

Do You Understand Mine Emergencies?



Are You Prepared for a Mine Emergency?

Instructor's Guide

MODULE 5: ESCAPE AND EVACUATION

PENN STATE MINER TRAINING PROGRAM
UNIVERSITY PARK, PA
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MINER TRAINING PROGRAM

DO YOU UNDERSTAND MINE EMERGENCIES?

ARE YOU PREPARED FOR A MINE EMERGENCY?

MODULE 5: ESCAPE AND EVACUATION

Mark Radomsky
Joseph Flick
Joeseph DeSalvo
Larry Grayson
&
Raja Ramani

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Please note that any mention or use of pictures of commercial products associated with mine emergencies does not constitute an endorsement by Penn State, MSHA, or the authors.

Preface

The history of underground coal in the United States is notable for its successes and failures. In the distant past, coal fueled and played a prominent role in our industrial revolution, rail transportation, iron and steel making, and heating needs. Most recently, it has been the source for affordable electricity, and for a myriad of other fuels and products. Extracting and processing coal is challenging, and the miners who work in the industry work in one of the Nation's most hazardous occupations.

Mine emergencies, such as mine explosions, fires, and inundations have been all too common. Too many miners have lost their lives over the years, and many more have suffered serious injuries doing the job that typically provides challenge, high wages, and good benefits. Mining stakeholders, such as the industry, government, organized labor, the academic community, those who supply products and equipment, and the miners themselves have worked diligently by applying technology, engineering, best work practices, standards, and training to make the mines a less hazardous occupation.

The tragedies of recent mine emergencies, such as Jim Walter Resources No. 5 Mine, Sago Mine, Aracoma Alma Mine No 1, and the Darby Mine No. 1 have reminded us that continuous safety vigilance is our vision, and continuous safety improvement is our goal—a challenge to every new generation. The Mine Improvement and New Emergency Response Act of 2006 (MINER ACT) is the latest example of a multi-faceted, and focused attack on underground coal mining hazards. Essentially, it seeks to enhance mine emergency preparedness and response through improving emergency planning, mine rescue capabilities, mine emergency equipment, technology, and training, specifically through the competitive Brookwood-Sago grant program.

The training program, titled, *Do you understand mine emergencies? Are you prepared for a mine emergency?* is the result of a 2007/2008 Brookwood-Sago Mine Safety Grant. This grant, one of several awarded in 2007 by the Mine Safety and Health Administration, was awarded to the Penn State Miner Training program on September 30, 2007.

The program was the result of a cooperative effort between many mining stakeholders (See Acknowledgements), and consists of an achieved webcast, titled, *Escape and survive*, and the training program referred to above. This program includes Instructor's and Participant's Guides. We believe that frequent, quality training is the key to better identify, avoid, and prevent hazards in an around the mines, and that through the use of this program, miner survivability—as they response to an emergency—will be enhanced.

These materials are available for a limited time at www.minerstownhall.org, or through the MSHA Academy at www.msha.gov.

We encourage your use and evaluation of this program. We look forward to your comments and suggestions. Please don't hesitate to contact us at 814.865.7472, or by contacting any of the authors (See Appendix C).

INTRODUCTION

Purpose

The training program, titled, *Do you understand mine emergencies? Are you prepared for a mine emergency?* was prepared for miners. The purpose of the training program is to enhance a miner's capability to survive a mine emergency, primarily through mine emergency preparedness (MEP). Survivability will depend on many factors, such as size of the mine, location of miners, the scope of the incident, amount of energy released, availability/use of emergency technology, emergency plans, training on MEP, and decision-making. The physical factors of the incident may often be beyond the control of those who manage and mine the coal. What we can control is our knowledge of and skills in emergency preparedness and response. By enhancing a miner's knowledge of emergency principles, standards, laws, procedures, policies, and best practices, combined with excellent performance and practice on emergency skills, and decision-making capabilities, more miners will be able to survive mine emergencies.

Format/content

This innovative training program uses webcast technology (Internet and CD ROM based), combined with PowerPoint presentations, Instructor's and Participant's Guides. The webcast is a multi-media resource that can be accessed through the Internet at www.minerstownhall.org or played from a CD. During the webcast panel commentaries, PowerPoint slides are used to summarize and supplement most of the main points made by the panelist. In addition, a series of high definition (HD) video clips are embedded within the webcast and "rolled in" at the appropriate times. This realistic clips, shot on location at a working mine, represent a simulated mine emergency and response, and feature donning/switching of the SCSR, and the use of directional lifelines.

This training program consists of six training modules that address the following major mine emergency preparedness issues:

- Mine emergencies
- Emergency response plans
- CSE SR-100 Self-contained self-rescuers
- Emergency communications and miner tracking
- Escape and evacuation
- Breathable air safe havens/refuge chambers

Instructors using these modules are encouraged to tailor the material to their needs. This may mean omitting some of the information, and in some cases, adding site-specific or supplemental information (e.g., pictures, video clips, group activities, quizzes, etc.) other than the ones included in the Participant's Guide. To supplement the content on mine emergency preparedness contained in the modules, the hour-long webcast—featuring an expert panel—is used to introduce and comment on important topics, concerns, and issues, such as the key provisions of the MINER ACT, progress in mine rescue and mine emergency preparedness technology, miner tracking, miners' stress in response to emergencies, decision making, innovative training, and barricading. In the next section, more detailed information is provided on using the materials contained in the training program.

SUGGESTIONS ON USING THIS TRAINING PROGRAM

Planning, Development and Presentation

Quality training results from a combination of good training material, and competent instructors. The first responsibility of the instructor is to design and develop a lesson plan that is based on a good training needs assessment, and pre-assessment. Essentially, the purpose of the needs assessment defines the training content. The best content is practical, relevant, and selected to meet the needs (both skill- and knowledge-based) of the miner. Typically, miners are willing to open up to learning if they are convinced that the material and information being presented—in short the curriculum—will enhance their safety, and help them achieve their goals. Another way of stating this is to remind instructors to always bear in mind that today's adult learners are tuned in to only one channel—WIIFM—**“What's In It For Me.”!** Further, today's miners are well informed, highly trained, and better educated than previous generations of miners. Today's younger miners—whose ranks are increasing daily—respond best to training that is interactive, image-rich, and lean on lecture-type instructional methods.

