Do You Understand Mine Emergencies?

Are You Prepared for a Mine Emergency?

PARTICIPANT'S GUIDE

MODULE 1: MINE EMERGENCIES

PENN STATE MINER TRAINING PROGRAM
UNIVERSITY PARK, PA
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PENNSTATE

MINER TRAINING PROGRAM

DO YOU UNDERSTAND MINE EMERGENCIES?

ARE YOU PREPARED FOR A MINE EMERGENCY?

Participant's Guide

MODULE 1: MINE EMERGENCIES

Mark Radomsky
Joseph Flick
Joeseph DeSalvo
Larry Grayson
&
Raja Ramani

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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 1

Mine Emergencies

Participant's Guide

Purpose of the Module

To increase your knowledge and skills to identify and understand mine emergencies, their causes and control, and to enhance your understanding of:

1. Accident prevention concepts
2. Mine fires
3. Mine explosions
4. Massive ground collapse

Pre-test

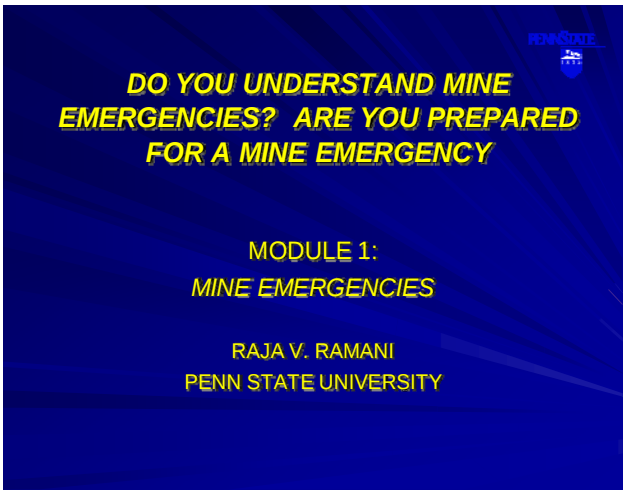
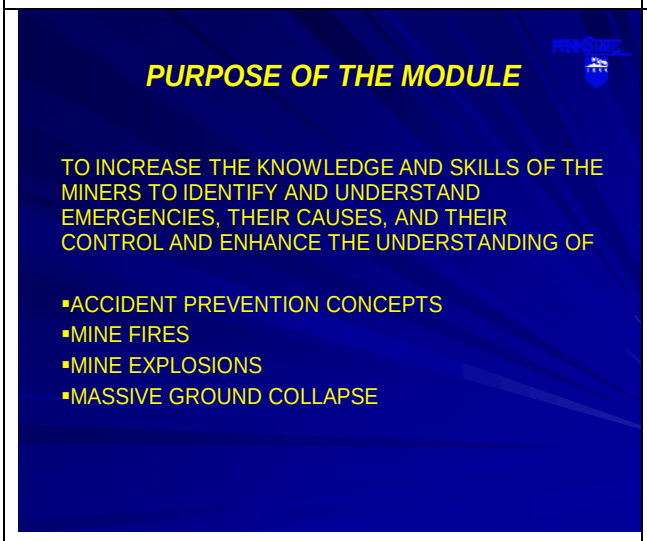
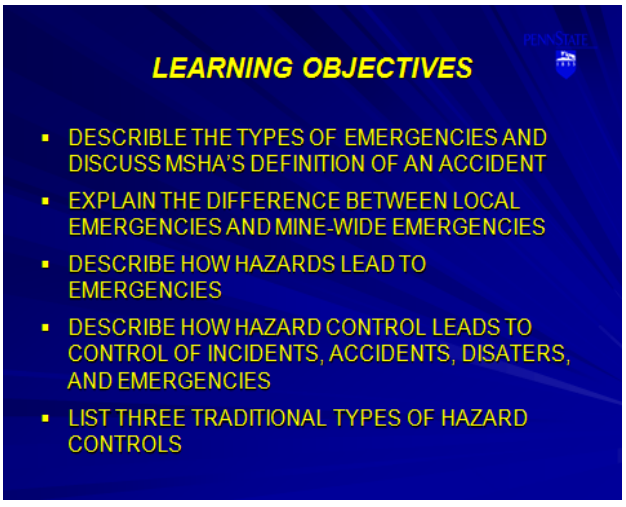
Following the introduction of this module, your instructor will ask you to complete a pre-test. The pre-test will demonstrate your knowledge and understanding of this topic.

