FREEPORT-
MCMORAN

FACILITATOR GUIDE

SFT FCX1022C
HOT WORK

FEBRUARY / 2018
VERSION 1

TABLE OF CONTENTS

COURSE OVERVIEW

The following is basic information about this course.

COURSE DESCRIPTION

Through this course, employees will be able to understand when and where Hot Work is allowed as well as the process to ensure it's done safely.

COURSE OBJECTIVES

Upon completion of this course, students will be able to:

- Module 1: Introduction To Hot Work
  - Define Hot Work and Fire Safe Area's and the safety concerns associated.
  - Differentiate between flammables and combustibles.
- Module 2: Critical Controls
  - Demonstrate use of applicable controls.
- Module 3: Roles And Responsibilities
  - Describe the roles and responsibilities of persons involved in Hot Work.
- Module 4: Equipment
  - Summarize the various equipment and hazards for different types of Hot Work.
- Module 5: Health Hazards
  - Describe the health hazards associated with Hot Work.
- Module 6: Hot Work Overview
  - Evaluate a scenario and conduct the necessary steps to perform the job.
- Module 7: High Hazard Areas
  - Evaluate scenarios and categorize the associated hazards.

COURSE PRE-REQUISITES

Before taking this course, students should be familiar with the fundamentals of safety.

COURSE LENGTH

This course takes approximately 2.5-3 hours to complete.

CLASS SIZE

This course is designed for a maximum of 20 students. Class size may be more or less depending on each site's needs and the students' skills and experience levels.

TARGET AUDIENCE

This training is intended to train anyone involved with Hot Work.

FACILITATOR QUALIFICATIONS

Facilitators should be well versed in Hot Work as well as the risks and controls used to safely conduct Hot Work.

REGULATIONS/POLICIES/PROCEDURES

This course teaches to the Hot Work Policy.

FACILITATOR PREPARATION

The following information will help the facilitator prepare for the course.

ABOUT THIS GUIDE

This guide is intended to give the facilitator a general outline for the flow of the course. It is designed to assist the facilitator in presenting content, conducting classroom activities, and managing time to meet the learning objectives. This Facilitator Guide (FG) is intended to be used in conjunction with the Student Guide (SG) and the PowerPoint (PPT). The guide belongs to the facilitator to make notes and write in as much as needed.

SAFETY

Safety must be a fundamental component of this course. Students must adhere to safety information in the SG and from the facilitator, and safety procedures must be focused on throughout the training. Equipment may not be operated without facilitator authorization.

ACTIVITIES

Students will participate in many hands-on activities designed to give students time to practice the knowledge learned throughout the course. They also provide the facilitator with opportunities to give immediate feedback on what each student does/does not do well. Facilitators must review each activity's directions in the FG before guiding students through the learning activities.

GENERAL MATERIALS

The following is a list of materials consistently needed for courses. Gather and/or order the necessary materials prior to the start of class and verify that everything functions properly.

- Attendance sign-in sheets
- Name cards – 1 per student
- Pens and/or pencils
- Push pins and/or tape such as painter's tape
- Sticky notes
- Easel
- Flipchart
- Markers of various colors
- Student Guide (SG) – 1 per student (available on MTI SharePoint)
- Projector and sound system for PPT and/or videos (available on MTI SharePoint)
- Laptop with access to the internet
- Assessments (available on MTI SharePoint)
- Course Evaluations (Found in the back of SG and FG)
- Appropriate Personal Protective Equipment (PPE)

ACTIVITY MATERIALS

The following are materials needed for activities in each module:

Module	Materials
Introduction	• Activity 1: Icebreaker ○ Gather the appropriate materials depending on the icebreaker chosen
Module 1: Introduction To Hot Work	N/A
Module 2: Critical Controls	• Activity 2: Task Control ○ Student Guide
Module 3: Roles And Responsibilities	N/A
Module 4: Equipment	• Activity 3: Team Word Webbing ○ Student Guide

Module 5: Health Hazards	• Activity 4: Acute or Chronic
	  ○ Student Guide
	  ○ Poster/Chart Paper
	  ○ Markers

Module 6: Hot Work Overview	• Activity 5: Showtime
	  ○ Student Guide
	  ○ Copies of sites Hot Work Permit
	  ○ Flip Charts (optional)
	  ○ Chart Markers (optional)

Module 7: High Hazard Areas	• Activity 6: Team Quiz
	  ○ Student Guide
	  ○ Flip Charts (optional)
	  ○ Chart Markers (optional)

Conclusion	• Course Debrief

FACILITATOR GUIDE CUES

Throughout the FG, cues are used to help the facilitator quickly identify slides that have unusual but important features. The purpose of each symbol is explained below.