Miners should pay attention to training on mine emergency preparedness, and take it very seriously. Part of the responsibility for achieving that rests with the miner. No one learns if they are not ready or willing to learn. The other part of the responsibility lies with the instructor and mine management. The most effective training should always be well-planned, and structured. Ample time and resources should be available to ensure quality training.

Instructors need to also be reminded that the greatest potential for learning (understanding) and retention occurs when the instructional methods provide an opportunity for active participation through doing/demonstrating the skills/knowledge they have been presented and demonstrated to them. With that in mind and what has been already been said regarding the importance of planning and preparation, here are some specific suggestions for presenting this training course:

1. Thoroughly prepare yourself by finding out about your mine's most important training needs in mine emergency preparedness.
2. Read over and study the lesson plans, and make notes to yourself about information you want to emphasize, and specific examples and materials (your ERP plan, information on your mines communication and tracking system, etc.) that you want to use and include in the discussions.
3. The information on the PowerPoint slides is to be used as "talking points." You must master the information (the details of instruction) and be prepared to ask a variety of questions to spur discussion or achieve other participant learning objectives, such as test knowledge of requirements, analyze a problem, explain how things differ, or to understand how things fit together to form the "big picture." The lesson plan consists of instructor objectives, key points to cover (column 1), details of instruction (column 2), and instructor notes (column 3). **You may choose to omit some of the details of the instruction (column 2). Some of this information falls into the category of "nice to know" information. While it is important information, it is not critical to the goal of the training program, i.e., providing the miners with the information and skills that are directly relevant to successfully escaping dangers associated with mine emergencies.** However, it was included in the modules for the benefit of the instructor who may need or want such information and the level of detail provided if he/she is training supervisors, management, responsible persons, etc.

Column 3 contains reminders to the instructors regarding ways to make the training more site-specific, suggestions for getting the students to participate by involving them in the discussions, and additional key points that are not addressed in column 1. The instructor who is adept at asking questions will be better able to get the participants

involved, and consequently have more success in meeting their training needs and goals. Questions are tools that can be used to achieve specific objectives. Generally, if you want to encourage discussions, then use open ended questions. A well prepared instructor will maximize student learning by:

- a) discussing the purpose of the lesson, and how the information and/or skills learned will help them (e.g., enhance their chance of surviving an emergency by remaining isolated from toxic atmospheres, enable them to get accurate information to those who need it...to those who can help them escape the mine, etc.);
- b) sharing the learning objections with the participants;
- c) using group activities if time permits (e.g., using their mine map to get out of the mine in the most efficient way);
and
- d) encouraging discussion of mine-specific issues and concerns (e.g., improving ERPs, clarifying policies, procedures, etc.).

Application

Opportunities to apply the knowledge and skills learned in class can be demonstrated in class or out of class. Skills (behaviors) and knowledge and attitudes (SKAs) that are learned and retained for the purpose of emergency response are unique. They must be learned and frequently relearned as a proactive strategy to reduce loss due to injury and property damage if an emergency occurs; however, everyone hopes that the only application of the SKAs stay strictly in the “classroom.” This type of training can become repetitious and participant and instructor motivation and enthusiasm can wane. Therefore, everyone must make a concerted effort to do their part to contribute to the training experience so that the necessary skills and knowledge are learned and retained, and ever ready should the need arise.

Evaluation of Effectiveness

Training should always be evaluated. It can be evaluated on several different levels, including reaction (satisfaction of the participants with the material, instructor, etc.), learning (did the participants learn a knowledge/skill/attitude in the classroom and can they demonstrate that they learned it?), behavior/performance (was a new behavior or set of skills learned that can be observed outside the classroom, such as donning a SCSR in response to an actual emergency at the mine?), and outcomes or results (are more miners able/capable of evacuating or surviving a mine emergency as a result of the training?). This training program gives the instructor a means to evaluate the training in terms of reaction and learning. This training program includes an evaluation form that should be distributed to the participants at the end of the course, or at the end of a lesson. Summarizing these results will give the instructor data on how well the training program was received and whether the participants were satisfied with the experience (see Appendix A). The training program also includes pre- and post-tests. These tests are intended to measure learning. The pre-tests (limited to five questions) were designed to get a baseline of a participant's knowledge prior to training. The questions that have been prepared evaluate only knowledge. However, instructors are encouraged to include a pre-test of a skill (e.g., donning/switching an SCSR, decision-making when confronted with an escape problem or challenge). The post-tests (include the pre-test questions and several additional questions) are designed to measure (when results are compared with the results from the pre-test) changes in learning resulting from the training. Instructors are encouraged to evaluate changes in behavior or performance that may have resulted from the training.

Summary

- Quality training results from a combination of good training material, and competent instructors.
- Instructors must take the time to prepare for presenting the training by studying the material, and personalizing/tailoring the lesson plan to their mine.

- Lesson objectives are statements about what you want the participants to know and/or do; they should always be shared with the participants at the beginning of the lesson.
- Instructors need to discuss how the information being presented and the skills being learned will help them in their daily lives to better achieve their goals.
- Participants learn best when a variety of their senses are engaged in the learning; therefore, instructors need to use a variety of instructional methods and choose several methods that actively involve the participants.
- While it varies depending on experience, adult learners possess a wealth of knowledge and skills; instructors need to plan for ways to acknowledge and tap into this valuable training resource.
- One of the best strategies for ensuring participant involvement is to make liberal use of questions.
- During lesson implementation, instructions should summarize often; not only does it allow the instructor to reinforce the most important points of the lesson, it gives the participants an opportunity to reflect on and digest what is being covered, and that in turn often leads to questions by the participants.
- Remember to evaluate the training. Asking questions during the presentation—aside from enriching the curriculum through participant input and involvement, it also gives the instructor the opportunity to gauge how well the material is being understood.
- In addition, oral and written quizzes, and observation of skills (e.g., switching SCSRs) are proven ways to measure learning and changes in performance.
- Be enthusiastic about what you are presenting, and how you present it. Earn the respect of those you train by mastering the material.
- Finally, show that you care...participants respond best to the training when instructors demonstrate that they care about them by taking an interest in their safety and health. People can teach you how to elevate and enhance your training skills, but no one can teach how you care.