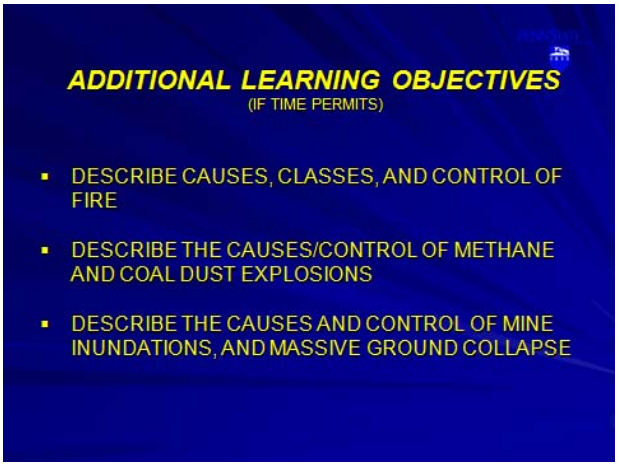
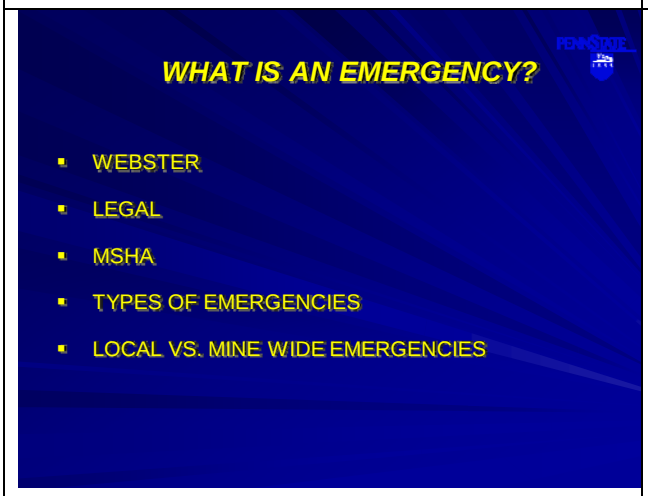
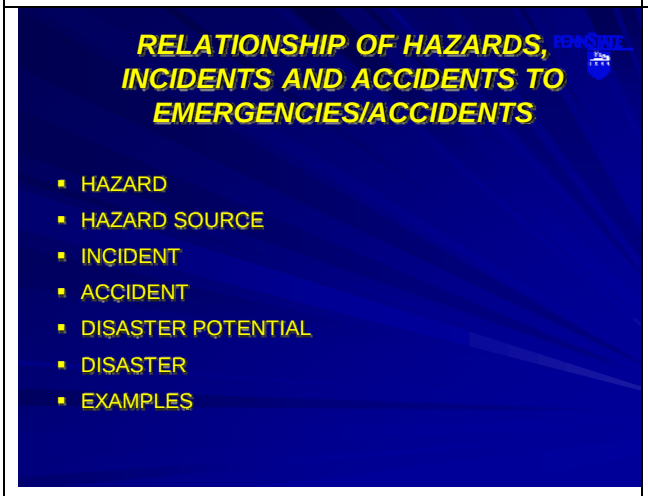
Post-test