Description	Symbol	Purpose
Audio Link		The speaker icon indicates when audio files are linked on a PPT slide.
Video Link		The director's clapboard is indicates when video files are linked on a PPT slide.
Animated Slide		The star indicates when a PPT slide has an animation and requires more than one click to view all of the content.
Note		The paper and pencil indicate that an important note relating to the slide is included on the PPT slide or in the FG. The note is not necessarily found in the SG.
Incidents		The first aid symbol indicates when a PFE, testimonial, or other safety related incident is addressed on a PPT slide or in the FG.
Flipchart		The marker indicates when the facilitator needs to write down responses given to them by the students. This is generally done with a flipchart or a whiteboard.
Discussion		The question mark indicates when students are expected to participate in a discussion either as a class or in small groups.
Example		The hand indicates when the instructor will hold up an item or pass an example around the class.
Facilitation Tip (FT)		The podium indicates a facilitation technique used by the facilitator to enhance the presentation. A corresponding red box with white text is provided near this cue to explain the tip.
Site Specific		The yellow arrow indicates a place where the facilitator will need to add Site Specific information. This will need to be completed in advance before teaching the class.

USING THE PPT PRESENTATION

When preparing to facilitate the course, there are several ways to integrate the PPT with the FG.

1. The facilitator can project the PPT and carry the paper copy of the FG as he/she walks around the room.
2. The facilitator can begin the PPT in presentation mode on his/her computer. This displays only the current slide to the class on the projection screen, but shows the facilitator a different view on his/her computer. The facilitator's screen shows a notes screen that has the same information for the slide that is included in the FG. This view also shows the next slide and lets the facilitator see the marker tools to write on the slides and emphasize teaching points.
3. The facilitator can also choose to do both. This is the preferred method for facilitating this course. Moving around the room helps the facilitator engage more participants and keeps the students' brains stimulated, thus promoting learning.

Note: The FG follows the PPT presentation slide by slide. Each page is designed with the information the facilitator needs and an image of the slide. The FG should be used as a roadmap to guide the facilitator through the course.

SETTING THE PRESENTATION MODE

To initiate the presentation mode, do the following:

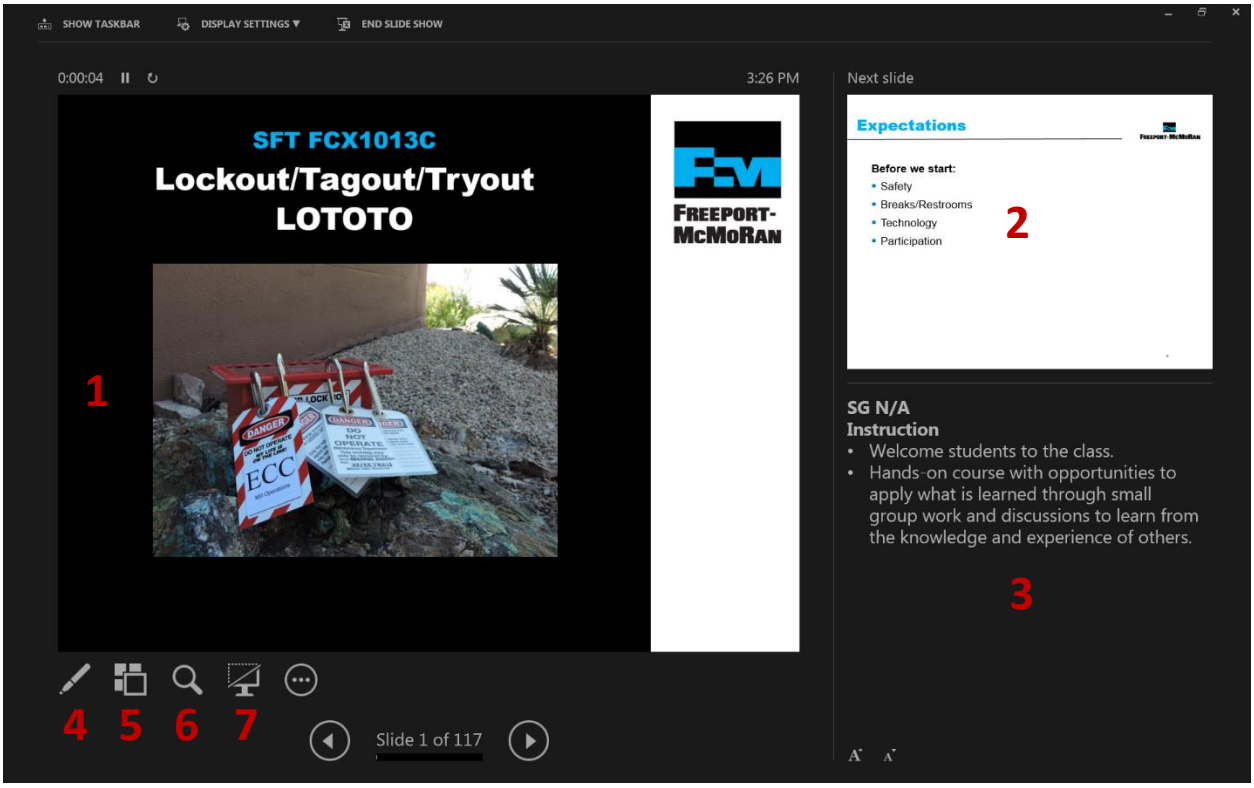
Step	Action
1	Open the PPT presentation.
2	At the bottom pf the screen is a colored bar (The look or color may vary depending on the version of PPT used).
3	Select the icon that is noted in the image below. 

Facilitation Tip

A well-prepared instructor is the best presenter of information, not the Power Point or Facilitator Guide. These are just tools to keep a prepared instructor on schedule. Instructor preparation is key to a successful learning experience.