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Module 5

Escape & Evacuation

Instructor's Guide

Purpose of the Module

Increase the trainees' knowledge and skills of key aspects for successful escape and evacuation from a mine emergency.

Outline

1. Requirements for primary and secondary escapeways and lifelines
2. Requirements for escapeways and mine maps
3. Requirements for quarterly fire drills and walking escapeways.
4. Staging areas/account for miners
5. Donning an SCSR
6. Beginning an evacuation
7. Locating and spacing of SCSR caches
8. Alternative, feasible escape routes

Learning Objectives

- Describe regulatory requirements for primary and secondary escape ways and lifelines
- Identify the specific mine's layout of escape ways and locations of lifelines and any available tag lines
- Discuss regulatory requirements for depicting escape ways on mine maps and where the maps are located at and in the specific mine.

- Describe requirements for quarterly fire drills and walking\escapeways
- Identify the staging areas at different locations in the specific mine for different types of workers, e.g., on sections, along various submains and mains, etc.
- Describe how to ensure that all workers in an area are accounted for
- Discuss what communications will be made in case of an emergency and what information to exchange while communicating with the responsible person.
- Describe when to don an SCSR(note: donning and switching procedures are covered in module 3)
- **Describe...**
 - When to begin an evacuation
 - The decision-making rationale for selection of an escape way under different emergency scenarios
 - Details about preparing for escape
 - And scenarios under which escape may be impossible, and as a last resort, when to seek refuge.
- **Describe**
 - Locations (on sections, in escape ways) and spacing of SCSR caches in the specific mine
 - How to find them during an emergency
 - Locations and spacing of any breathable air safety havens (refuge chambers).
- **Describe ...**
 - Alternative, feasible escape routes if the primary and secondary escape ways are or become inaccessible, and when to change the escape route.
 - When a safe area has been or may be reached, and when the SCSR may be taken off.

Using the Module

- **Instructor PowerPoint slide presentation consists of bulleted talking points**
 - Familiarize yourself thoroughly with the detailed information in this lesson and elaborate on key points as needed
 - Involve the group by following up on suggestions in the Instructor Notes
- **Use site-specific examples whenever possible**
 - Introduce mine-specific examples when possible
 - Use mine maps, emergency response plans, and corporate policies to tailor this information to your own mine.
- **Pre-test**
 - Have adequate tests available.
 - Allow 10 minutes for completion of test.
 - Each trainee takes his/her own test.
 - Explain purpose of pre-test: Pre-test will establish baseline of pre-existing knowledge.
 - Collect and score pre-test before completion of this module

- **Present the Lesson**

- Using the slides, introduce the purpose of the module (Slides 1-2)
- Introduce the lesson objectives to the participants (Slides 3-9)
- Present the information in the module

At the end of the lesson administer the post-test

- Allow 15 minutes for completion of the test

SLIDE 10
PRIMARY/SECONDARY ESCAPE WAYS AND
LIFELINES/TAGLINES

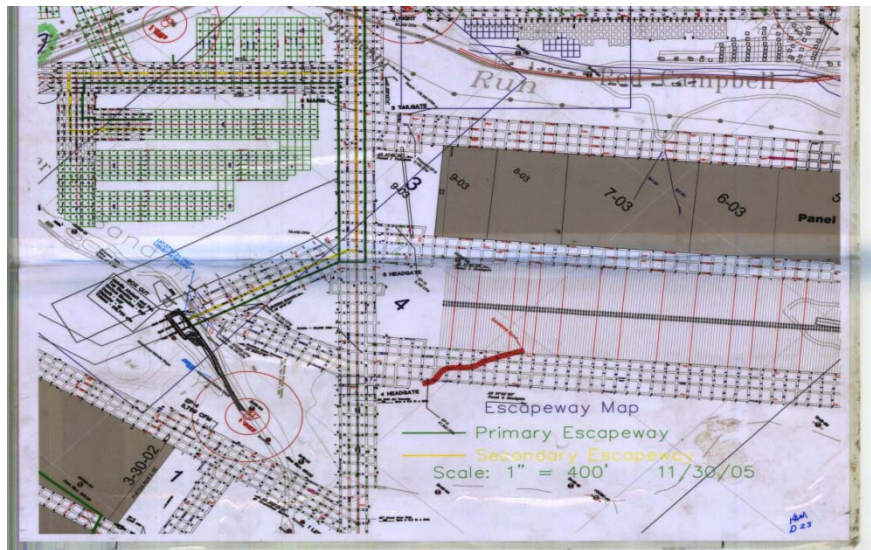
SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>Escapeways</i> • <i>Lifelines / Taglines</i> • <i>Alternate Escapeways</i> • <i>Mechanical Escapeways</i> 		
Important Points	Details of Instruction	Instructor Notes
<p>Explain regulatory requirements of 30 CFR (75.380) and (75.1704)</p> <ul style="list-style-type: none"> • Escapeways 	<ul style="list-style-type: none"> ▪ At least two separate and distinct travelable escape ways from each working section (and areas where equipment being installed or removed) continuous to escape drift, shaft, slope to the surface. 	<p>Use 30 CFR Parts 75.380 and 75.1704 to describe MSHA requirements of escapeways.</p>
<ul style="list-style-type: none"> • Lifelines/Taglines 	<p>Lifelines must be continuous, durable and directional</p> <ul style="list-style-type: none"> • In entire length of each escape way • Flame-resistant • Marked with a reflective material every 25 feet 	<p>Use 30 CFR Parts 75.380 and 75.1704 to describe MSHA requirements of lifeline and taglines.</p> <p>Ask the group to describe:</p> <ul style="list-style-type: none"> • What their lifelines are made of