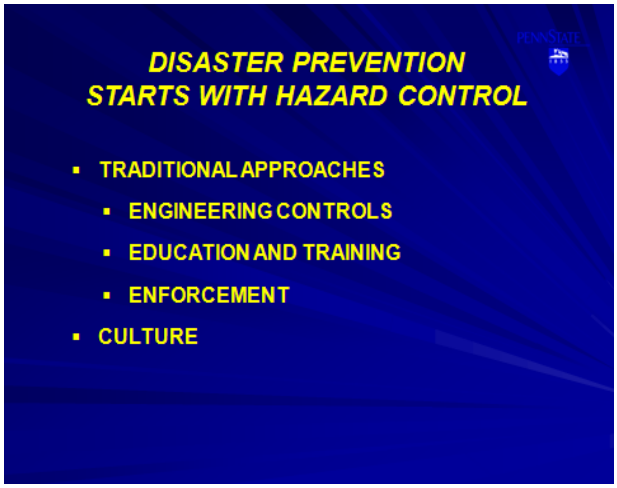
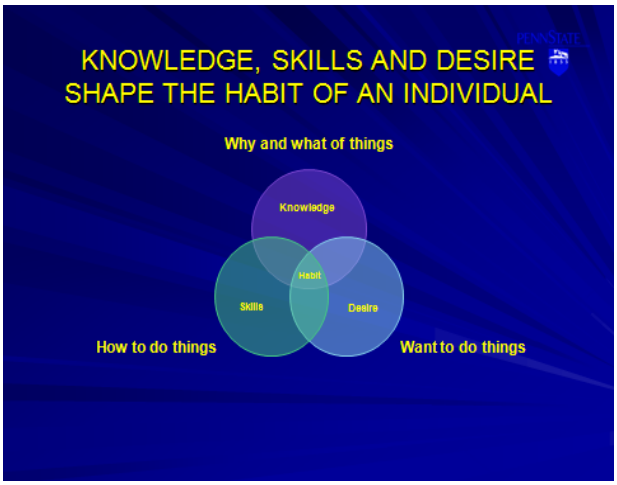
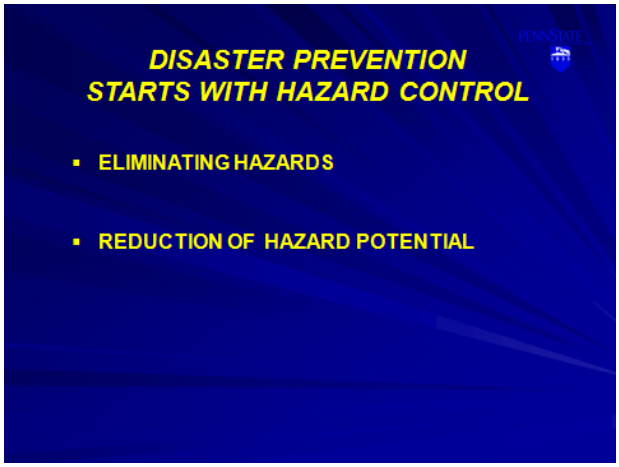
After completing this module, the instructor will ask you to complete a post-test. By comparing the group scores between the pre- and post-test, the instructor can demonstrate whether the training was effective.

