

Do You Understand Mine Emergencies?



Are You Prepared for a Mine
Emergency?

PARTICIPANT'S GUIDE

**MODULE 4: EMERGENCY COMMUNICATIONS AND MINER
TRACKING**

PENN STATE MINER TRAINING PROGRAM
UNIVERSITY PARK, PA
2008



MINER TRAINING PROGRAM

DO YOU UNDERSTAND MINE EMERGENCIES?

ARE YOU PREPARED FOR A MINE EMERGENCY?

Participant's Guide

MODULE 4: EMERGENCY COMMUNICATIONS AND MINER TRACKING

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Preface

The history of underground coal in the United States is notable for its successes and failures. In the distant past, coal 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.

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 and continuous safety improvement is our goal—a challenge to every miner.

Acknowledgements

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The training program, titled, *Do you understand mine emergencies? Are you prepared for a mine emergency?* is the result of a 2007/2008 MSHA, 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, and consists of an achieved webcast, titled, *Escape and survive*, and the training program referred to above.

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

We encourage you to help us improve this program. Please don't hesitate to contact us at 814.865.7472, or by contacting any of the authors (See Appendix B).

INTRODUCTION

Purpose

The training program, titled, *Do you understand mine emergencies? Are you prepared for a mine emergency?* was prepared to help miners deal with mine emergencies. The purpose of the training program is to improve your capability to survive a mine emergency, primarily through mine emergency preparedness (MEP). Surviving an emergency depends on many factors, such as size of the mine, location of miners, the scope of the incident, the amount of energy released, the effectiveness of emergency plans, training and good decision-making. Some factors in an emergency can't be controlled. What you can control is your knowledge and skills in emergency preparedness and response. By improving your knowledge of emergency principles, emergency skills, and decision-making capabilities, more miners will be able to survive mine emergencies.

Format/content

This training program uses Internet webcast technology and CD ROM based PowerPoint presentations, an Instructor's and Participant's Guide. The webcast can be accessed through the Internet at www.minerstownhall.org or played from a CD. During the webcast, various expert panelists will comment on mine emergency subjects. Informational slides appear to the right of the speakers to summarize most of the main points. In addition, a series of video clips are "rolled in" at the appropriate times. These 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
- Self-contained self-rescuers
- Emergency communications and miner tracking
- Escape and evacuation
- Breathable air safe havens/refuge chambers

Each module has a pre-test and a post-test (See Appendix A). You may be given a short test before each lesson to evaluate your knowledge of key points. You may also be given a slightly longer test at the conclusion of the module to evaluate if you grasped the key concepts of the module. If you missed some questions on the pre-test, pay close attention to those parts of the training module.

A few tips to help you with the learning process:

- Take notes
- Ask questions
- Apply your training to your mine
- Talk with other miners
- Think about the layout of your mine during the training
- Make suggestions to improve training
- Ask yourself (and discuss with other miners): “If an emergency were to occur at my mine, how would I apply these principles to escape or evacuate?”

Application

Knowing how to react in an emergency is critical to your survival. Coal mining is serious business! Training is also serious business! Take your training very seriously! Pay attention to training on mine emergencies, and take it very seriously! Thoroughly prepare yourself by finding out about your mine’s most important mine emergency preparedness procedures. In a real emergency your training and your knowledge could help save your life. A few tips to help you think about how to react to mine emergencies:

- Know the contents of your mine Emergency Response Plan.
- Know the contents of your emergency escape and fire-fighting plans.
- Know the layout of your mine and where escapeways, directional lifelines, emergency supplies, extra SCSR’s and refuge chambers are located.
- Know how to report an emergency and provide accurate information.
- Know how to don and switch SCSR units.
- Know where to meet at the first sign of an emergency.
- Know how your mine tracking system works.
- Know how refuge chambers operate.
- Know where you are at all times in the mine, and how to escape from where you are located.

Of course, the best solution to mine emergencies is to have no emergencies! Your daily efforts to work safely, play by the rules, report problems and take care of yourself and your co-workers can go a long way to make “no emergencies” a reality. You must be prepared however for the unexpected and emergencies are unexpected.