	<ul style="list-style-type: none"> • Located for effective escape • Equipped with directional indicators at intervals not exceeding 100 feet • Securely attached to and marked to provide tactile feedback indicating the location of any SCSR storage locations in the escape ways 	<ul style="list-style-type: none"> • Where they are located • What type of directional indicators are used and how they work.
<ul style="list-style-type: none"> • Alternate Escapeways 	<p>Alternate escapeways must be separated from the primary escape way for its entire length, except that the alternate and primary escape ways may be ventilated from a common intake air shaft or slope opening</p>	<p>Use 30 CFR Parts 75.380 and 75.1704 to describe MSHA requirements of alternate escapeways.</p>
<ul style="list-style-type: none"> • Mechanical Escapeways 	<p>Mechanical escape facilities shall be provided and maintained for</p> <ol style="list-style-type: none"> 1. Each shaft that is part of a designated escape way and is greater than 50 feet in depth; and 2. Each slope to the surface that is part of a designated escape way and is inclined more than 9⁰ <ul style="list-style-type: none"> • Within 30 minutes after mine personnel on the surface have been notified of an emergency requiring evacuation, mechanical escape facilities provided shall be operational at the bottom of shaft and slope openings that are part of escape ways. • Except where automatically activated hoisting equipment is used, the bottom 	<p>Use 30 CFR Parts 75.380 and 75.1704 to describe MSHA requirements of lifeline and taglines.</p> <p>Ask the group to explain how mechanical hoists are used for escape at this mine (if applicable).</p>

	<p>of each shaft or slope opening that is part of a designated escape way shall be equipped with a means of signaling a surface location where a person is always on duty when anyone is underground. When the signal is activated or the evacuation of persons underground is necessary, the person shall assure that mechanical escape facilities are operational as required by paragraph (j) of this section.</p>	
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SLIDE 11
ESCAPEWAY MAP

SLIDE CONTENTS



Important Points	Details of Instruction	Instructor Notes

SLIDE 12
ESCAPEWAY MAP

SLIDE CONTENTS



Important Points	Details of Instruction	Instructor Notes

SLIDE 13
PRIMARY/SECONDARY ESCAPE WAYS AND
LIFELINES/TAGLINES

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>Stairways</i> • <i>Examination Of Escapeways</i> • <i>Locations of Taglines</i> 		
	Details of Instruction	Instructor Notes
<p>Explain regulatory requirements of 30 CFR (75.380) and (75.1704)</p> <ul style="list-style-type: none"> • Stairways 	<ul style="list-style-type: none"> • Stairways or mechanical escape facilities shall be installed in shafts that are part of the designated escape ways and that are 50 feet or less in depth, except ladders may be used in shafts that are part of the designated escape ways and that are 5 feet or less in depth • Stairways shall be constructed of concrete or metal, set on an angle not to exceed 45 degrees from the horizontal, and equipped on the open side with handrails. In addition, landing platforms that are at least 2 feet by 4 feet shall be installed at intervals not to exceed 20 vertical feet on the stairways and equipped on the open side with handrails • Ladders shall be constructed of metal, anchored 	<p>Describe how stairs and ladders would be used for escape at this mine (if applicable).</p> <p>Locate all applicable stairs and ladders used for escape on the mine map.</p> <p>Ask the group to locate all applicable stairs and ladders used for escape at this mine.</p>

	<p>securely, and set on an angle not to exceed 60 degrees from the horizontal</p> <ul style="list-style-type: none"> • A travel way designed to prevent slippage shall be provided in slope and drift openings that are part of designated escape ways, unless mechanical escape facilities are installed 	
<ul style="list-style-type: none"> • Examination of Escapeways 	<ul style="list-style-type: none"> • Escape ways shall be examined by certified person in their entirety at least once/week (unless mine idle for entire week)(week means not exceeding 7 days) • Each miner to travel escape ways through section to main escape ways at least once every 90 days • At least 2 miners, including supervisor, on each producing section travel main escape ways to portal at least once every 6 weeks 	<p>Describe when escapeways are inspected.</p> <p>Describe what will be checked during the inspection.</p> <p>Ask the group to provide examples of conditions that need attention, and to remind them to report any deficiencies they observe in escapeways immediately!</p>

SLIDE 14

ESCAPEWAYS AND MINE MAPS REGULATORY REQUIREMENTS

SLIDE CONTENTS

Mine Maps

- *Locations of Escapeways*
- *Temporary Notations And Revisions*
- *Changes*

Important Points	Details of Instruction	Instructor Notes
Explain where escapeways are located on mine maps.	<ul style="list-style-type: none">• Escape ways required on mine ventilation map.• Also required on mine map.	Use mine maps to point out escapeways. Ask the group to locate escapeways on the mine maps.
Explain how mine maps are revised	<ul style="list-style-type: none">• Mine maps require temporary notations, revisions, and supplements and revisions at not more than 6 months, including for escape ways.	Show any current revisions to escapeways on mine maps.
Describe how changes are made and how soon they have to be included on mine map following changes.	<ul style="list-style-type: none">• Changes to be annotated at end of shift – outside and on work sections/locations; notify miners underground immediately as changed.	