PRESENTATION MODE FEATURES

Once you are in presentation mode, the students will only see the slide displayed but the facilitator will see the layout below. Some of the commonly used features available from this view are numbered in red and identified in the image.



1. **Current slide** – This is the same slide that students see on the projection screen.
2. **Next slide** – A visual preview for the next slide is shown.
3. **Notes** – These notes are the same as the talking points available in the FG. The notes correspond with the current slide projected to the students.
4. **Pens** – This icon gives the user access to a laser pointer, pen, highlighter, and arrow options. Whichever tool is used on the facilitator's screen will show on the projection screen for the students and allows for specific points on the PPT to be emphasized. This helps the facilitator customize the PPT presentation to better suit the needs of the site and students.
5. **All slides** – This will show small images of all of the slides together on the facilitator's screen.
6. **Zoom** – This icon lets the facilitator zoom in on specific aspects of the PPT.
7. **Black screen** – If the facilitator would like to explain content further but feels the PPT slide shown on the screen may distract from the learning, the screen can be blacked out to help focus the students.

INTRODUCTION

Hot Work is working with ignition sources near flammable materials. It is any temporary maintenance, construction or activity that will use gas or electrically powered equipment, which produces flames, sparks, or heat that is sufficient to start a fire or ignite flammable/combustible materials.

Hot Work procedures not only identify and control physical hazards but allows personnel to evaluate the critical controls already in place that protect employees from Fatal Risks.

Employees will understand when and where Hot Work can be performed as well as the process to ensure it's done safely.

ACTIVITIES

- Activity 1: Icebreaker

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 3.

TOTAL TEACHING TIME

The introduction takes approximately 10 minutes to complete.

PPT slide 1

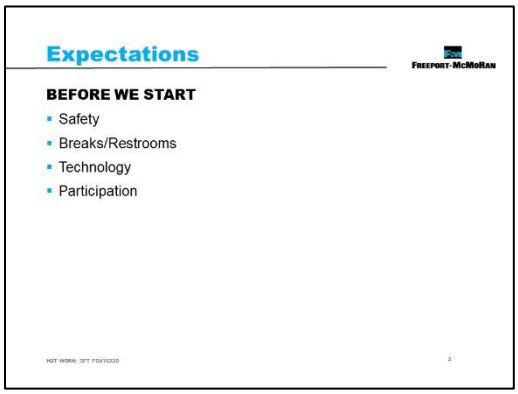
Instruction

- Welcome students to class
- Facilitator introduces self by stating
  - your position at FMI
  - how long you've been with the company,
  - how long you've been in mining

Facilitation Tip

This is a good time to establish your credibility as an instructor. Stating your credentials as a subject matter expert will assure students the information they are about to learn can be trusted. That it will be valuable to them in their future workplace successes.

PPT slide 2

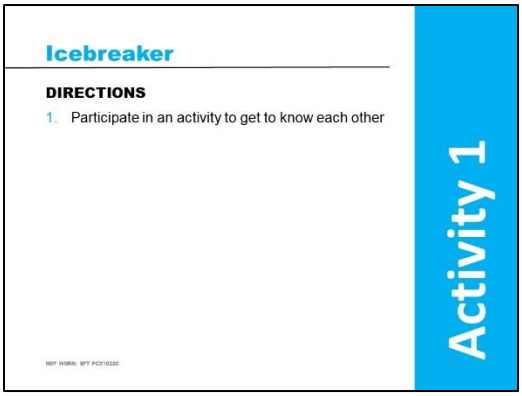


Instruction

- Administrative/Classroom policies
  - Safety
    - Identify the appropriate evacuation procedures, gathering areas, and emergency exits and fire extinguisher locations, etc.
  - Breaks and Restrooms
    - Establish a break schedule and announce it to the class.
      Suggested break times are included throughout the FG and occur approximately every hour and often occur at the end of each module. Breaks should last 5-10 minutes to give students time to rest and relax before beginning the next learning session.
    - Identify the location of restrooms and smoking areas.
  - Technology policy
    - Review your expectations on cell phone and laptop use during the training.
  - Participation
    - This course requires significant participation. Students should be prepared for discussions and small group activities.
  - Set the class ground rules by verbalizing your expectations. Some suggestions are provided below.
    - Participate
    - Be on time
    - Stay on task
    - Listen when others talk
    - Respect the opinions and attitudes of others

ACTIVITY 1: ICEBREAKER

PPT slide 3



Time
Approximately 10 minutes

Materials
- Choose an icebreaker and gather appropriate materials.

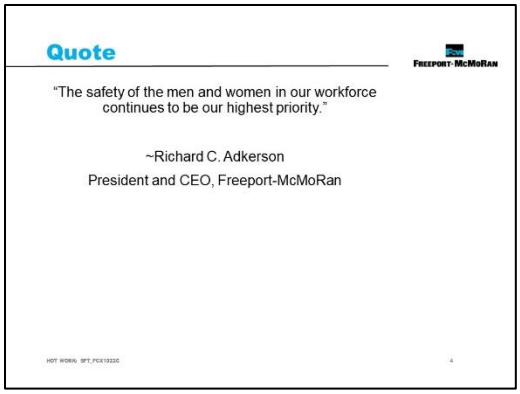
Purpose
- Successful icebreakers encourage students to contribute their ideas and experiences thus increasing motivation and engagement in the class.
- Below is an assortment of icebreakers that the facilitator can incorporate at the beginning of the course as well as after breaks.

