and you may begin to feel faint. So, if you find yourself breathing quickly, try to control your breathing and slow it down.

Also, you will probably experience some resistance to breathing while wearing the apparatus facepiece.

This is caused by the air pressure in the facepiece. With practice and familiarity with the apparatus, you should be able to compensate for this resistance.

### **Weight and Size of Apparatus**

This extra weight you will be carrying will affect your endurance, your rate of work, and your maneuverability. Therefore, you will have to practice working with the apparatus on so that you can get used to moving and working with the extra weight and bulk.

**NOTE: When wearing an apparatus, use caution when crawling through narrow passageways.**

### **Verbal Communications**

It is going to be more difficult to communicate while wearing the facepiece because your voice will be muffled.

All the facepieces have a speaking diaphragm to transmit your voice to the outside of the facepiece but they tend to muffle your voice. You may find yourself having to speak a little louder and slower than usual in order to be understood.

Also, you should try to talk as little as possible while wearing the apparatus. This means to cut out all unnecessary “chatter” so that only important information is communicated.

### **The Facepiece and Facepiece Seal**

When you wear the facepiece, it is extremely important to have a good tight seal around your face. This is known as the face-to-facepiece seal, or simply as the facepiece seal.

The heat and moisture produced within some of the apparatus can cause the facepiece to fog, making it difficult for you to see. Yet there are special “anti-fog” solutions that can be applied to the facepiece lens to help prevent it from fogging up on you.

When you wear the facepiece, you will find yourself turning your head and body more often than usual to see things around you.

Eyeglasses, beards, and bushy sideburns could prevent a good, tight facepiece seal. To achieve a proper seal, the wearer must be clean shaven (mustaches are acceptable).

Since contact lenses may become dislodged, the apparatus wearer should consult with a physician to see if contact lenses can be used while wearing the facepiece.

**NOTE TO TRAINER:** Before you have the team go under oxygen, you may want to address any questions or uncertainties that team members may have.

## REVIEW & EVALUATION

**TIP** – You may do a Q&A session with the group, or you may choose to ask the questions and have each team member write down their answers so you can check their progress. A complete written exam is provided in the back of this training package.

**1) Explain generally how a self-contained breathing apparatus works.**

**Answer:** As a closed circuit system, the apparatus *re-circulates the exhaled air, taking out the carbon dioxide and adding fresh oxygen to the air*, so that the wearer can inhale the purified, oxygen-enriched air.

**2) Why is a good facepiece seal important?**

**Answer:** A good seal will prevent smoke and poisonous gases and fumes from leaking into the facepiece and infiltrating the oxygen supply and will prevent loss of breathing air from inside the facepiece.

**3) List some of the things that can interfere with a good face-to-facepiece seal.**

**Answer:** Eyeglasses, deep scars, beards, bushy sideburns, large cheekbones.

**4) List some limitations associated with wearing an apparatus.**

**Answer:**

- Limit the time in which you have to work.
- Restrict your maneuverability.
- Restrict your peripheral vision.
- Make communication more difficult.

## **Donning the Apparatus/Going Under Oxygen**

Before putting on the apparatus you should make sure it has been properly tested and properly prepared for use. You should also check over the apparatus to make sure it is in good condition.

Some of the things you should check are the condition of the wearing harness straps and the condition of the facepiece and hoses.

You should also check to see if you have a fresh supply of the carbon dioxide absorbent in the apparatus and a proper supply of oxygen or air.

**NOTE TO TRAINER:** Prepare the team for donning their apparatus. Emphasize systematic approach.

### **Team Checks**

Once you have put on the apparatus and are under oxygen, the team captain should check you and the other team members to make sure that you feel okay and are ready to go, and to make sure that your apparatus is on correctly and is functioning properly.

Another designated team member, in turn, should check the captain.

These checks are known as “team checks” and they should be done right after you’ve gotten under oxygen and also periodically as you work under oxygen. These are generally accepted as 20 minutes or less.

## **REVIEW & EVALUATION**

- Quiz team members to determine retention and lessons learned.
- Team members should demonstrate knowledge gained from training.
- Encourage team members to ask questions and to discuss subjects covered.
- Ensure team members that **all** questions and comments are important and could illuminate important points for the entire team.

## **END OF MODULE 2**

# Appendix

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## Quiz

### Introduction to Self-Contained Breathing Apparatus

1. An approved label gives the following information:
  - a. Time limit, cleaning instructions, approval number.
  - b. List of approved assembly part numbers.
  - c. List of cautions, steps for putting on.
  - d. Manufacturer's name, cleaning instructions.
  - e. Steps for putting on, time limit.
  
