Do You Understand Mine Emergencies?

Are You Prepared for a Mine Emergency?

Instructor's Guide

MODULE 4: EMERGENCY COMMUNICATIONS AND MINER TRACKING

PENN STATE MINER TRAINING PROGRAM
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DO YOU UNDERSTAND MINE EMERGENCIES?

ARE YOU PREPARED FOR A MINE EMERGENCY?
MODULE 4: EMERGENCY COMMUNICATIONS AND MINER TRACKING

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Acknowledgements

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 of 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 leaning; 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 reinforcement 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 gage 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 4

Emergency Communications & Miner Tracking

Instructor's Guide

Purpose of the Module

Increase the knowledge and skills in the miner to understand, use, and benefit from emergency communications and miner tracking systems...to maximize effective communication to enhance escape or evacuation in the event of an emergency.

Outline

- **INTRODUCTION**
- **LEARNING/PERFORMANCE OBJECTIVES**
- **EFFECTIVE COMMUNICATION**
- **COMMON MEANS OF COMMUNICATION AND STRATEGIES TO ENHANCE EFFECTIVE COMMUNICATION**
- **CURRENT ROUTINE COMMUNICATION SYSTEMS, I.E., PURPOSE, EQUIPMENT, USES**
- **CONCEPT OF EMERGENCY COMMUNICATION**
- **CONCEPT OF EMERGENCY MINER TRACKING**
- **PROVISIONS OF THE MINER ACT REGARDING POST-ACCIDENT COMMUNICATIONS**
- **PROVISIONS OF THE MINER ACT REGARDING POST-ACCIDENT MINER TRACKING**
- **THE BASIC FEATURES OF A POST-EMERGENCY COMMUNICATION SYSTEM**
- **EMERGENCY COMMUNICATION SYSTEM**

■ **MAJOR ISSUES ASSOCIATED WITH EMERGENCY COMMUNICATION**

■ **MAJOR ISSUES ASSOCIATED WITH EMERGENCY TRACKING**

■ **MINE-SPECIFIC EMERGENCY COMMUNICATION AND TRACKING SYSTEMS**

■ **MOST CURRENT COMMUNICATION AND TRACKING SYSTEMS**

■ **STRENGTHS AND LIMITATIONS OF EACH SYSTEM**

Lesson Objectives

1. Define communication, emergency communication
2. Identify three primary parts to the communication process
3. Identify the three essential elements of mine emergency communications (emergency communications triangle)
4. Identify the critical information needed during an emergency
5. Discuss the requirements of the miner act regarding post-accident communications and miner tracking
6. Identify the various types of communication devices used in underground coal mining
7. Provide several advantages and disadvantages of wired communication systems...wireless systems
8. Identify the main problems and undesirable results of poor/ineffective communication
9. Identify several emerging wireless mine communication systems
10. Discuss the concept of miner tracking
11. Identify several emerging wireless miner tracking systems
12. Discuss mine specific emergency communication and miner tracking system used at your mine

Using the Module

- **Instructor PowerPoint slide presentation consists of bulleted talking points**

    o Familiarize yourself thoroughly with the detailed information in this lesson and elaborate on key points as needed

    o Involve the group by following up on suggestions in the Instructor Notes

- **Use site-specific examples whenever possible**

    o 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**
    o Have adequate tests available.

    o Allow 10 minutes for completion of test.

    o Each trainee takes his/her own test.

    o Explain purpose of pre-test: Pre-test will establish baseline of pre-existing knowledge.

    o Collect and score pre-test before completion of this module

- **Present the Lesson**

o   Using the slides, introduce the purpose of the module

o   Review the lesson objectives (slides 5-7)

o   Present the information in the module

At the end of the lesson administer the post-test

o   Allow 15 minutes for completion of the test

SLIDE CONTENTS		
• *What it is* • *What it isn't*		
Important Points	**Details of Instruction**	**Instructor Notes**