Icebreaker	Instructions
What would you do if you had a million dollars? *(5-10 minutes)*	1. The facilitator will begin by answering this question themselves, such as "I will buy a tiny island in the Bahamas and live there the rest of my life selling coconuts and bananas", "I will sell my house and live in an RV touring the U.S and Canada", or "I plan on paying off all my debt and giving $xxx to ABC charity." 2. The facilitator will then ask each student to respond to the question. There may be some similarities or common themes.
Two Truths and a Lie *(15 minutes)*	1. The facilitator will begin this icebreaker by explaining the activity. Each student will think of two true statements about themselves and one false statement. Allow a few minutes for students to come up with their examples. The facilitator will then proceed telling the class two truths and a lie about him or herself. 2. The class will come to a common vote on what they believe is the lie. The facilitator will reveal the correct answer. After the lie has been detected, the facilitator can elaborate on one or two of the statements that they made. 3. Continue the exercise with the students as you have each one present their statements.

Icebreaker	Instructions
A Little Known Fact *(10-15 minutes)*	1. The facilitator will begin by stating their name, title, organization (if different than students), length of time in position and one little known fact about themselves. 2. Continue this exercise by asking each student to share the same information about themselves.
One Question One Answer *(5-10 minutes)* *http://humanresources.about.com/od/icebreakers/a/Ice-Breakers-For-Meetings.htm*	1. Divide class into groups of about four people by either having them work with the people near them or numbering them and having them move to be with others of the same number. This gives individuals the chance to meet new people. 2. Assign a question to each group from the list below. Have individuals share with their groups. • What are you most worried about at work this month? • What characteristic do you value the most in your coworkers? • What is the most important personal attribute that you bring to your job? • What are you most excited about in relation to your job this year? • What coworker characteristic do you find most irritating? • What's the one word that you'd like to hear from your boss? • What's the single most important factor that you would change about your job?

Icebreaker	Instructions
Ten Things in Common *(15 minutes)* *http://humanresources.about.com/od/icebreakers/a/icebreaker_com.htm*	1. Divide class into groups of about four people by either having them work with the people near them or numbering them and having them move to be with others of the same number. This gives individuals the chance to meet new people. Give each group a paper and pen. 2. Tell class their assignment is to find ten things they all have in common that have nothing to do with work, body parts, or clothes. 3. One person should list the things that everyone has in common on paper. 4. After about seven minutes of brainstorming stop the groups so there will be time to share. Tell the groups that if they didn't get ten things, it is okay. 5. Have one person from each group share their list with the class.
Would You Rather *(10-15 minutes)*	1. Divide class into groups of about four people by either having them work with the people near them or numbering them and having them move to be with others of the same number (this gives individuals the chance to meet new people). 2. Ask each statement below one at a time and give the groups about two minutes to discuss and explain their answers. Each individual should be given a chance to share. Would you rather . . . . . . be a farmer or a politician? . . . ride a roller coaster or a mechanical bull? . . . have the power to fly or disappear? . . . live in the city or the country? . . . drive a Ford or a Chevy? . . . be known for your looks or your personality? . . . go for a month without the internet or your car? . . . lose your wallet or your keys? . . . spend every minute of the rest of your life indoors or outdoors? . . . live in a home without electricity or running water?

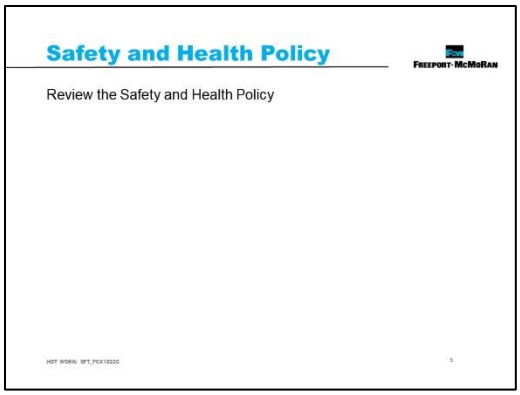
PPT slide 4, SG page i



Instruction

- Introduce the student guide (SG) as a resource
- Read or have a student read the quote
- As a class, discuss what the quote means

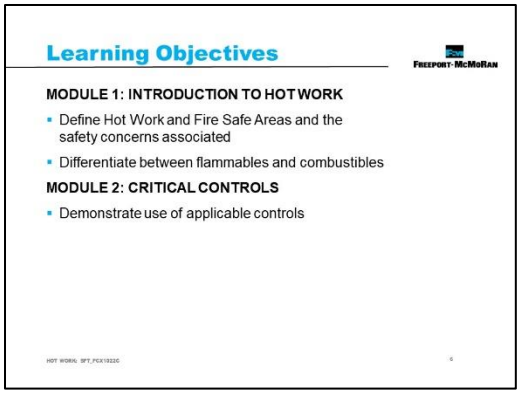
PPT slide 5, SG page v-vi



Instruction

- With the class, discuss the Corporate Safety and Health Policy
- Tell students where they can find the policy (SharePoint)
- Ask the question and discuss possible answers