Best wishes to you in your training and your mining career. Thank you for all you do to make mining a safer place to work! Never let a chance for something that could save your life pass you by. Learn all you can about mine emergency response! What you know could save your life, or help someone else save yours!

Module 4

Emergency Communications and Miner Tracking

Participant's Guide

Purpose of the Module

Increase your knowledge and skills to understand, use, and benefit from mine emergency communications and tracking systems...to maximize effective communication to enhance escape or rescue.

Pre-test

Following the introduction of this module, your instructor will ask you to complete a pre-test. The pre-test will demonstrate your knowledge and understanding of this topic.

Post-test

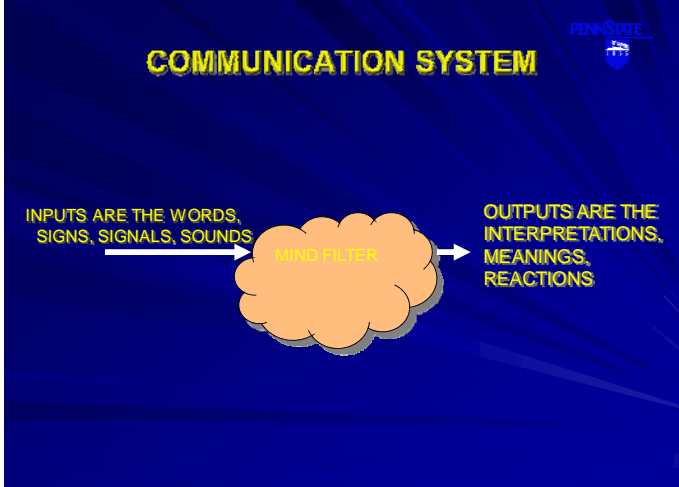
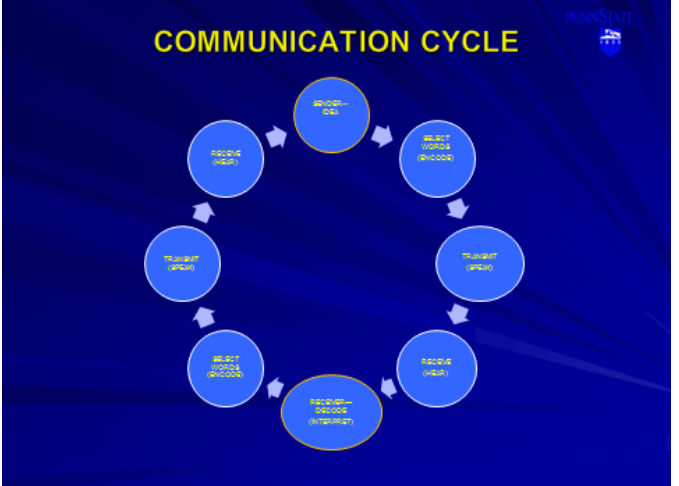
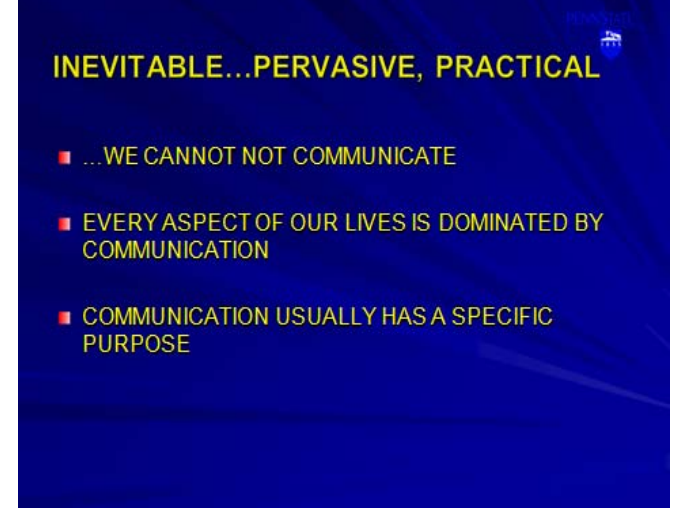
After completing this module, the instructor will ask you to complete a post-test. By comparing the group scores between the pre- and post-test, the instructor can demonstrate whether the training was effective.