2. Which of the following are conditions you must get used to in wearing self-contained breathing apparatus?
  - a. Voice distortion.
  - b. Weight and size of equipment.
  - c. Lack of carbon dioxide.
  - d. a and b.
  - e. b and c.
  
3. A self-contained breathing apparatus does all of the following *except*:
  - a. Removes or expels CO<sub>2</sub> from breathing cycle.
  - b. Provides oxygen or air.
  - c. Protects you from smoke.
  - d. Protects you from hydrogen cyanide.
  - e. Protects you from carbon monoxide.
  
4. A closed circuit apparatus differs from an open circuit apparatus because a closed circuit apparatus:
  - a. Removes oxygen from breathing cycle.
  - b. Expels exhaled air.
  - c. Has its own source of oxygen.
  - d. Recycles breathing air.
  - e. Uses chemicals.

5. Federal regulations require that breathing apparatus be inspected and tested at least:
  - a. Weekly.
  - b. Every 15 days.
  - c. Every 30 days.
  - d. Every 180 days.
  - e. Annually.
  
6. Cleaning and disinfecting the apparatus should be done:
  - a. Weekly.
  - b. Monthly.
  - c. Twice a year.
  - d. Before each use.
  - e. After each use.
  
7. A good face-to-facepiece seal is necessary in order that:
  - a. The apparatus will start supplying oxygen.
  - b. No poisonous gases enter the facepiece.
  - c. You maintain negative pressure in the facepiece.
  - d. No fog builds up in the facepiece.
  
8. When getting under oxygen:
  - a. The captain will check to see that each person is ready and that each person's apparatus is on correctly.
  - b. The co-captain will check that each apparatus is airtight.
  - c. You will perform the routine 30-day testing procedures.
  - d. You should be sure to check the person to the right of you.
  
9. Which of the following are normal limitations of wearing an apparatus?
  - a. Time restriction.
  - b. Restriction of peripheral vision.
  - c. Should not wear contact lenses.
  - d. Should not wear a beard.
  - e. All of the above.

10. According to 30 CFR Part 49, what is the minimum capacity for an approved self contained breathing apparatus?
- a. 4 hours.
  - b. 60 minutes.
  - c. 2 hours.
  - d. 3 hours.

**General review answers:**

1. b
2. d
3. d
4. d
5. c
6. e
7. b
8. a
9. e
10. a

## Basic Exercise for Donning and Wearing the Apparatus

**NOTE TO TRAINER:** Ideally, it will enhance the training experience if the team works in an area which provides realistic conditions (such as using a simulated smoke generator). The purpose for this type of exercise is to have team members perform activities while under oxygen, so that they can experience how the apparatus properly functions. In addition, you may want to have the team conduct a simple exploration exercise.

**WHEN CONDUCTING TRAINING, NEVER TRY TO GENERATE SMOKE BY BURNING WOOD OR OTHER MATERIALS. ALWAYS USE SIMULATION SMOKE.**

*This type of environment is created for mine rescue training at the Mine Health and Safety Academy's Mine Simulation Laboratory in Beckley, West Virginia. Contact the Academy to schedule training.*

### Prepare for Exploration

- Arrange for the team to explore a small area of the mine with an easy terrain.
- At the starting point of the exploration, set up a simulated fresh air base with a map and communication equipment.
- Have someone (perhaps the team alternate) stay at the fresh air base to handle communications and to mark the map.
- Also, you may want to have someone stay at the fresh air base to serve as the communication line, or lifeline, attendant.
- Have the team prepare their apparatus, gather their equipment together, and report to you with all their equipment ready.

### Brief the Team

The team's assignment is to explore and report the conditions they find.

- Tell the team they will be evaluated on how they function as a team and how they perform their individual duties such as team checks, safe procedures, mapping, gas testing, roof,back, and rib testing, and communications.
- Instruct the captain to begin the donning procedures/equipment checks.
- The captain should then lead the team to the simulated fresh air base. When the team is ready, let them begin their assignment.
- You should accompany the team to observe and evaluate their performance. The individuals staying at the fresh air base should stand by, ready to perform their duties.

## Team Performance: Debrief and Feedback

- Lead discussion of the team's performance.
- Use evaluation checklist on next page (some elements on the form may not apply to this particular exercise).
- Cover all relevant training objectives.
- Encourage team members to discuss lessons learned during the training.
- Emphasize not only on mistakes, but also point out what they did **right**.

**NOTE TO TRAINER:** Use the evaluation checklist on the next page. You may want to make copies of the evaluation checklist and allow the team members to rate their *own* performance.