PPT slide 6, SG page vii



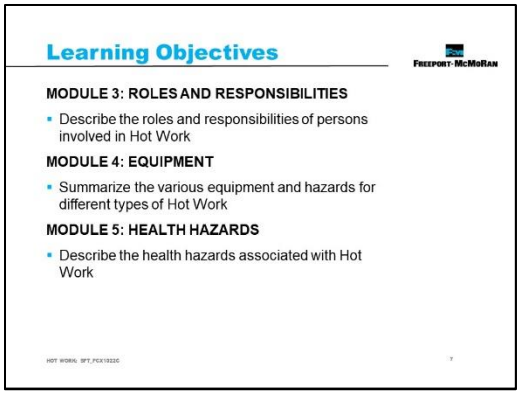
Instruction

- Review each objective
- Tie any appropriate recorded responses to the course objective (even if it is a vague connection)

Facilitation Tip

Stating the objective before the lesson is important for several reasons. First, it lets the student know what they are supposed to learn. Second, it tells them what tools or equipment they can use and what standard they must achieve. Third, it gets student ready to learn. See laws of learning page, 17

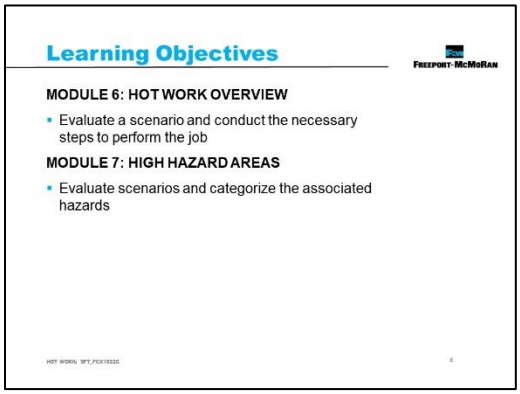
PPT slide 7, SG page vii



Instruction

- Review each objective
- Tie any appropriate recorded responses to the course objective (even if it is a vague connection)

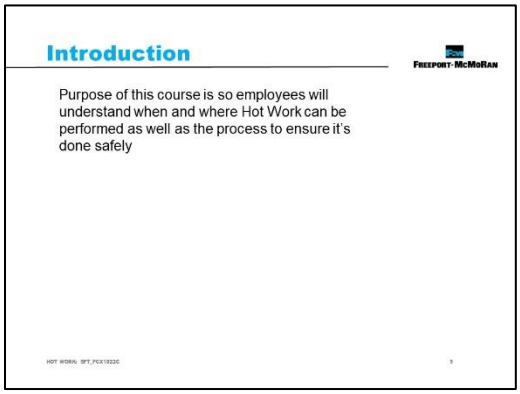
PPT slide 8, SG page vii



Instruction

- Review each objective
- Tie any appropriate recorded responses to the course objective (even if it is a vague connection)

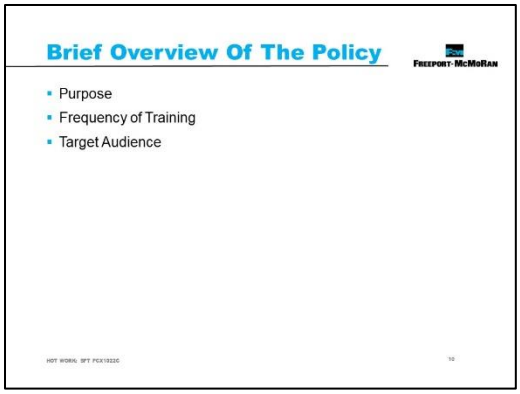
PPT slide 9, SG page ix



Instruction

- Ask a student to read each paragraph of the course introduction.
- Discuss each paragraph with the students about the purpose of the course.
    - Purpose of the course is so employees will understand when and where Hot Work can be performed as well as the process to ensure it's done safely.

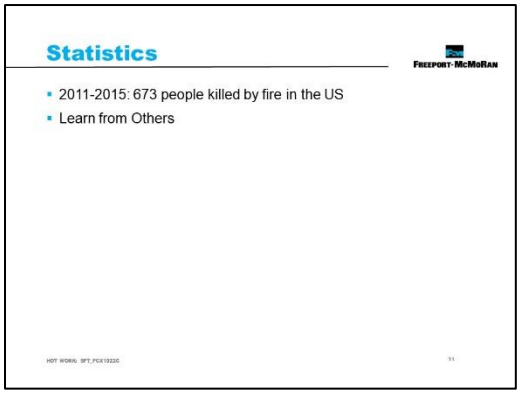
PPT slide 10, SG page xi



Instruction
Explain each bullet

- The purpose of the Hot Work Policy is to provide guidelines and monitor compliance for all Hot Work activities that will be performed in locations that are not normally identified as "Fire Safe" areas.
- Frequency of Training
    - The Hot Work training is provided as an initial, annual refresher and remedial as necessary.
- Target Audience
    - This training is intended to train anyone involved with Hot Work.

PPT slide 11, SG page xiii



Instruction
Explain each bullet

- 2011 to 2015 a total of 673 people were killed as a result of fire or explosions in the United States alone.