Evaluation


Following completion of the course, you will be asked to provide feedback to the instructor on whether you believe the course achieved its purpose. You will also be asked several questions regarding the design, and implementation of the course. An evaluation form will be used for this purpose.

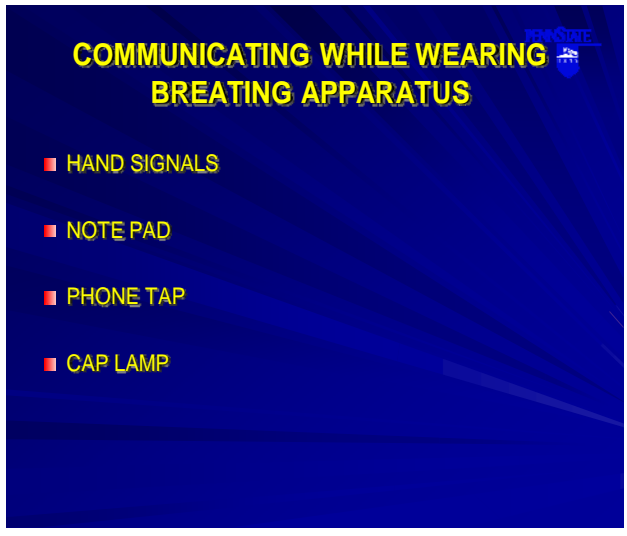
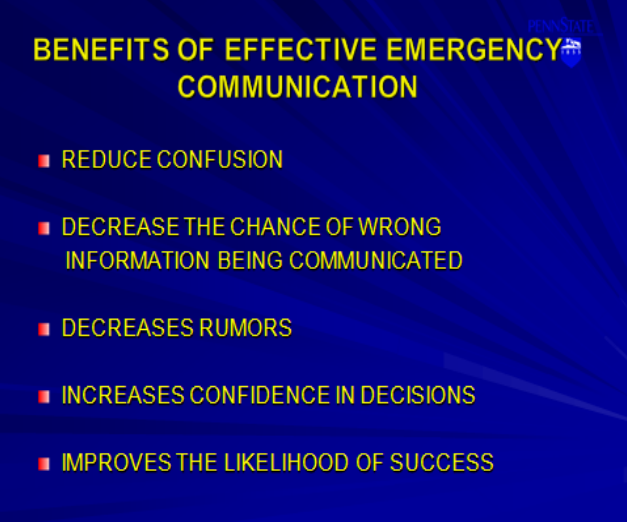
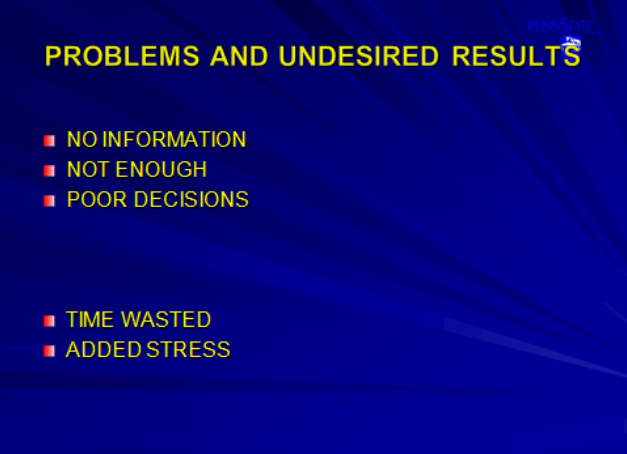
Introduction	Notes
 <p>DO YOU UNDERSTAND MINE EMERGENCIES? ARE YOU PREPARED FOR A MINE EMERGENCY?</p> <p>MODULE 4: EMERGENCY COMMUNICATIONS & MINER TRACKING</p> <p>MARK C. RADOMSKY The Pennsylvania State University</p>	
 <p>PURPOSE OF THE MODULE:</p> <p>INCREASE THE KNOWLEDGE AND SKILLS IN THE MINER TO UNDERSTAND, USE, AND BENEFIT FROM MINE EMERGENCY COMMUNICATIONS AND TRACKING SYSTEMS...TO MAXIMIZE EFFECTIVE COMMUNICATION TO ENHANCE ESCAPE OR RESCUE</p>	
 <p>LEARNING OBJECTIVES</p> <p>DEFINE COMMUNICATION, EMERGENCY COMMUNICATION</p> <p>IDENTIFY THREE PRIMARY PARTS TO THE COMMUNICATION PROCESS</p> <p>IDENTIFY THE THREE ESSENTIAL ELEMENTS OF MINE EMERGENCY COMMUNICATIONS (EMERGENCY COMMUNICATIONS TRIANGLE)</p> <p>IDENTIFY THE CRITICAL INFORMATION NEEDED DURING AN EMERGENCY</p>	