Need to be clear about definition of communication	• What it isn't, e.g., act or instance of communicating…information communicated…an exchange of information
	
	 • What it is: **WHAT WE DO TO SHARE UNDERSTANDING THROUGH THE USE OF SYMBOLS AND SIGNS**
	   • Two-way process of sending and receiving symbols to achieve understanding
	     • Speaking, listening, reading, writing, behaving, observing behavior, observing: signals, signs, images…
	       • Oral, verbal, body language, image
	       • Two people, groups of people
	       • Person and written word
	       • Formal direction: up and down, left and right	

SLIDE 7

COMMUNICATION SYSTEM

SLIDE CONTENTS

- *Inputs*
- *Mind Filter*
- *Outputs*

Important Points	Details of Instruction	Instructor Notes
Explain the communication system elements associated with the interpretation of the message The filter (the listener's perception/interpretation) determines the meaning—for the listener	• Inputs are the words, signals, sounds • Filter is our mind…the symbol is sensed, and passes through the listener's brain • Outputs are the interpretations, meanings, the way the message is understood	Ask the participants to identify or draw a sketch that identifies the three parts of the communication cycle: Sender, message, receiver

SLIDE 8

COMMUNICATION CYCLE

SLIDE CONTENTS		
A diagram that depicts the communication cycle		
Important Points	**Details of Instruction**	**Instructor Notes**
Explain the communication cycle Communication is cyclical...starts with idea of the sender...the receiver or listener is as important as the sender	• Communication is a "two-way street" • The idea originates with the sender (speaker) who must encode...select the symbols (words usually) to convey the idea • The receiver (listener) hears the message, and then must decode it (interpret) • The cycle continues when the receiver assumes the role of sender	Ask the participants to identify or draw a sketch that identifies the three parts of the communication cycle: Sender, message, receiver

SLIDE CONTENTS		
• *We cannot not communicate* • *Every aspect of our lives is dominated by communication* • *Communication usually has a specific purpose*		
Important Points	**Details of Instruction**	**Instructor Notes**
• Everything we do involves communication, and therefore hard not to communicate • People communicate because they want something • Communication is practical • Take communication seriously…always try to improve it	Communication dominates every aspect of our lives, and is especially important in our social and at-work relationships. **Aristotle:** The search for "all available means of persuasion"…Throughout our lives we are dependent on communication to get what we want (Maslow's needs)…we are not always as successful as we want to be. How well we communicate determines success. Provide an example of the need for persuasive communication during an emergency? **Covey:** Called "the greatest skill in life." **Mining:** In mining, it can literally be an injury prevention and life saving tool	Ask the miners to provide an example of communication that has no purpose Ask the miners to provide some examples of communication that involves safety/security. Some examples: training, monitors, danger signs, etc. Explosion at Sago occurred at 6:26 am…by ~7:10 am ~10 separate phone calls or conversations occurred. Person communicating always has a purpose in mind…give or get information…persuade, influence…entertain…maintain social relationships

SLIDE 10

MEANINGS ARE IN PEOPLE

SLIDE CONTENTS

- *When communication fails its purpose*

- *Meanings and symbols*

Important Points	Details of Instruction	Instructor Notes
Counter-productive to find fault when communication breaks down Meanings are not in the symbols	When communication fails its purpose, we tend to find fault with someone…much more accurate to admit that all parties played a role in the breakdown Meanings are in people…not in the signs and symbols we use to communicate	Ask miners to share their experiences about communication breakdowns and misunderstandings at work