SLIDE 15

QUARTERLY MINE EMERGENCY EVACUATION TRAINING- DRILLS/WALKING ESCAPE WAYS REGULATORY REQUIREMENTS

SLIDE CONTENTS

- *Training*
- *SCSRs*
- *Escapeway Drills*
- *Fire Suppression Equipment*
- *Expectations Training*
- *Recordkeeping Requirements*

Important Points	Details of Instruction	Instructor Notes
Describe training requirements	<ul style="list-style-type: none">• Requires each miner to participate in quarterly SCSR and evacuation training	<ul style="list-style-type: none">• Ask the miners WHY it is so important that they participate
Describe requirements of SCSR training	<ul style="list-style-type: none">• Hands-on training on all types of self-rescue devices (transferring, too)	

<p>The proper use of a SCSR can mean the difference of escaping successfully and not escaping at all!</p>	<p>Emphasize the importance of:</p> <ul style="list-style-type: none"> • Recognizing when SCSR not working right • Not removing mouthpiece until fresh air • Controlling breathing and physical exertion 	
<p>Describe the requirements of escape way drills</p>	<ul style="list-style-type: none"> • Realistic escape way drill with different approved scenario will be conducted each quarter. <p>Escape way drill requirements:</p> <ul style="list-style-type: none"> • Travel primary or alternate escape way in entirety, alternating escape ways each quarter • Practice using lifeline and tether • Locate stored SCRSS • Traverse undercasts or overcasts and doors • Switches escape ways, as applicable • Negotiate any other unique conditions 	
<p>Describe where fire fighting equipment is located and how it works</p>	<p>Review mine and escape way maps, fire-fighting plan, and emergency evacuation plan, including:</p> <ul style="list-style-type: none"> • Locations of fire doors, check curtains, changes in travel routes, and plans for diverting smoke from escape ways • Locating escape ways, exits, travel routes to surface, and abandoned areas • Operate fire suppression equipment and the location/use of fire-fighting equipment and materials. 	<p>Review mine maps and point out important fire-fighting information.</p> <p>Ask miners to summarize procedures on how to use fire-fighting equipment.</p>

<p>Describe/define “expectations training (ET)”</p>	<p>EACH miner must participate in annual expectations training (within 1 quarter of being employed) and the training will include:</p> <ul style="list-style-type: none"> • Donning/transferring SCSRs in smoke, simulated smoke, or an equivalent environment • Breathing through a realistic SCSR training unit that simulates airflow resistance and heat 	<p>Discuss how previous drills have been conducted</p> <p>Ask the participants why “expectations training” is so important.</p>
<p>Describe what it is meant to do... what will be expected from miners during this training</p>	<ul style="list-style-type: none"> • ET attempts to approximate potential, actual emergency conditions 	<p>Ask the miners is they have any concerns about ET</p>
<p>Describe what types of records are required to be maintained</p> <p>Explain how to obtain a copy of the training certificate, what is included on the training record, and how long the record will be maintained.</p>	<ul style="list-style-type: none"> • At completion of each training or drill, certify by signature and date that training was done according to requirements. • Miners can receive a copy of the training form, if requested <p>Records must be kept for one (1) year and include:</p> <ul style="list-style-type: none"> • The names of participating miners • The contents of training or drill component for each miner • The escape way traveled and the scenario used 	<p>Show a typical training certificate that will be issued.</p>

SLIDE 16

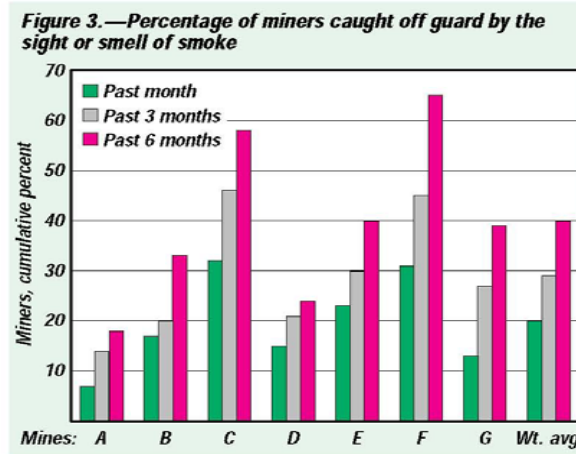
MINERS' REPORT OF DETECTION OF SMOKE

SLIDE CONT								
<i>Cumulative frequencies (in percent) with which miners reported either seeing or smelling smoke underground for any reason</i>								
<i>Frequency</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>Mine</i>			<i>Wgt'd. avg.</i>	
				<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	
							<i>all mines</i>	
<i>At least once per shift</i>	4	7	4	18	16	20	7	11
<i>At least once per week</i>	37	37	32	55	55	71	27	46
<i>At least once per month</i>	63	70	46	67	84	95	67	71
<i>At least once per year</i>	78	80	89	79	100	97	90	88
<i>Less than once per year</i>	96	100	96	100	—	100	97	99
<i>No response</i>	100	—	100	—	—	—	100	100
<i>¹Median frequency for the mine</i>								
Important Points	Details of Instruction						Instructor Notes	

SLIDE 17

DATA ON MINERS' AND SMOKE IN MINE

SLIDE CONTENTS



Important Points	Details of Instruction	Instructor Notes

SLIDE 18
DATA ON SOURCE OF SMOKE

SLIDE CONTENTS																														
<p><i>Figure 4.—Source of fire for miners caught off guard by smoke</i></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <caption>Data for Figure 4: Source of fire for miners caught off guard by smoke</caption> <thead> <tr> <th>Source of Fire</th> <th>Number of Miners</th> </tr> </thead> <tbody> <tr><td>Belt rubbing</td><td>25</td></tr> <tr><td>Hot metal</td><td>25</td></tr> <tr><td>Belt rollers</td><td>21</td></tr> <tr><td>Mobile eqpt.</td><td>13</td></tr> <tr><td>Belt drive</td><td>9</td></tr> <tr><td>Cables</td><td>9</td></tr> <tr><td>Trolley line</td><td>6</td></tr> <tr><td>Batteries</td><td>5</td></tr> <tr><td>Elect. components</td><td>5</td></tr> <tr><td>Tall roller</td><td>4</td></tr> <tr><td>Other spont. comb.</td><td>4</td></tr> <tr><td>Other</td><td>10</td></tr> <tr><td>Unknown</td><td>11</td></tr> </tbody> </table>			Source of Fire	Number of Miners	Belt rubbing	25	Hot metal	25	Belt rollers	21	Mobile eqpt.	13	Belt drive	9	Cables	9	Trolley line	6	Batteries	5	Elect. components	5	Tall roller	4	Other spont. comb.	4	Other	10	Unknown	11
Source of Fire	Number of Miners																													
Belt rubbing	25																													
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Unknown	11																													
Important Points	Details of Instruction	Instructor Notes																												