Learn from Others

- Read the Learn from Others and discuss the incident with the students.
- Identify the root cause (e.g. insufficient critical control) and any controls that would have prevented this fatal event. (Welding blankets, atmospheric testing)

MODULE 1: INTRODUCTION TO HOT WORK

This module contains introductory information about Hot Work and what constitutes Hot Work. You will discover the difference between areas safe for Hot Work and what is required to make an area safe for Hot Work. Flammables and combustibles are introduced and knowing how ignition sources play a role with those materials is critical to your safety. Our processes are full of combustible areas and knowing how to identify those areas will be a focus.

LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Define Hot Work and Fire Safe Area's and the safety concerns associated.
- Identify and differentiate between flammable and combustible materials.

ACTIVITIES

- N/A

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 3.

TOTAL TEACHING TIME

Module 1 takes approximately 10 Minutes to complete.

Facilitation Tip

If utilized the Six Laws of Learning can produce a more effect learning experience for both students and instructors.

Six Laws of Learning

Readiness – Students learn when they're ready, and learn little when they're not. Instructors need to motivate them in the beginning.
Exercise – Things most often repeated are best remembered.
Effect – People learn better from a positive situation versus a negative. Constant negative motivation stifles the learning process.
Intensity – Students learn best from the real thing versus substitutes. Be creative if trying to mimic reality…audio/video adds vividness, intensity is increased through performance/demonstration.
Primacy – Teach it right the first time. Re-teaching requires more time and may not work immediately.
Recency – The most recent learning idea is the easiest to recall. You can practice this law with summaries, re-stating, and conclusions.

PPT slide 12, SG page 1-3

Instruction
Introduce the topics in Module 1:

- What Constitutes Hot Work?
- Fire Safe Areas
- How Do You Determine An Area Safe For Hot Work?
- Hot Work Area Considerations
- Differences Between Flammables And Combustibles
- Combustible Areas

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
  - Define Hot Work and Fire Safe Area's and the safety concerns associated.
  - Identify and differentiate between flammable and combustible materials

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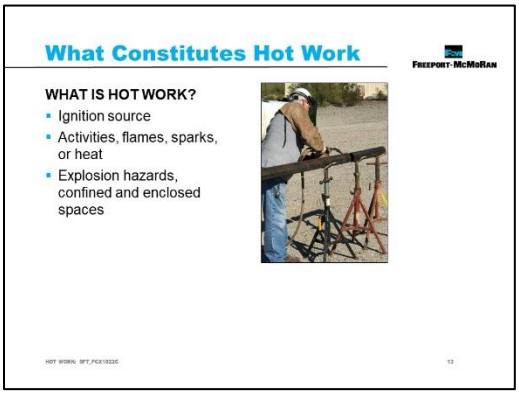
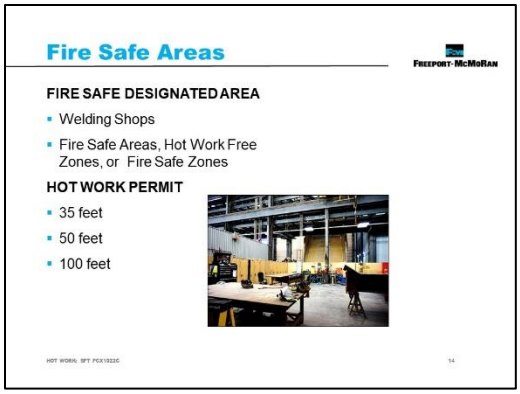
PPT slide 13, SG page 5-7



Instruction
Explain each bullet

- Hot Work is work which has the potential of creating or becoming a source of ignition. This includes grinding, welding, thermal or oxygen cutting or heating, and other related heat or spark producing operations.
- Hot Work is any temporary maintenance, construction or activity that will use gas or electrically powered equipment, which produces flames, sparks, or heat that is sufficient to start a fire or ignite flammable/combustible materials.
- Hot Work can lead to increased risks of fire and explosion hazards because it is often performed in confined and enclosed spaces.

PPT slide 14, SG p. 7



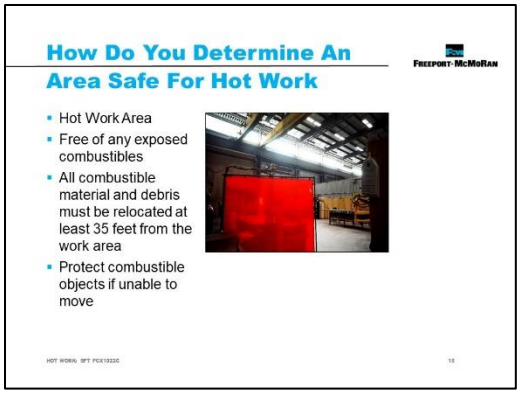
Instruction

Explain each bullet

- A *Fire Safe Designated Area* is an area specifically designed for Hot Work - such as welding shops - which are free of any exposed combustibles.
- All sites must identify each "Fire Safe" Area along with the tasks that can be performed, and must maintain a record of the area and the processes.
- Fire Safe Designated Areas are sometimes referred to as Fire Safe Areas, Hot Work Free Zones, or Fire Safe Zones.
- If an area is not designated as "*Fire Safe*", then a Hot Work Permit is required.
- A Hot Work Permit is needed when Hot Work operations will be on or near operational processes, or within 35 feet of flammable/combustible materials.
- Safe distances of up to 50 feet may be required where flammable gases or vapors are present.
- Distances of 100 feet are required from any powder magazine or fuel storage area.