SLIDE 11

HOW WE VIEW THE WORLD

SLIDE CONTENTS		
Conditioning *The source of meanings*		
Conditioning determines how we will view reality	Conditioning: we are "conditioned" to see the world in terms of our cultural/family background, past experiences, values, beliefs, biases, prejudices, feelings, needs, roles. Paradigms: the sources of our behavior and attitudes…determine how we react with others I'm right…you are wrong…facts are the same. Have no meaning apart from the interpretation	If time permits, provide some examples (e.g., Tunnel vision clip, trained seal/ballroom dance, old woman/young woman Tell Stephen Covey's story about his paradigm shift while traveling on the NYC subway
No meaning in symbols apart from meanings given by people	Source of meaning: not in the words, signs, symbols…meanings are in people	

SLIDE 12

HOW WE SEE COMMUNICATION DIFFERENTLY

SLIDE CONTENTS

- *Language teacher*
- *Sociologist*
- *Foreman/management*
- *Hourly worker*

Important Points	Details of Instruction	Instructor Notes
We have different views on the value/purpose of communication… Depends on our role/position	Language teacher: set of skills used to present and receive information Sociologist: tool for establishing relationships Management sees it as a tool or means of keeping people informed…they tend to think of the formal communication channels…based on hierarchy Worker: important…like to get clear instructions…at work may feel that it needs to be improved because they feel left out…entertainment…pleasure…	

SLIDE 13

STOP AND REFLECT

SLIDE CONTENTS		

WHY DO WE NEED TO COMMUNICATE AT WORK?
     o *KNOW WHAT OCCURRED ON THE PREVIOUS SHIFT*
     o *FURTHER PREPARATION*
     o *ENTERING THE MINE, ON-SECTION, ON-SHIFT EXAM...*
     o *EMERGENCY PREPAREDNESS*		

Important Points	**Details of Instruction**	**Instructor Notes**
Good communication is essential at the mine Good communication takes effort	What occurred on the previous shift: Production and delay sheet, record book...pre-shift, on-shift, accident reports, violations, maintenance log, etc. Assess crew...readiness for work Further Preparation: Give assignments, instructions...communicate safety value **Entering the mine, on-section, on-shift exam...** Section map Call-out sheet...order supplies Communications meeting Giving instructions, training, feedback, describing a plan Emergency preparedness: knowing the location of miners	Ask the miners to provide additional examples

SLIDE 14

EMERGENCY COMMUNICATION & THE RESPONSIBLE PERSON (RP)

SLIDE CONTENTS		
🟥 *DEFINITION* 🟥 *OBLIGATION/RESPONSIBILITY OF RESPONSIBLE PERSON REGARDING COMMUNICATIONS*		
Important Points	**Details of Instruction**	**Instructor Notes**
Emergency communication is very focused	All communication that occurs in the context of an emergency, from initial first response (notification) communication through and including communication initiated and received whose purpose is to facilitate a successful emergency response.	Ask the miners how emergency communication can be improved at their mine…
Communication responsibilities of RP are challenging…training, education are essential to good performance by the RP	RP: knowing the location of miners and familiar with the communication system used at the mine…trained annually in: (i) Organizing a command center… (x) Contacting emergency personnel; and (xi) Communicating appropriate information related to the emergency.	Ask the miners how they can support the RP's communication responsibilities

SLIDE 15

BENEFITS OF EFFECTIVE EMERGENCY COMMUNICATION

SLIDE CONTENTS

- *TELEPHONES*
- *MINE PAGE PHONES*
- *WALKIE TALKIES*
- *TROLLEY PHONES*
- *LEAKY FEEDER*
- *HOIST PHONES*
- *MINE RESCUE TEAM COMMUNICATIONS*

Important Points	Details of Instruction	Instructor Notes
There is a variety of devices and systems used for communicating…they must be used properly… Training and retraining on emergency communication and the use of the communication system at your mine is essential	Telephones: e.g. At Sago the underground mine communication system consisted of pager phones, trolley phones and wireless handheld two-way radios. The responsible person for the system was to be trained in the operation of the AMS and in the proper procedures to follow in the event of an emergency or malfunction and, in that event, was to take appropriate action immediately. However, some dispatchers at the mine were unaware of the correct alert and alarm levels, or of the proper procedures to follow when those alert and alarm levels were reached. In addition, dispatchers were improperly using the AMS to signal miners on the working sections to answer the mine phone.	Ask the miner to identify and discuss the communication systems in use at their mine