SLIDE 19

STAGING AREA/ACCOUNTING FOR PERSONAL

SLIDE CONTENTS

- ✓ *Depends on location in mine and emergency scenario causing the threat*
 - *Where stage on section?*
 - *In submains?*
 - *In mains?*
 - *Other?*

Important Points	Details of Instruction	Instructor Notes

SLIDE 20
RESPONSIBLE PERSON/COMMUNICATIONS

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>Responsibilities of responsible person</i> • <i>Training requirements of responsible person</i> • <i>Crucial information for responsible persons</i> 		
Important Points	Details of Instruction	Instructor Notes


<p>Describe the training requirements of the Responsible Person</p>	<p>Responsible Persons must receive annual training</p> <ul style="list-style-type: none"> • Organizing a command center • Coordinating fire-fighting personnel • Deploying fire-fighting equipment • Coordinating mine rescue personnel • Establishing a fresh air base • Deploying mine rescue teams • Providing for mine gas sampling and analysis • Establishing security • Initiating an emergency mine evacuation • Contacting emergency personnel • Communicating appropriate information related to the emergency 	<p>Reference the tasks list of the responsible person (Appendix D)</p>
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<p>Describe the need for Responsible persons to get critical information in an emergency</p>	<p>Critical information to be given to Responsible Persons in an emergency</p> <ul style="list-style-type: none">• What has happened?• Who is reporting the problem?• Where is the problem?• What is happening now?• How serious is the problem?• Is anyone in danger?• What is being done?• What resources are on the scene?	<p>Ask the participants WHY the responsible person needs this information and what they will do with this information when they receive it.</p>
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SLIDE #21
RESPONSIBLE PERSON/COMMUNICATIONS

SLIDE CONTENTS

- ✓ *EMERGENCY COMMUNICATION TRIANGLE*
 - *IDENTIFY YOURSELF*
 - *IDENTIFY THE LOCATION*
 - *IDENTIFY THE PROBLEM*
- *INTERACT AS MORE ACCURATE CRITICAL INFORMATION BECOMES AVAILABLE*

Important Points	Details of Instruction	Instructor Notes
<p>EMERGENCY COMMUNICATION TRIANGLE</p> 	<ul style="list-style-type: none"> • IDENTIFY YOURSELF • IDENTIFY THE LOCATION • IDENTIFY THE PROBLEM • Interact as more, accurate critical information becomes available, e.g., who is accounted for, who is hurt or worse, who is not accounted for, update on the problem, etc. 	<p>Ask the miners if they have any ideas on how the emergency triangle can be remembered.</p>

SLIDE 22
WHEN TO DON SCSR

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>By order</i> • <i>Presence of doubt</i> • <i>Other circumstances</i> 		
Important Points	Details of Instruction	Instructor Notes
<p>When ordered</p> <p>Follow donning orders immediately</p>	<ul style="list-style-type: none"> • When told to do so by Responsible Person or mine supervisor – and follow instructions thereafter 	
<p>When in doubt</p> <p>Best to err to the side of safety.</p>	<ul style="list-style-type: none"> • If in doubt and especially when away from communications, be conservative – it’s your life 	
<p>Discuss other circumstances</p>	<ul style="list-style-type: none"> • If with other miners and no communication received, evaluate situation and be conservative 	

SLIDE 23
WHEN TO EVACUATE

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>When ordered</i> • <i>When in doubt, and especially...</i> • <i>When away from communications</i> • <i>If with other miners and no communication is received</i> 		
Important Points	Details of Instruction	Instructor Notes
<p><i>When ordered</i> Follow evacuation orders immediately.</p>	<ul style="list-style-type: none"> • When told to do so by Responsible Person or mine supervisor and follow instructions thereafter 	
<p><i>When in doubt</i> Best to err to the side of safety.</p>	<ul style="list-style-type: none"> • If in doubt and especially when away from communications, be conservative – it’s your life 	
<p><i>When away from communications</i> Best to err to the side of safety.</p>	<ul style="list-style-type: none"> • If in doubt and especially when away from communications, be conservative – it’s your life 	
<p><i>Discuss other circumstances</i></p>	<ul style="list-style-type: none"> • If with other miners and no communication received, evaluate situation and be conservative 	

SLIDE 24
PREPARING TO EVACUATE

SLIDE CONTENTS		
<p><i>Select proper escape way</i></p> <ul style="list-style-type: none"> • <i>Primary, intake escape way</i> • <i>If primary blocked</i> 		
Important Points	Details of Instruction	Instructor Notes
<p>Select proper escape way: Follow directions on what escapeway to use.</p>	<ul style="list-style-type: none"> • Select escape way to use based on information given by Responsible Person, by mine supervisor, or observed conditions evaluating the emergency scenario. 	
<p>Primary, intake escape way: Primary, intake escapeway is the first choice</p>	<ul style="list-style-type: none"> • Preference goes to primary, intake escape way, if no other information is available and conditions are generally equal. 	
	<ul style="list-style-type: none"> • If primary blocked, based on available information, and secondary escape way appears feasible, use it. • • If primary and secondary escape ways are blocked, based on available information, then assess possibility of using another route that is known by someone in your group. 	<p>Ask the miner what they should do if both primary and secondary escapeways are blocked...answer: find another escapeway. Get out alive!</p>

SLIDE 25
PREPARING TO EVACUATE

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>If primary and secondary escape ways are blocked</i> • <i>Question: where are other routes?</i> 		
Important Points	Details of Instruction	Instructor Notes
<p>Select proper escape way: Follow directions on what escapeway to use.</p>	<ul style="list-style-type: none"> • Select escape way to use based on information given by Responsible Person, by mine supervisor, or observed conditions evaluating the emergency scenario. 	
<p>Primary, intake escape way: Primary, intake escapeway is the first choice</p>	<ul style="list-style-type: none"> • Preference goes to primary, intake escape way, if no other information is available and conditions are generally equal. 	
<p>If primary escapeway is blocked: If the primary escapeway is blocked, attempt to use the secondary escapeway.</p>	<ul style="list-style-type: none"> • If primary blocked, based on available information, and secondary escape way appears feasible, use it. • If primary and secondary escape ways are blocked, based on available information, then assess possibility of using another route that is known by someone in your group. 	<p>Ask the miner what they should do if both primary and secondary escapeways are blocked...answer: find another escapeway. Get out alive!</p>