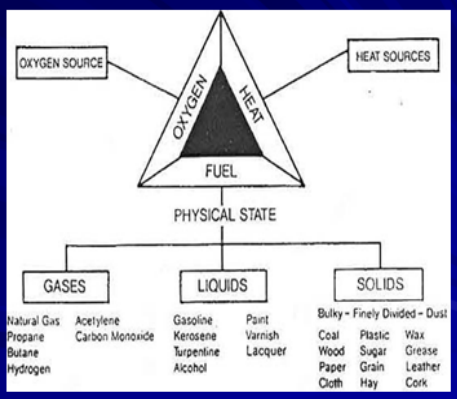
Evaluation

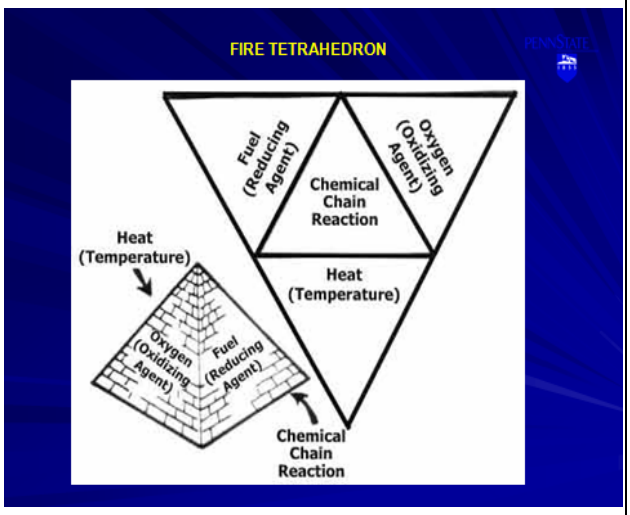
Following completion of the course, you will be asked to provide feedback to the instructor on whether you believe the course achieved its purpose. You will also be asked several questions regarding the design, and implementation of the course. An evaluation form will be used for this purpose.

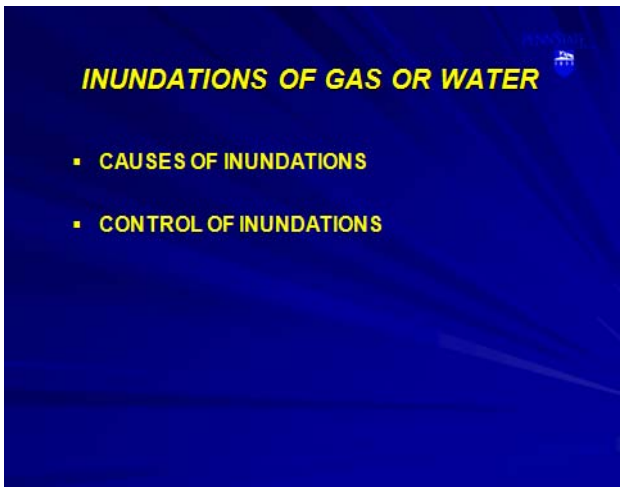
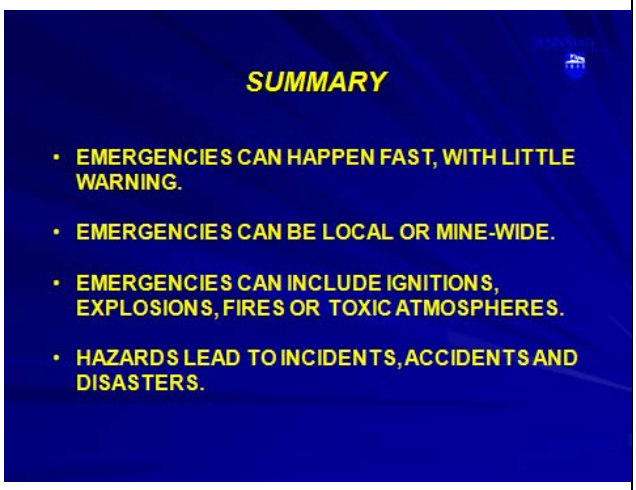
Introduction	Notes
	
	What do you know about mine emergencies? Have you ever thought about how mine emergencies could affect your safety? Think and reflect on the importance of this lesson. Why is it important to you?
	