SLIDE 16

COMMUNICATING WHILE WEARING A BREATHING APPARATUS

SLIDE CONTENTS		
▮ *HAND SIGNALS* ▮ *NOTE PAD* ▮ *PHONE TAP* ▮ *CAP LAMP*		
Important Points	**Details of Instruction**	**Instructor Notes**
When we can't use our voice for oral communication…either face to face or over a device…we must resort to alternative methods	Hand signals are a convenient way to communicate…many of the signals are readily understood by everyone Use of a note pad requires paper and pencil, and ability to write Phone tap is not unlike Morse code…must understand the "language" Cap lamp is well established means of non-verbal communication	Ask the miner to identify and discuss these non-verbal communication examples in their mine

SLIDE 17

BENEFITS OF EFFECTIVE EMERGENCY COMMUNICATION

SLIDE CONTENTS

- *REDUCES CONFUSION*
- *DECREASES THE CHANCE OF WRONG INFORMATION BEING COMMUNICATED*

- *DECREASES RUMORS*
- *INCREASES CONFIDENCE IN DECISIONS*
- *IMPROVES THE LIKELIHOOD OF SUCCESS*

Important Points	Details of Instruction	Instructor Notes
Effective emergency communication provides many benefits	Emergency situations are stressful… Getting information is often difficult…wrong/inaccurate information delays escape/evacuation Premium is on effective communication…accurate information leads to good decisions Communication is the key element in successful emergency response	

SLIDE 18

PROBLEMS AND UNDESIRED RESULTS

SLIDE CONTENTS

- *NO INFORMATION*
- *NOT ENOUGH*
- *POOR DECISIONS*
- *TIME WASTED*
- *ADDED STRESS*

Important Points	Details of Instruction	Instructor Notes
Ineffective communication creates at least 2 types of problems… Ineffective communication results in at least 3 undesired results	No information increases stress and anxiety among rescuers, family, etc., and waste time Not enough information can stymie decisions, and result in poor decisions…	

SLIDE 19

CRITICAL EMERGENCY INFORMATION

SLIDE CONTENTS

- *WHO REPORTED THE PROBLEM?*
- *WHERE IS THE PROBLEM?*
- *WHAT HAS HAPPENED?*
- *WHAT IS HAPPENING NOW?*

Important Points	Details of Instruction	Instructor Notes
After an incident/emergency it is imperative that we address the "Who", "Where", "What" of the incident	Early communication post-incident at Sago "Pat Boni went to the mine phone located near the No. 4 Belt drive at approximately 6:32 a.m., called Chisolm on the surface and asked what had happened. Chisolm replied that lightning had knocked out some of theunderground power. Pat Boni replied he did not think that was what had happened, since dust was moving inby rather that outby, the opposite direction in which air normally flowed (Gates, et al, 2007)	

SLIDE 20

CRITICAL EMERGENCY INFORMATION

SLIDE CONTENTS

- *IS ANYONE IN DANGER?*
- *HOW SERIOUS IS THE PROBLEM?*
- *WHAT IS BEING DONE?*
- *WHAT RESOURCES ARE ON THE SCENE?*

Important Points	Details of Instruction	Instructor Notes
After the initial information is addressed, miners attempt to assess situation in more detail	Whether a miner is or miners are in danger is arguably the most import issue…danger here may mean at "high risk". A judgment is made regarding seriousness—it's better to error to the side of "more serious" than "less serious." It is especially important to give a brief, concise summary of steps are being taken preserve life, and control the hazards associated with the emergency	