SLIDE 26
EVACUATION AND DECISIONS

SLIDE CONTENTS		
<ul style="list-style-type: none"> • <i>Once a decision is made to escape</i> • <i>Before leaving</i> • <i>If serious conditions are encountered,</i> • <i>While traveling the secondary escape way</i> 		
Important Points	Details of Instruction	Instructor Notes
<p>Once a decision is made to escape: Prepare to escape in an orderly manner, gather needed supplies</p>	<p>Once a decision is made to escape and communications have been made (if possible), ensure additional SCSRs, safely reachable food and water, and other safely reachable potentially useful items are gathered.</p>	
<p>Before leaving: Check for all crewmembers.</p>	<p>Before leaving do an accountability check for miners at your location, and then depart by the selected route.</p>	
<p>If serious conditions are encountered: Switch escapeways if adverse conditions are encountered.</p>	<p>If while evacuating via the selected alternate route, serious conditions are encountered, preventing further travel, then a switch to the primary or secondary escape should be made.</p>	

SLIDE 27

EVACUATION AND DECISIONS/PREPARATIONS

SLIDE CONTENTS

- *If no escape appears feasible*
- *If travel to the safe haven appears infeasible*

Important Points	Details of Instruction	Instructor Notes
Describe what to do if no escape appears feasible: Safe havens are only to be used after all means of exit have been exhausted	<ul style="list-style-type: none">• After assessing the feasibility of escape by a different, prioritized routes, and if no escape appears feasible, only then as a last resort determine where a breathable air safe haven is in the mine and, after preparation, depart for it – if feasible	
Describe what to do if travel to the safe haven appears infeasible Barricading is the ABSOLUTE LAST RESORT!	<ul style="list-style-type: none">• If travel to the safe haven appears infeasible, then as the very last resort, determine where to build a barricade, and build it well	

SLIDE 28

LOCATING SCSRS ALONG ESCAPE WAY

SLIDE CONTENTS

- *Additional SCSRs are Available At Each Fixed Work Location*
- *Remember: SCSR Locations Are Spaced At Intervals Along The Escape Way According To Seam Height*

Important Points	Details of Instruction	Instructor Notes
Location of additional SCSRs in a timely manner is critical	<ul style="list-style-type: none">• In addition to individual SCSRS, an additional SCSR is available at each fixed work location• Knowing how to locate SCSRs along escape ways during evacuation is critical.	Show on the mine map the locations of all SCSR caches. Ask the group to describe the locations of all SCSR caches.
Describe how far apart the SCSR caches are at this mine. Seam height determines SCSR locations along the escape way	<ul style="list-style-type: none">• SCSR locations are spaced at intervals along the escape way according to seam height, e.g., the maximum distance between storage locations is 4,400 ft in seam that is between 50" and 65" in height.	Ask the miners about how long it will take to reach an SCSR cache?

SLIDE 29

LOCATING SCSRS ALONG ESCAPE WAY

SLIDE CONTENTS

- *An SCSR Location is Securely Attached To The Lifeline In The Escape Way*
- *Additional SCSRs are Available at the Same Intervals*
- *Additional SCSRs are Available on Mantrips or Mobile Equipment*

Important Points	Details of Instruction	Instructor Notes
An SCSR location is securely attached to the lifeline in the escape way	<ul style="list-style-type: none">• An SCSR location is securely attached to the lifeline in the escape way, which is marked to provide tactile feedback regarding the location; it has a sign with reflective material on it; and it has direction signs of reflective material leading to it.	Ask the miners how SCSRs are identified by the lifeline at this mine.
Additional SCSRs are available at the same intervals	<ul style="list-style-type: none">• Additional SCSRs are available at the same intervals along the normal travel routes for pumpers, examiners, and other persons without fixed work locations.	Ask the miners what the distance is between SCSR caches at this mine.
Additional SCSRs are available on mantrips or mobile equipment	<ul style="list-style-type: none">• Also available is at least one additional SCSR for each person who uses a mantrip or mobile equipment to enter or exit the mine	Ask the miners where SCSRs are located on the mantrip.

SLIDE 30

REACHING A SAFE AREA/REMOVING SCSR

SLIDE CONTENTS

- *Change SCSRs at Storage Caches*
- *Do Not Remove Until You Reach Outside or Fresh Air*
- *Other Reason to Remove SCSR?*

Important Points	Details of Instruction	Instructor Notes
Change SCSRs at storage (caches) is recommended	<ul style="list-style-type: none"> • SCSRs will generally be changed at storage locations along the escape way as evacuation proceeds. • By switching SCSR at the cache, the miner will be supplied with another 60 minutes of oxygen. 	
Do not remove until you reach outside fresh air	<ul style="list-style-type: none"> • Travel the escape all the way to the surface before removing the last SCSR used. • Do not remove SCSR when clear air is found. There could still be deadly toxins in clear air...toxins are often colorless and odorless. 	
Other reasons to remove SCSR	<ul style="list-style-type: none"> • When evidence, based on accurate information obtained before or during evacuation, is accurately determined indicating that a safe area has been reached, then the SCSR may be removed, provided that and order to do so is given by the responsible person or a supervisor 	

SLIDE 31
SUMMARY

SLIDE CONTENTS

- ✓ MOST ESCAPE AND EVACUATION FACILITIES/PROCEDURES ARE LEGALLY REQUIRED AND PROVIDED
- ✓ FAMILIARITY WITH LEGAL REQUIREMENTS—FACILITIES/PROCEDURES—IS ESSENTIAL