Discuss site specific Fire Safe Designated Areas

PPT slide 15, SG p. 8

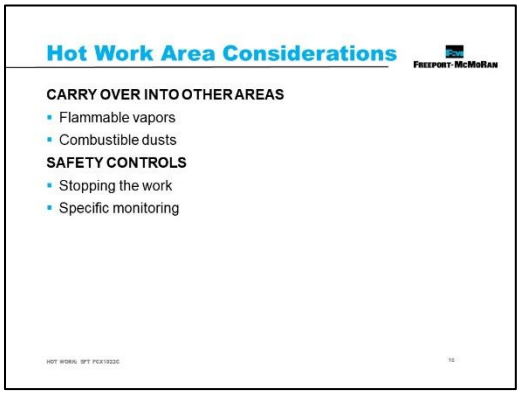


Instruction
Explain the first bullet

- Check to see that your Hot Work area is free of any exposed combustibles.
    - If the area is not free of combustibles, try to move the Hot Work to another location.
    - If the work cannot be moved, then the area must be made safe for hot work.
- In order for an area to be safe for Hot Work, all exposed combustibles must be controlled or removed and a Hot Work Permit obtained.
- All combustible material and debris must be relocated **at least 35 feet** from the work area.
- If relocation is impossible, combustibles must be secured with flame resistant blankets or shielded with heat-resistant curtains.
- Protect combustible objects from falling sparks, hot materials, and igneous byproduct generated from Hot Work.

Discuss the photograph and the features that make the area safe for Hot Work.

PPT slide 16, SG p. 8



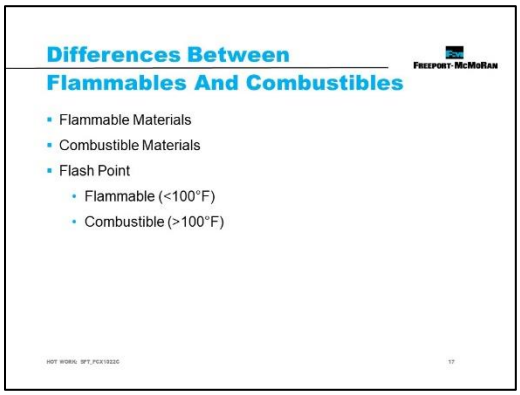
Instruction
Explain each bullet

- Attention must be given to those areas that are near materials or activities that can carry over into the working area, such as flammable vapors and combustible dusts.
- If there is any chance that spillage or carry over may occur, safety controls such as stopping the work, specific monitoring, or other effective means must be implemented.

Facilitation Tip

Questions play a key role in the students learning. Instructors should be using planned and spontaneous questions throughout the lesson. This helps check for understanding and can clarify any misconceptions. If needed refer to the Instructor Fundamental Student Guide for more information about the purpose and types of questions. (Overhead, Direct, Relay, Reverse etc…)

PPT slide 17, SG page 8-9



Instruction

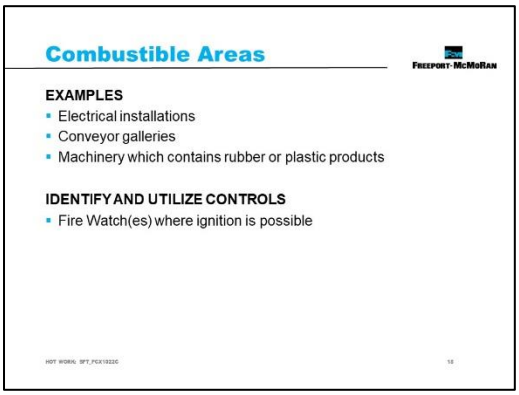
Explain each bullet

- All flammable substances are combustible, but not all combustible substances are flammable.
- Flammable material is anything that can easily catch fire under normal circumstances and with the help of minimal ignition source. Flammable materials include flammable liquids, aerosols, solids, and gasses.
- Combustible materials can include anything that will burn but more vigorous conditions are required for an ideal combustible material to burn. Combustible liquids, metals, wood, certain dust concentrations, paper, rubber, and plastics are examples of combustible materials.
- Flammable liquids are more dangerous than combustible. In general, flammable liquids will ignite and burn easily at normal working temperatures.
- Flammable Liquids have flash points below 100°F.
- Combustible liquids have higher flash points between 100°F and 200°F.
- The flash point is the lowest temperature at which vapors of a liquid will ignite when given an ignition source.
- Flammable and combustible liquids are present at all of the sites.
- Fuels and many common products like solvents, thinners, cleaners, adhesives, and paints may be flammable or combustible liquids.
- Everyone who works with these liquids must be aware of their hazards and how to work safely with them.
- Information on the properties of a specific material or liquid can be found on the safety data sheet (SDS), or other reference material.