SLIDE CONTENTS

- *WHO*
  - *CREDIBILITY ISSUE*
- *LOCATION*
  - *OFTEN MISSED*
  - *RAMIFICATIONS*
- *PROBLEM*
  - *NOT ALWAYS COMMUNICATED*

Important Points	Details of Instruction	Instructor Notes
Remember the emergency triangle…"Who," "Location," and "Problem."	Credibility of the info is affected by who gives the information Location: affects the decisions regarding escape…routes taken, when SCSRs were donned. Escape decisions, evacuation…If the problem is not described correctly, e.g., fellows we're going home…reaction will be affected accordingly…valuable time could be lost	Ask the miners: which leg of the triangle is the most important

SLIDE 22
SUMMARY...COMMUNICATION

SLIDE CONTENTS

WHO...WHERE...AND WHAT...

- 🟥 *IDENTIFY YOURSELF*
- 🟥 *IDENTIFY THE LOCATION*
- 🟥 *IDENTIFY THE PROBLEM*

Important Points	Details of Instruction	Instructor Notes
It essential that this important information finds the right people both underground and on the surface	What is communicated, and the accuracy of that information are critical to reducing the risks faced by miners involved in an emergency Event: "fire on the cm, no. 7 entry, some smoke." Miners: "no one injured!" Response: "we're on the scene, power is cut, we're hitting the fire with extinguishers."	Give the miners an emergency scenario...ask them to review it and answer the following questions: did the miner correctly identify themselves; the location of the event, what was being done to address the emergency

SLIDE CONTENTS

CASE STUDY #1…

CASE STUDY #2…

Important Points	Details of Instruction	Instructor Notes
Give the participants at least two short case studies to read and react to. Often, because of stress, or lack of a formal procedure and training on the procedure, one of more of the "legs" get omitted	CASE #1 Your mine is ventilated by two exhausting fans, located on the surface. It's Sunday morning around 10:30 am. There are 17 miners inside doing a variety of jobs, such as a longwall move, pumping, maintenance, etc. You are working near the Douglas airshaft fan, located on the surface. You notice that the fan is fluctuating. What do you do?	Give the miners an emergency scenario…TWO ARE PROVIDED FOR YOUR USE HERE. YOU CAN DEVELOP OTHERS THAT ARE MORE DETAILED AND THAT PROVIDE MORE INFORMATION SO THAT THE MINER CAN ANSWER THE FOLLOWING QUESTIONS: Did the miner correctly identify themselves? The location of the event? The problem? What was being done to address the emergency?

| | CASE #2 | Ask the miners to read this |
| | You are working around the seals checking pumps. You are about 600 feet from the crew tearing down the longwall. The pump at 4th main sump is okay, and at the number 5 seal there is nothing unusual. You hope on the trolley to check some other pumps and as you approach the 1-right switch, the power fails. You proceed on foot to where the rectifier is located. While inside the rectifier, you hear a rushing sound. As you exit the enclosure, you see water flowing outby (2 feet deep, and 4 feet wide). You run to the mine phone at the belt drive tail piece. You call the UG shop, but get no answer. You call the communication's office. Someone answers, but the communication is distorted. What do you do now? | scenario, and answer the question... |

SLIDE 24

MINER ACT

SLIDE CONTENTS

- *POST-ACCIDENT COMMUNICATIONS (PAC)*
  - *REDUNDANT INSTALLATIONS*
  - *WIRELESS*
- *POST-ACCIDENT TRACKING (PAT)*
  - *DISPATCHER*
  - *WIRELESS (ELECTRONICALLY)*

Important Points	Details of Instruction	Instructor Notes
PAC and PAT are consistently improving…miners deserve the best that technology can provide Regardless of the technology available	Post-accident communications; (i.e., "redundant communications" until 2009, at which time a two-way, "wireless system" or close alternative is required), Redundant installation…means independent…best achieved by having separate systems in different entries. tracking…Knowing the location of miners (current)…immediate pre-accident is critical information	Ask the miners to discuss the specific system in use at their mine…