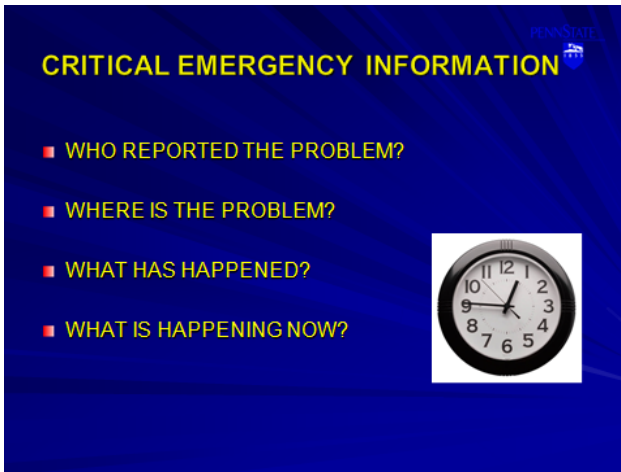
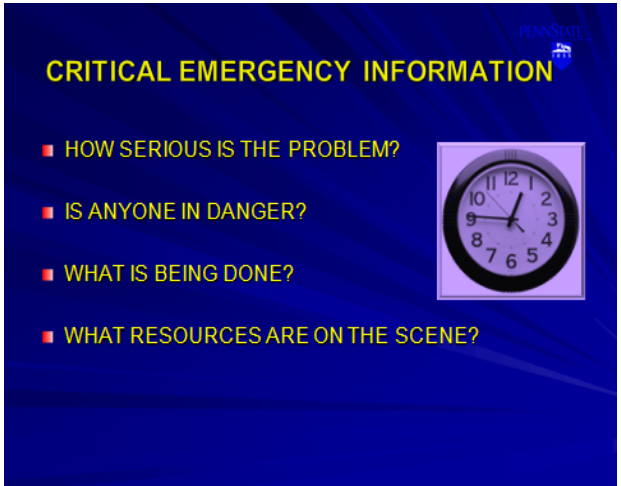
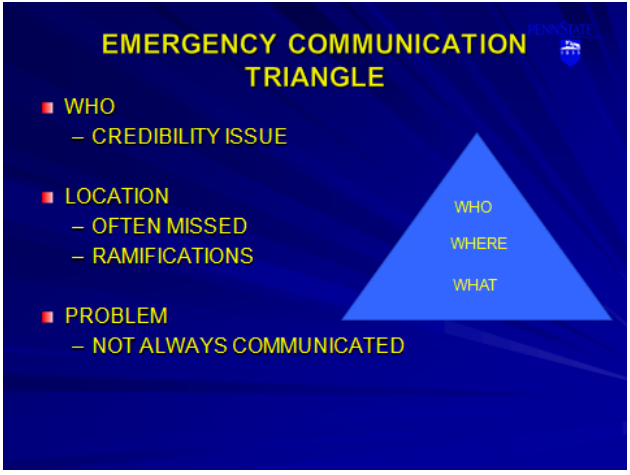
Introduction	Notes
<p style="text-align: right;"><small>PENNSYLVANIA STATE UNIVERSITY</small></p> <p>LEARNING OBJECTIVES (Continued)</p> <p>DISCUSS THE REQUIREMENTS OF THE MINER ACT REGARDING POST-ACCIDENT COMMUNICATIONS AND MINER TRACKING</p> <p>IDENTIFY THE VARIOUS TYPES OF COMMUNICATION DEVICES USED IN UNDERGROUND COAL MINING</p> <p>PROVIDE SEVERAL ADVANTAGES AND DISADVANTAGES OF WIRED COMMUNICATION SYSTEMS... WIRELESS SYSTEMS</p> <p>IDENTIFY THE MAIN PROBLEMS AND UNDESIRABLE RESULTS OF POOR/INEFFECTIVE COMMUNICATION</p>	
<p style="text-align: right;"><small>PENNSYLVANIA STATE UNIVERSITY</small></p> <p>LEARNING OBJECTIVES (continued)</p> <p>IDENTIFY SEVERAL EMERGING WIRELESS MINE COMMUNICATION SYSTEMS</p> <p>DISCUSS THE CONCEPT OF MINER TRACKING</p> <p>IDENTIFY SEVERAL EMERGING WIRELESS MINER TRACKING SYSTEMS</p> <p>DISCUSS MINE SPECIFIC EMERGENCY COMMUNICATION AND MINER TRACKING SYSTEM USED AT YOUR MINE</p>	
<p style="text-align: right;"><small>PENNSYLVANIA STATE UNIVERSITY</small></p> <p>COMMUNICATION</p> <ul style="list-style-type: none"> • WHAT IT ISN'T • WHAT IT IS 	