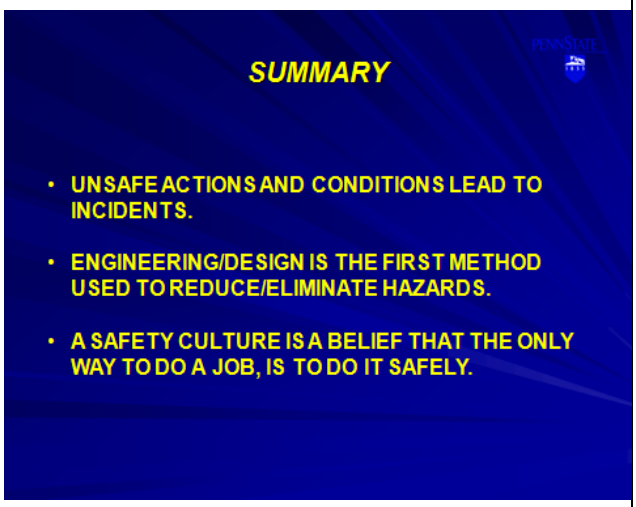
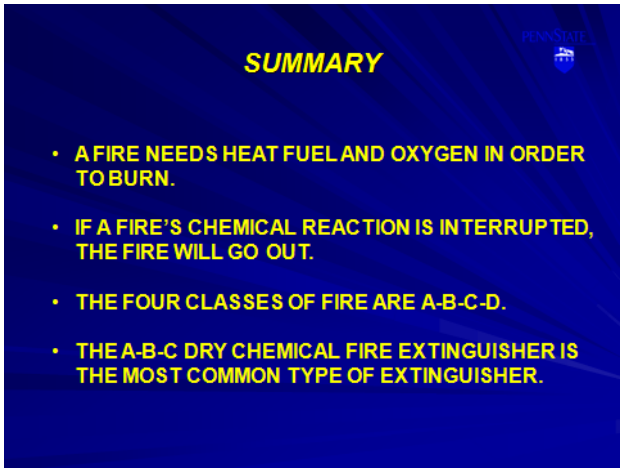
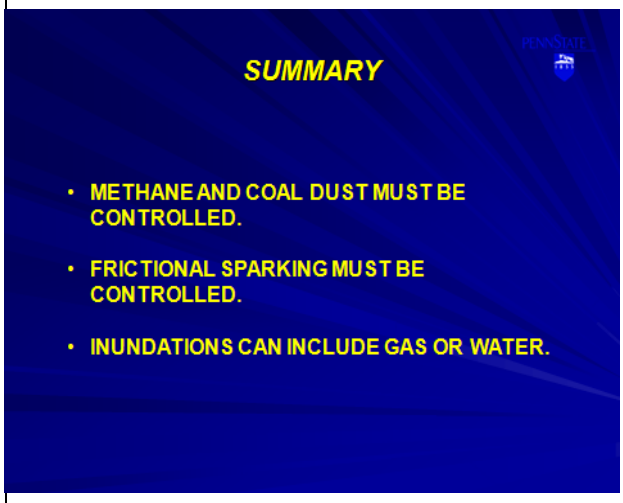
Introduction	
	
	What is **your** definition of an emergency? Provide examples of a local mine and mine-wide emergency. Emergencies happen fast, usually give little warning and are life-threatening.
	What must we do before we can control a hazard? An incident is a close call. An accident involves personal injury or property damage. The difference between an incident and an accident or disaster is usually just a fraction of a second or a fraction of an inch.

Important Points	Notes
	The primary way to control hazards is through engineering or design. You must know the what, why and how of your job!
	What is your definition of a habit? Do you think it is hard to form good work habits? What does it take?
	

Important Points	Notes
SUMMARY ▪ HAZARDS LEAD TO INCIDENTS, ACCIDENTS, AND DISATERS ▪ EMERGENCIES ARE THE RESULT OF THE REALIZATION OF HAZARDS ▪ HAZARD ELIMINATION, HAZARD MINIMIZATION/REDUCTION IS THE KEY ▪ ALL APPROACHES—ENGINEERING, EDUCATION & TRAINING, ENFORCEMENT AND SAFETY CULTURE DEVELOPMENT ARE ESSENTIAL ▪ IMPACT MINIMIZATION IS ESSENTIAL IF HAZARDS ARE NOT ELIMINATED	
MINE FIRES – CAUSES AND CONTROL ▪ COMPONENTS OF FIRE ▪ FIRE TRIANGLE ▪ FIRE TETRAHEDRON ▪ CLASSES OF FIRES ▪ CONTROL OF FIRES	Provide examples of several fire hazards. Describe the concept of the fire triangle. What are the four classes of fires? What fire-fighting equipment is in your work area, and how do you use it?
FIRE TRIANGLE  	

Important Points	Notes
	
METHANE AND COAL DUST EXPLOSIONS ▪ CONDITIONS THAT LEAD TO EXPLOSIONS ▪ CAUSES OF METHANE ACCUMULATIONS ▪ AIRBORNE COAL DUST ▪ SOURCES OF IGNITION ▪ FRICTIONAL SPARKING	What are the chemical properties of methane? What are the hazards of fine coal dust, and how do you control it? Name three sources of ignitions that could lead to an explosion?
METHANE AND COAL DUST EXPLOSIONS ▪ PREVENTING EXPLOSIONS ▪ LIMITING SIZE AND EXTENT OF EXPLOSIONS ▪ FUNCTION OF ROCKDUSTING	List four ways to prevent explosions. Why is proper rockdusting an important way to prevent explosions?