Important Points	Details of Instruction	Instructor Notes

SLIDE 32

SUMMARY

SLIDE CONTENTS

- ✓ EMERGENCIES/EVACUATION ARE OR SHOULD BE RARE EVENTS—DURING THEIR OCCURANCE IS HARDLY THE TIME TO LEARN ABOUT THEM

- ✓ BE FAMILIAR WITH FACILITIES/PROCEDURES BY DILIGENT PRACTICIES/REPETITIONS DURING DRILLS—EMERGENCY PRACTICES SHOULD BECOME HABIT

Important Points	Details of Instruction	Instructor Notes

APPENDIX A

MODULE 5

ESCAPE AND EVACUATION PRE-TEST—INSTRUCTOR'S ANSWER KEY

1. Which of the following **is not** a requirement regarding each escapeway?
 - a. maintained in a safe condition
 - b. clearly marked to show the route and direction of travel to the surface
 - c. maintained at least 3 feet wide
 - d. *part of the CO monitoring system***

2. Escapeway maps shall show the designated escapeways from the working sections or the miners' work station to the surface.
 - a. *True***
 - b. False

3. Which of the following **is not** a requirement regarding the posting or accessibility of mine maps?
 - a. in each working section
 - b. in each area where mechanized mining equipment is being installed or removed
 - c. at surface locations of the mine
 - d. *in each primary escapeway***

4. Which of the following **is not** a requirement for SCSR expectations training?
 - a. practical experience in donning and transferring SCSRs in smoke or an equivalent environment
 - b. breathing through a realistic SCSR training unit or device
 - c. must be performed annually
 - d. *SCSR must be worn at least 15 minutes by each miner***

5. Which of the following **is not** required regarding mine emergency evacuation training and drills?
- a. hands on training on all types of self rescue devices in use at the mine
 - b. the importance of not removing the mouthpiece even to communicate until reaching fresh air
 - c. ***fire fighting practice***
 - d. a realistic escape way drill

MODULE 5

ESCAPE AND EVACUATION POST-TEST—INSTRUCTOR'S ANSWER KEY

1. Which of the following **is not** a requirement regarding each escapeway?
 - a. Maintained in a safe condition
 - b. Clearly marked to show the route and direction of travel to the surface
 - c. Maintained at least 3 foot wide
 - d. *Part of the CO monitoring system***

2. Escapeway maps shall show the designated escape ways from the working sections or the miners work station to the surface.
 - a. *True***
 - b. False

3. Which of the following **is not** a requirement regarding the posting or accessibility of mine maps?
 - a. In each working section
 - b. In each area where mechanized mining equipment is being installed or removed
 - c. At surface locations of the mine
 - d. *In each primary escapeway***

4. Which of the following **is not** a requirement for SCSR expectations training?
 - a. Practical experience in donning and transferring SCSRs in smoke or an equivalent environment
 - b. Breathing through a realistic SCSR training unit or device
 - c. Must be performed annually
 - d. *SCSR must be worn at least 15 minutes by each miner***

5. Which of the following **is not** required regarding mine emergency evacuation training and drills?
- a. Hands on training on all types of self rescue devices in use at the mine
 - b. The importance of not removing the mouthpiece even to communicate until reaching fresh air
 - c. *Fire fighting practice***
 - d. A realistic escapeway drill
6. Which of the following **is not** a requirement for additional SCSRs?
- a. One additional SCSR for each person at a fixed underground location
 - b. Additional SCSR along the normal travel ways for persons who do not work at a fixed location
 - c. Available for each person who uses transportation portal to portal
 - d. *Two additional SCSRs required for mine examiners***
7. Which of the following **is not** a further requirement for storage of SCSRs?
- a. *Each storage unit shall be painted red***
 - b. The location of all stored SCSRs shall be indicated on the mine map
 - c. Stored in conspicuous locations that are readily accessible
 - d. Each storage location shall be spaced at 30 minute travel distances
8. Which of the following **is not** a feature/requirement of the continuous durable lifelines required under the MINER Act?
- a. Installed throughout the length of each escapeway
 - b. Flame resistant and equipped with directional indicators
 - c. Marked with reflective material every 25 feet
 - d. *Installed on the right side of the escapeway***

9. The Emergency Triangle consists of three parts: Who, Where and What.

- a. **True**
- b. False

10. Who is the responsible person on your shift? _____

Back up? _____

APPENDIX B

Post-Training Evaluation Form

*Do You Understand Mine Emergencies?
Are You Prepared for a Mine Emergency?*

1. Was the material covered relevant to your needs, interests, and expertise?
 Very Much So To Some Extent Needs More Work No
2. Were the objectives of the course met?
 Very Much So To Some Extent Needs More Work No
3. Were the instructors knowledgeable and competent in the subject area(s)?
 Very Much So To Some Extent Needs More Work No
4. Was the course content logically organized?
 Very Much So To Some Extent Needs More Work No
5. Was the length of the course adequate?
 Yes, keep as is Not long enough Shorten it
6. Was there an adequate opportunity for discussions and questions?
 Yes, keep as is Allow more time for discussions and questions

7. Was the use of audiovisuals adequate and appropriate for the course materials?
 Yes No (If no, why?)

8. Do you believe that today's training help you survive a mine emergency?
 Very Much So To Some Extent No

SUGGESTIONS/RECOMMENDATIONS TO IMPROVE THIS TRAINING:

APPENDIX C

MARK C. RADOMSKY

E-mail: mcr4@psu.edu

Address: 0212 RES BL WEST

UNIVERSITY PARK

Telephone Number: +1 814 865 6335

JOSEPH P FLICK

E-mail: jpf1@psu.edu

Address: 0213 RES BL WEST

UNIVERSITY PARK

Telephone Number: +1 814 865 7472

JOSEPH NICHOLAS DESALVO

E-mail: jnd10@psu.edu

Address: 0213 RES BL WEST

UNIVERSITY PARK

Telephone Number: +1 814 865 7472

ROBERT LARRY GRAYSON

E-mail: rlg19@psu.edu

Address: 0103A HOSLER BUILDING
UNIVERSITY PARK

Telephone Number: +1 814 863 1644

RAJA V. RAMANI

E-mail: rvr@psu.edu

Address: 0209 RES BL WEST
UNIVERSITY PARK

Telephone Number: +1 814 863 1617