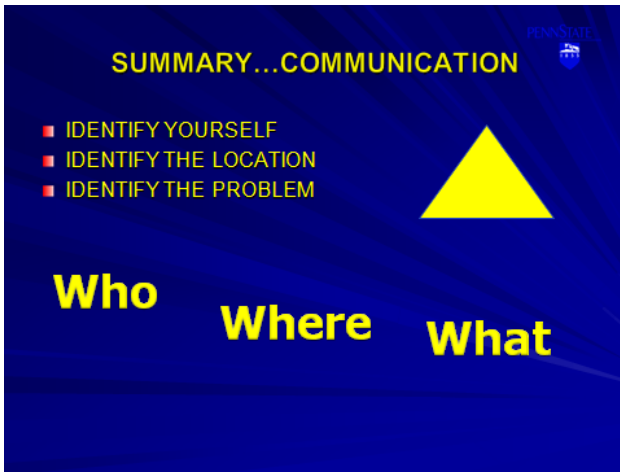
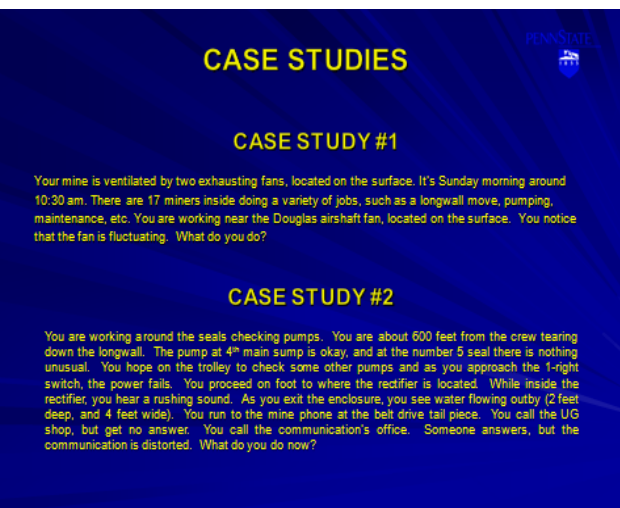
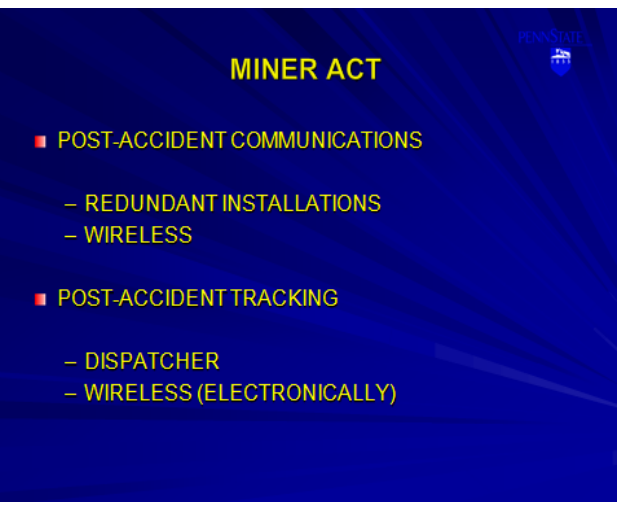
Introduction and Important Points	Notes
 <p>COMMUNICATION SYSTEM</p> <p>INPUTS ARE THE WORDS, SIGNS, SIGNALS, SOUNDS</p> <p>MIND FILTER</p> <p>OUTPUTS ARE THE INTERPRETATIONS, MEANINGS, REACTIONS</p>	<p>One of the three main components of the communication cycle is the “message” ...can you identify the other two?</p>
 <p>COMMUNICATION CYCLE</p> <p>TO SPEAK (ENCODE)</p> <p>TO LISTEN (DECODE)</p> <p>TO SPEAK (ENCODE)</p> <p>TO LISTEN (DECODE)</p> <p>TO SPEAK (ENCODE)</p> <p>TO LISTEN (DECODE)</p> <p>TO SPEAK (ENCODE)</p> <p>TO LISTEN (DECODE)</p>	<p>How important is the speaker in getting the right meaning conveyed.....the listener?</p>
 <p>INEVITABLE...PERVASIVE, PRACTICAL</p> <ul style="list-style-type: none"> ■ ... WE CANNOT NOT COMMUNICATE ■ EVERY ASPECT OF OUR LIVES IS DOMINATED BY COMMUNICATION ■ COMMUNICATION USUALLY HAS A SPECIFIC PURPOSE 	<p>Can you think of an example of communication that has no purpose?</p> <p>List some examples of communication that involves safety and/or security:</p> <p>What is the most common purpose for communication around the mine?</p>