## Evaluation Checklist

Use the following checklist to aid in evaluating the team's performance. Be sure to discuss any problems the team encountered. (**NOTE:** Use items that apply to your particular training).

### A. Team and Apparatus Checks

- Did captain check team and apparatus before leaving the fresh air base?
- Did captain make a first check soon after leaving the fresh air base?
- Did captain provide a reasonable number of rest stops for the team?
- Were team and apparatus checks made at each rest stop?
- Was the oxygen supply or timer of each apparatus checked at each test stop?

### B. Exploration/Traveling Procedures

- Did team travel in proper order?
- Did any team member advance into an area ahead of the team captain?
- Did team "tie-in" so they were never in by an unexplored area?
- Did team mark the route of travel?

### C. Testing Procedures

- Was routine roof and rib testing done by captain?
- Were routine gas tests indicated at proper places?
- Were tested areas properly marked?

### D. Communications

- Did captain and co-captain communicate clearly?
- Did team members properly respond to all signals and directions?
- Was talking among team members kept to a minimum?
- Were all significant findings reported to the fresh air base?
- Were communications with the fresh air base clear and understandable?
- Did team communicate to the fresh air base frequently enough?

### E. Mapping

- Did team map person note all important findings correctly on the map?
- Do the team map and the fresh air base map correlate with each other?

### F. Overall Team Performance

- Did team explore full extent of area?
- Did team function smoothly under the direction of the captain?

Comments/Problems/Suggestions:

# 30 CFR PART 49 – MINE RESCUE TEAMS

## Subpart A--Mine Rescue Teams for Underground Metal and Nonmetal Mines

### Section 49.6

#### Equipment and maintenance requirements:

(a) Each mine rescue station shall be provided with at least the following equipment:

- (1) Twelve self-contained breathing apparatus, each with a minimum of 4 hours capacity (approved by MSHA and NIOSH under 42 CFR Part 84, Subpart H), and any necessary equipment for testing such breathing apparatus;
- (2) A portable supply of liquid air, liquid oxygen, pressurized oxygen, or oxygen generating chemicals, and carbon dioxide absorbent chemicals, applicable to the supplied breathing apparatus and sufficient to sustain each team for eight hours while using the breathing apparatus during rescue operations.
- (3) Two extra, fully-charged oxygen bottles for every six self- contained breathing apparatus;
- (4) One oxygen pump or a cascading system, compatible with the supplied breathing apparatus;
- (5) Twelve permissible cap lamps and a charging rack;
- (6) Four gas detectors appropriate for each type of gas that may be encountered at the mines served. Gas detectors must measure concentrations of methane from 0.0 percent to 100 percent of volume, oxygen from 0.0 percent to at least 20 percent of volume, and carbon monoxide from 0.0 parts per million to at least 9,999 parts per million.
- (7) [Reserved].
- (8) One portable mine rescue communication system (approved under part 23 of this title) or a sound-powered communication system.
  - (i) The wires or cable to the communication system shall be of sufficient tensile strength to be used as a manual communication system.
  - (ii) These communication systems shall be at least 1,000 feet in length.
- (9) Necessary spare parts and tools for repairing the breathing apparatus and communication system.

**(b)** Mine rescue apparatus and equipment shall be maintained in a manner that will ensure readiness for immediate use.

(1) A person trained in the use and care of breathing apparatus shall inspect and test the apparatus at intervals not exceeding 30 days and shall certify by signature and date that the inspections and tests were done.

(2) When the inspection indicates that a corrective action is necessary, the corrective action shall be made and the person shall record the corrective action taken.

(3) The certification and the record of corrective action shall be maintained at the mine rescue station for a period of one year and made available on request to an authorized representative of the Secretary.

## **Section 49.7**

### **Physical requirements for mine rescue team:**

**(a)** Each member of a mine rescue team shall be examined annually by a physician who shall certify that each person is physically fit to perform mine rescue and recovery work for prolonged periods under strenuous conditions. The first such physical examination shall be completed within 60 days prior to scheduled initial training. A team member requiring corrective eyeglasses will not be disqualified provided the eyeglasses can be worn securely within an approved facepiece.