Important Points	Notes
	What two types of agents are responsible for inundations?
	What are several major causes of ground collapses?
	

Important Points	Notes
	
	
	

Appendix A

MODULE 1

MINE EMERGENCIES

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. What is the ***best*** method by which to control hazards?
    a. By using PPE
    b. Through planned inspections
    c. Ventilate all areas of the mine
    d. Eliminate through design

2. Airborne coal dust can be:
    a. Poisonous
    b. An ignition source
    c. Made harmless
    d. Explosive

3. What is the ***best*** method by which to limit ignitions to face areas?
    a. Well maintained water sprays
    b. Regular airflow measurements
    c. Listening for methane outbursts
    d. All of the above

4. What is the ignition source of *most* methane explosions?
    a. Electrical arcs
    b. Improper blasting
    c. Frictional sparking
    d. None of the above

5. When using a fire extinguisher, you should aim:
    a. In the air to allow the extinguishing agent to settle on the flames
    b. At the base of the flames
    c. At the closest miner to provide protection
    d. None of the above

MODULE 1

TYPES OF EMERGENCIES

POST-TEST

This post-test consists of 12 multiple-choice questions. Each question is followed by four choices. Circle the letter that indicates the best choice.

1. What is the ***best*** method by which to control hazards?
    a. By using PPE
    b. Through planned inspections
    c. Ventilate all areas of the mine
    d. Eliminate through design

2. Airborne coal dust can be
    a. poisonous.
    b. an ignition source.
    c. made harmless.
    d. explosive.

3. What is the ***best*** method by which to limit ignitions to face areas?
    a. Well maintained water sprays
    b. Regular airflow measurements
    c. Listening for methane outbursts
    d. All of the above

4. What is the ignition source of *most* methane explosions?
    a. Electrical arcs
    b. Improper blasting
    c. Frictional sparking
    d. None of the above

5. When using a fire extinguisher, you should aim:
    a. in the air to allow the extinguishing agent to settle on the flames
    b. at the base of the flames
    c. at the closest miner to provide protection
    d. none of the above

6. When welding or using oxygen-acetylene you should always:
    a. Conduct an inspection of the area before beginning work
    b. Have a fire extinguisher in the immediate area
    c. Post a fire watch
    d. All of the above

7. ***Common*** sources of ignition include:
    a. Sustained friction
    b. Electrical arcing
    c. Sparks from welding
    d. All of the above

8. The safest method to use when mining close to abandoned mines or worked-out areas is:
    a. Drill boreholes in advance of the face
    b. Drain water from overlying strata
    c. Dig sumps at low elevations in the mine
    d. Maintain extra pumping capacity

9. When should PPE be used?
    a. Only when hazards cannot be eliminated by other controls
    b. At all times
    c. As a substitute for engineering controls
    d. Never

10. Methane action levels
    a. require immediate response when methane reaches the respective levels.
    b. are above the lower end of the explosive range of methane.
    c. should be implemented at the end of each production cycle.
    d. must involve all available personnel immediately.

11. ***Most*** methane ignitions are initiated by
    a. frictional sparks from cutting bits.
    b. miners smoking underground.
    c. electrical equipment that has not been recently inspected.
    d. striking sandstone with a steel hammer or bar.

12. Poorly constructed or damaged ventilation controls can:
    a. Reduce entry cross-sectional area
    b. Allow methane to accumulate
    c. Allow coal dust to settle
    d. All of the above

APPENDIX B

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