Important Points	Notes
 <p>MEANINGS ARE IN PEOPLE</p> <ul style="list-style-type: none"> ■ WHEN COMMUNICATION FAILS ITS PURPOSE ■ MEANINGS AND SYMBOLS 	<p>Think about some situations around the mine where communication have broken down or failed:</p> <p>What was the cause of the breakdown?</p> <p>Be prepared to share these with the group</p>
 <p>HOW WE VIEW WORLD</p> <ul style="list-style-type: none"> ■ CONDITIONING ■ THE SOURCE OF MEANINGS 	
 <p>HOW WE SEE COMMUNICATION DIFFERENTLY</p> <ul style="list-style-type: none"> ■ LANGUAGE TEACHER ■ SOCIOLOGIST ■ FOREMAN...MANAGEMENT ■ WORKER 	

Important Points	Notes
<p data-bbox="370 317 662 348" style="text-align: center;">STOP AND REFLECT</p> <p data-bbox="228 405 764 457">■ WHY DO WE NEED TO COMMUNICATE AT WORK?</p> <ul style="list-style-type: none"> <li data-bbox="261 489 756 531">– KNOW WHAT OCCURRED ON THE PREVIOUS SHIFT <li data-bbox="261 558 548 579">– FURTHER PREPARATION <li data-bbox="261 606 764 648">– ENTERING THE MINE, ON-SECTION, ON-SHIFT EXAM... <li data-bbox="261 676 607 697">– EMERGENCY PREPAREDNESS 	<p data-bbox="889 352 1344 457">List some additional examples of the uses of communication in and around the mine (be specific)</p>
<p data-bbox="256 842 792 905" style="text-align: center;">EMERGENCY COMMUNICATION & THE RESPONSIBLE PERSON (RP)</p> <ul style="list-style-type: none"> <li data-bbox="240 961 386 982">■ DEFINITION <li data-bbox="240 1056 768 1108">■ OBLIGATION/RESPONSIBILITY OF RESPONSIBLE PERSON REGARDING COMMUNICATIONS 	<p data-bbox="889 779 1344 877">Think of some ways to improve emergency communication at the mine.</p> <p data-bbox="889 961 1328 1108">Think of some things you can do to support the Responsible Person's communication responsibilities.</p>
<p data-bbox="321 1356 711 1388" style="text-align: center;">COMMUNICATION DEVICES</p> <ul style="list-style-type: none"> <li data-bbox="228 1434 402 1455">■ TELEPHONES <li data-bbox="228 1465 475 1486">■ MINE PAGE PHONES <li data-bbox="228 1497 435 1518">■ WALKIE TALKIES <li data-bbox="228 1528 451 1549">■ TROLLEY PHONES <li data-bbox="228 1560 418 1581">■ LEAKY FEEDER <li data-bbox="228 1591 418 1612">■ HOIST PHONES <li data-bbox="228 1623 678 1644">■ MINE RESCUE TEAM COMMUNICATIONS 	<p data-bbox="889 1314 1320 1413">Be prepared to discuss the communication devices used at your mine</p>