**(b)** In determining whether a miner is physically capable of performing mine rescue duties, the physician shall take the following conditions into consideration:

(1) Seizure disorder;

(2) Perforated eardrum;

(3) Hearing loss without a hearing aid greater than 40 decibels at 400, 1,000 and 2,000 Hz;

(4) Repeated blood pressure (controlled or uncontrolled by medication) reading which exceeds 160 systolic, or 100 diastolic, or which is less than 105 systolic, or 60 diastolic;

(5) Distant visual acuity (without glasses) less than 20/50 Snellen scale in one eye, and 20/70 in the other;

(6) Heart disease;

(7) Hernia;

(8) Absence of a limb or hand; or

(9) Any other condition which the examining physician determines is relevant to the question of whether the miner is fit for rescue team service;

**(c)** The operator shall have MSHA Form 5000-3 certifying medical fitness completed and signed by the examining physician for each member of a mine rescue team. These forms shall be kept on file at the mine rescue station for a period of one year.

**For more information, see MSHA's Program Policy Manual**

# 30 CFR PART 49 – MINE RESCUE TEAMS

## Subpart B – Mine Rescue Teams for Underground Coal Mines

### Section 49.16

#### Equipment and maintenance requirements:

(a) Each mine rescue station shall be provided with at least the following equipment. Mine rescue stations serving underground anthracite coal mines, which have no electrical equipment at the face or working section, shall have at least the amount of equipment appropriate for the number of mine rescue team members.

- (1) Twelve self-contained breathing apparatus, each with a minimum of 4 hours capacity (approved by MSHA and NIOSH under 42 CFR part 84, subpart H), and any necessary equipment for testing such breathing apparatus.
- (2) A portable supply of liquid air, liquid oxygen, pressurized oxygen, or oxygen generating chemicals, and carbon dioxide absorbent chemicals, as applicable to the supplied breathing apparatus and sufficient to sustain each team for 8 hours while using the breathing apparatus during rescue operations.
- (3) Two extra, fully-charged oxygen bottles for every six self-contained breathing apparatus.
- (4) One oxygen pump or a cascading system, compatible with the supplied breathing apparatus.
- (5) Twelve permissible cap lamps and a charging rack.
- (6) Four gas detectors appropriate for each type of gas that may be encountered at the mines served. Gas detectors must measure concentrations of methane from 0.0 percent to 100 percent of volume, oxygen from 0.0 percent to at least 20 percent of volume, and carbon monoxide from 0.0 parts per million to at least 9,999 parts per million.
- (7) [Reserved].
- (8) One portable mine rescue communication system (approved under part 23 of this title) or a sound-powered communication system.
  - (i) The wires or cable to the communication system shall be of sufficient tensile strength to be used as a manual communication system.
  - (ii) These communication systems shall be at least 1,000 feet in length.

(9) Necessary spare parts and tools for repairing the breathing apparatus and communication system.

**(b)** Mine rescue apparatus and equipment shall be maintained in a manner that will ensure readiness for immediate use.

(1) A person trained in the use and care of breathing apparatus shall inspect and test the apparatus at intervals not exceeding 30 days and shall certify by signature and date that the inspections and tests were done.

(2) When the inspection indicates that a corrective action is necessary, the corrective action shall be made and the person shall record the corrective action taken.

(3) The certification and the record of corrective action shall be maintained at the mine rescue station for a period of 1 year and made available on request to an authorized representative of the Secretary.

## **Section 49.17**

### **Physical requirements for mine rescue team:**

**(a)** Each member of a mine rescue team shall be examined annually by a physician who shall certify that each person is physically fit to perform mine rescue and recovery work for prolonged periods under strenuous conditions. The first such physical examination shall be completed within 60 days prior to scheduled initial training. A team member requiring corrective eyeglasses will not be disqualified provided the eyeglasses can be worn securely within an approved facepiece.

**(b)** In determining whether a miner is physically capable of performing mine rescue duties, the physician shall take the following conditions into consideration:

(1) Seizure disorder;

(2) Perforated eardrum;

(3) Hearing loss without a hearing aid greater than 40 decibels at 400, 1000, and 2000 Hz;

(4) Repeated blood pressure (controlled or uncontrolled by medication) reading which exceeds 160 systolic, or 100 diastolic, or which is less than 105 systolic, or 60 diastolic;

(5) Distant visual acuity (without glasses) less than 20/50 Snellen scale in one eye, and 20/70 in the other;

(6) Heart disease;

(7) Hernia;

(8) Absence of a limb or hand; or

(9) Any other condition which the examining physician determines is relevant to the question of whether the miner is fit for rescue team service.

**(c)** The operator shall have MSHA Form 5000-3 (available at <http://www.msha.gov>) certifying medical fitness completed and signed by the examining physician for each member of a mine rescue team. These forms shall be kept on file at the mine rescue station for a period of 1 year.

**For more information, see MSHA's Program Policy Manual**