SLIDE 25

EMERGENCY COMMUNICATIONS AND MINER TRACKING DEVICES

SLIDE CONTENTS

■ *MSHA TESTING OR DEMONSTRATION*
■ *NEW OR REVISED APPROVALS*
■ *APPROVAL APPLICATIONS*

Important Points	Details of Instruction	Instructor Notes
MSHA's program of testing and approval is on-going	As of March 28, 2008, MSHA has observed testing or demonstration of 30 communications and/or tracking systems at various mine sites. We have met with representatives from 61 communications and tracking system companies. To date, we have had discussions with various vendors regarding 168 different proposals for development of mine communications and tracking systems. MSHA is currently focusing its resources on the evaluation of approval applications for communications and tracking	See *Supplemental Resources*, Description of MSHA Approved Technologies

	technology. Approval: meeting the requirements of Title 30 Part 23 (telephone and signaling devices) Since the beginning of 2006, we have issued 38 new or revised approvals for communications and tracking products. We are currently investigating 50 approval applications for communications and tracking technology. We recently initiated a program to evaluate new technology communication and tracking system performance after MSHA approval and system deployment. We are currently investigating 50 approval applications for communications and tracking technology. We continue to work with the Communications Partnership Working Group sponsored by the NMA/BCOA to arrange for demonstrations of additional systems. MSHA met with NIOSH on March 14, 2008, to discuss underground communications and tracking technology.	

SLIDE 26
WIRED VERSUS WIRELESS

SLIDE CONTENTS		
■ *WIRED* ■ *WIRELESS*		
Important Points	**Details of Instruction**	**Instructor Notes**
A wireless system is coming...in the meantime, a combination of wired and wireless system will be used	Wired: performs well under normal conditions...wires can be damaged in fires/explosions, roof falls, etc. Wireless: more flexibility....possible damage to components in fire, explosion, roof fall, etc. Some components of wireless tracking systems: RFID and PED	

SLIDE 27

APPROVAL HISTORY

SLIDE CONTENTS		
■ *FIRST OFFICIAL APPROVAL OF A WIRELESS TRACKING SYSTEM* ■ *MINETRACER MINER LOCATION MONITORING SYSTEM*		
Important Points	**Details of Instruction**	**Instructor Notes**
To date there are several wireless systems that have been approved	MTMLMS: MineTracer is an integrated wireless communication and tracking system designed specifically for use in underground mines. MineTracer was developed to address the Federal MINER Act of 2006 and West Virginia Rules for communication-tracking performance. Every component of the system has been approved by MSHA for operation in permissible areas in coal mines (potentially explosive atmospheres).	

MINETRACER SYSTEM COMPONENTS

SLIDE CONTENTS

TEXT-MESSAGING MOBILE COMMUNICATOR (TMC)

MOBILE COMMUNICATOR

WIRELESS ACCESS POINT (WAP)

NETWORK CONTROLLER AND SERVER

Important Points	Details of Instruction	Instructor Notes
This particular system uses a WAP, a communication device worn by the miner, and a network controller and server Network controller and server allows those on the surface to see the location of miners	The location of each miner is displayed on a map and in tabular form on a computer in the mine office. Location data for up to hundreds of TMCs and 28 miles of mine coverage is updated every 20 seconds providing continuous safety monitoring of miners from the mine office.	