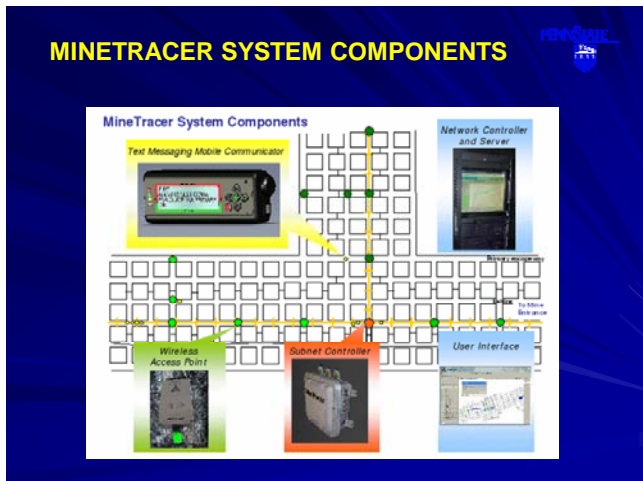
Important Points	Notes
 <p>COMMUNICATING WHILE WEARING BREATHING APPARATUS</p> <ul style="list-style-type: none"> ■ HAND SIGNALS ■ NOTE PAD ■ PHONE TAP ■ CAP LAMP 	<p>Be prepared to discuss some of the non-verbal methods you might use at your mine.</p>
 <p>BENEFITS OF EFFECTIVE EMERGENCY COMMUNICATION</p> <ul style="list-style-type: none"> ■ REDUCE CONFUSION ■ DECREASE THE CHANCE OF WRONG INFORMATION BEING COMMUNICATED ■ DECREASES RUMORS ■ INCREASES CONFIDENCE IN DECISIONS ■ IMPROVES THE LIKELIHOOD OF SUCCESS 	
 <p>PROBLEMS AND UNDESIRE RESULTS</p> <ul style="list-style-type: none"> ■ NO INFORMATION ■ NOT ENOUGH ■ POOR DECISIONS ■ TIME WASTED ■ ADDED STRESS 	

Important Points	Notes
 <p>CRITICAL EMERGENCY INFORMATION</p> <ul style="list-style-type: none"> ■ WHO REPORTED THE PROBLEM? ■ WHERE IS THE PROBLEM? ■ WHAT HAS HAPPENED? ■ WHAT IS HAPPENING NOW? 	
 <p>CRITICAL EMERGENCY INFORMATION</p> <ul style="list-style-type: none"> ■ HOW SERIOUS IS THE PROBLEM? ■ IS ANYONE IN DANGER? ■ WHAT IS BEING DONE? ■ WHAT RESOURCES ARE ON THE SCENE? 	
 <p>EMERGENCY COMMUNICATION TRIANGLE</p> <ul style="list-style-type: none"> ■ WHO <ul style="list-style-type: none"> – CREDIBILITY ISSUE ■ LOCATION <ul style="list-style-type: none"> – OFTEN MISSED – RAMIFICATIONS ■ PROBLEM <ul style="list-style-type: none"> – NOT ALWAYS COMMUNICATED 	<p>Which leg of the triangle is the most important one?</p>

Important Points	Notes
 <p>SUMMARY...COMMUNICATION</p> <ul style="list-style-type: none"> ■ IDENTIFY YOURSELF ■ IDENTIFY THE LOCATION ■ IDENTIFY THE PROBLEM <p>Who Where What</p>	<p>Be prepared to read an emergency scenario and provide feedback regarding the actions and decisions of the miners.</p>
 <p>CASE STUDIES</p> <p>CASE STUDY #1</p> <p>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?</p> <p>CASE STUDY #2</p> <p>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?</p>	<p>Read over these case studies, or ones that you instructor gives you, and be prepared to discuss them.</p>
 <p>MINER ACT</p> <ul style="list-style-type: none"> ■ POST-ACCIDENT COMMUNICATIONS <ul style="list-style-type: none"> – REDUNDANT INSTALLATIONS – WIRELESS ■ POST-ACCIDENT TRACKING <ul style="list-style-type: none"> – DISPATCHER – WIRELESS (ELECTRONICALLY) 	<p>Be prepared to discuss how the post-accident communications work at your mine.</p> <p>Be prepared to discuss how the post-accident miner tracking works at your mine.</p>

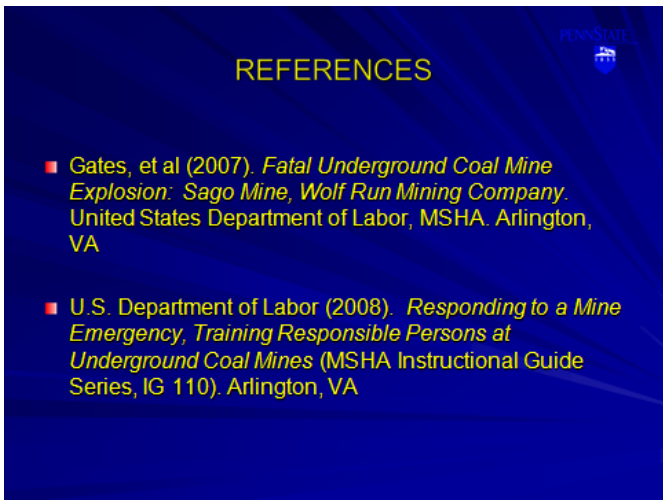
Important Points	Notes
 <p>EMERGENCY COMMUNICATIONS AND MINER TRACKING DEVICES</p> <ul style="list-style-type: none"> ■ MSHA TESTING OR DEMONSTRATION ■ NEW OR REVISED APPROVALS ■ APPROVAL APPLICATIONS 	
 <p>WIRED VERSUS WIRELESS</p> <ul style="list-style-type: none"> ■ WIRED ■ WIRELESS <p>Radio Frequency Identification (RFID) Personal Emergency Device (PED)</p>	
 <p>APPROVAL HISTORY</p> <ul style="list-style-type: none"> ■ FIRST OFFICIAL APPROVAL OF A WIRELESS TRACKING SYSTEM ■ MINETRACER MINER LOCATION MONITORING SYSTEM 	

Important Points	Notes
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- SUMMARY**
- COMMUNICATION AND COMMUNICATIONS ARE ESSENTIAL
 - UNDERSTANDING THE COMMUNICATION PROCESS CRITICAL
 - MEANINGS ARE IN PEOPLE

- SUMMARY**
- CRITICAL INFORMATION DURING AN EMERGENCY
 - MINER ACT WILL ENHANCE EMERGENCY COMMUNICATION
 - PERIODICALLY EVALUATE YOUR MINE COMMUNICATIONS, AND MINER TRACKING SYSTEM

Important Points	Notes
 <p data-bbox="412 363 610 394">REFERENCES</p> <ul style="list-style-type: none"> <li data-bbox="224 464 769 562">■ Gates, et al (2007). <i>Fatal Underground Coal Mine Explosion: Sago Mine, Wolf Run Mining Company</i>. United States Department of Labor, MSHA. Arlington, VA <li data-bbox="224 604 797 703">■ U.S. Department of Labor (2008). <i>Responding to a Mine Emergency, Training Responsible Persons at Underground Coal Mines</i> (MSHA Instructional Guide Series, IG 110). Arlington, VA 	

APPENDIX A

MODULE 4

EMERGENCY COMMUNICATIONS AND MINER TRACKING PRE-TEST

This pre-test consists of five multiple-choice questions. Each question is followed by four choices. Circle the letter that indicates the best choice.

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.

MODULE 4 COMMUNICATIONS AND MINER TRACKING

POST-TEST

This post-test consists of 11 multiple-choice and one True or False question. Each multiple-choice question is followed by four choices. Circle the letter that indicates the best choice.

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 - d. the use of symbols to send messages.

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 - d. surface personnel can determine the current or immediate pre-accident location of mine personnel.

6. Decisions that are made during an emergency rely 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 crews 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

APPENDIX B

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