SLIDE 29

SUMMARY

SLIDE CONTENTS

- COMMUNICATION AND EMERGENCY COMMUNICATIONS ARE ESSENTIAL TO SUCCESSFUL ESCAPE AND EVACUATION
- UNDERSTANDING THE COMMUNICATION PROCESS AND YOUR MINE'S EMERGENCY COMMUNICATION SYSTEM IS CRITICAL

Important Points	Details of Instruction	Instructor Notes
Never take communication for granted	Don't overlook the fact that you should apply continuous improvement principles to mine communications and especially emergency communications	

SLIDE CONTENTS

- CRITICAL INFORMATION DURING AN EMERGENCY IS "WHO", "WHAT", "WHERE"
- MINER ACT WILL ENHANCE EMERGENCY COMMUNICATION
- PERIODICALLY EVALUATE YOUR MINE'S EMERGENCY COMMUNICATIONS, AND MINER TRACKING SYSTEM

Important Points	Details of Instruction	Instructor Notes
Remember Who, What, Where	Identify yourself, give description of what has occurred, and where, and what has been done to control the emergency	

MODULE 4
COMMUNICATIONS AND MINER TRACKING

PRE-TEST—INSTRUCTOR'S ANSWER KEY

1. Human communication is best defined as
    a. a written message.
    b. ***a process of sharing meanings between people.***
    c. an exchange of information between people.
    d. the use of symbols to send messages.

2. Which of the following is a common communication breakdown during mine emergencies?
    a. Confusion over who is in charge of emergency response
    b. Interference on phone lines
    c. ***Communicating the wrong information***
    d. Loss of time

3. Under the MINER Act of 2006, Emergency Response Plans (ERPs) shall
    a. provide a through the earth signal system for locating trapped miners.
    b. ***provide for a redundant means of communication between surface and underground personnel.***
    c. include provisions for yearly revision of all communication systems.
    d. exempt mines with less than 10 miners from MINER Act requirements.

4. The purpose of communications around the mines is best understood as
    a. a tool used by salaried and hourly workers to achieve safe production.
    b. getting management's message across.
    c. ***an essential element in safety, production, and mine emergency response.***
    d. getting the hourly worker's message across.

5. Under the MINER act, the tracking of miners means a system whereby
    a. surface personnel can determine the current location of all mine personnel.
    b. surface personnel can be in constant communication with all miners.
    c. miners underground can initiate a signal (wireless or wire-based) that can be communicated to the surface
    d. ***surface personnel can determine the current or immediate pre-accident location of mine personnel.***

POST-TEST—INSTRUCTOR'S ANSWER KEY

1. Human communication is best defined as
    a. a written message.
    b. ***a process of sharing meanings between people.***
    c. an exchange of information between people.
    d. the use of symbols to send messages.

2. Which of the following is a common communication breakdown during mine emergencies?
    a. Confusion over who is in charge of emergency response
    b. Interference on phone lines
    c. ***Communicating the wrong information***
    d. Loss of time

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    b. surface personnel can be in constant communication with all miners.
    c. miners underground can initiate a signal (wireless or wire-based) that can be communicated to the surface
    d. ***surface personnel can determine the current or immediate pre-accident location of mine personnel.***

6. Decisions that are made during an emergency rely primarily on
    a. redundant mine phones.
    b. ***accurate information.***
    c. an educated crew.
    d. the attitude of the crew.

7. When important communication fails or "breaks down," we often react by
    a. trying a different form of communication.
    b. admitting our role in the "break down."
    c. ***blaming someone or something for the break down.***
    d. all of the above.

8. A common purpose of communication is to
    a. influence.
    b. inform.
    c. socialize.
    d. **all of the above.**

9. The primary purpose of emergency communication is to
    a. ***facilitate a successful emergency response.***
    b. operate a command center.
    c. locate all crew members.
    d. verify a problem.

10. In addition to having a working knowledge of the mine communication system, the responsible person must also
    a. approve all SCSRs used at the mine.
    b. sign off on the mine's emergency response plan.
    c. communicate appropriate information during an emergency.
    d. annually train all crew in firefighting.

11. The mine emergency communication triangle refers to vital information regarding
    the _____, _____, and _____ of incidents.
    a. who, where, why
    b. where, what, when
    c. how, why, who
    d. who, where, what

12. True or False: Hand signals are the best way to communicate while wearing an SCSR?
    a. True
    b. False

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

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