Discuss the table in the Student Guide pg. 9

Flash Point of Common Flammables and Combustibles		
	Flammable (<100°F)	**Combustible (>100°F)**
Example & Possible Locations	Gasoline -45°F Fuel Docks, Power Equipment, Light Vehicles, Handheld Equipment	Diesel Fuel #2 125°F Fuel Dock, Power Equipment, Heavy Equipment, Shops, Service Equipment
Example & Possible Locations	Hot Splice Solvent Cleaner -0.4°F Shops, Service Equipment, Maintenance Areas, Concentrator	WD-40 122°F Shops, Service Equipment, Maintenance Areas

PPT slide 18, SG page 9



Instruction

Explain each bullet

- Areas that may have known, but not obvious combustibles and shall have appropriate signage requiring the use of a Hot Work Permit. Examples of the areas are:
    - Electrical installations
    - Conveyor galleries
    - Machinery that contains rubber or plastic products.
- Each site's departments are required to periodically survey these operational areas for any changing conditions, hazards, and Hot Work requirements.

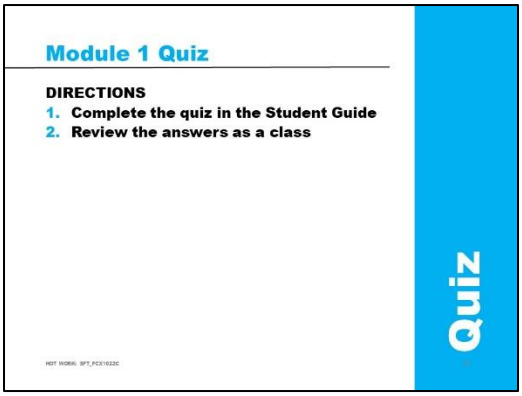
- When working in combustible areas it is vital to identify and utilize controls on items that are plastic, rubber lined, combustible, or flammable.

- Ensure there is a fire watch or multiple fire watches where ignition sources may be introduced into a combustible area.

Discuss site specific combustible areas.

MODULE 1 QUIZ

PPT slide 19-23, SG page 11

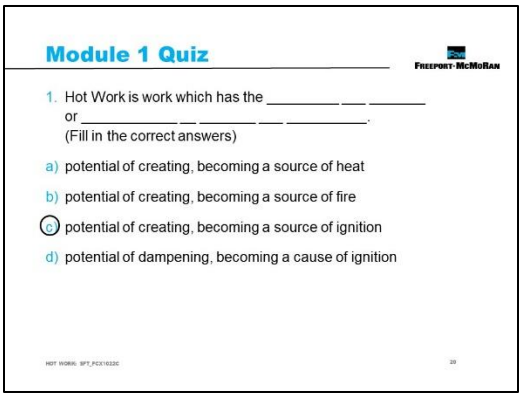


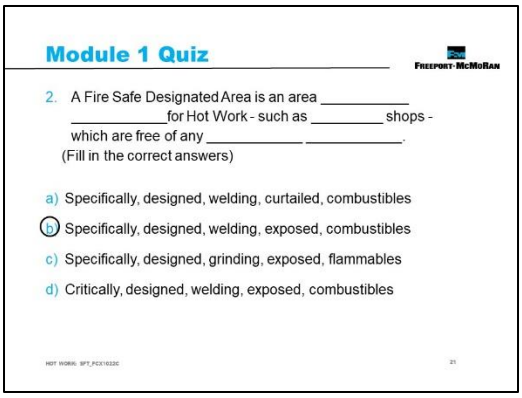
Instruction

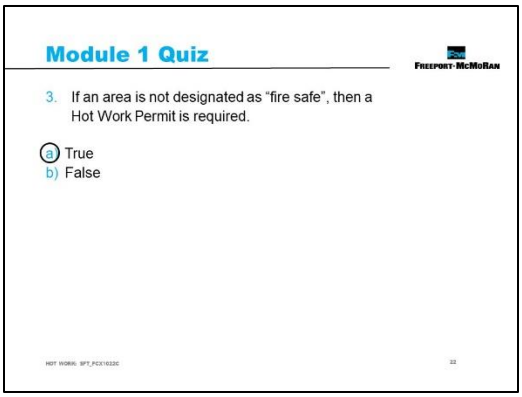
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

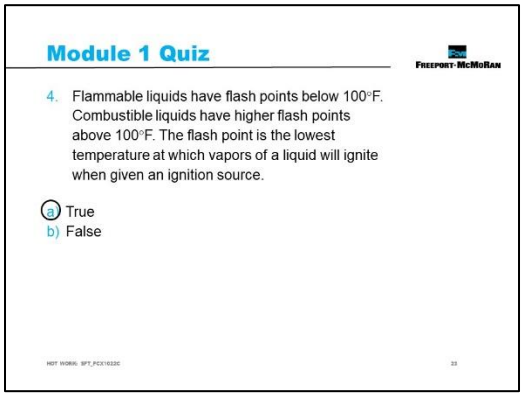
Quiz Answers

1. C (SG page 7)
2. B (SG page 7)
3. A (SG page 7)
4. A (SG page 8)









MODULE 2: CRITICAL CONTROLS

This module contains introductory information about identifying critical controls used to eliminate risk. Fire is introduced as Hot Work's primary Fatal Risk. PPE, fire suppression, and emergency procedures are discussed in the event a control fails.

LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Demonstrate the use of applicable controls.

ACTIVITIES

- Activity 2: Task Control

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 3.

TOTAL TEACHING TIME

Module 2 takes approximately 20 minutes to complete.

Facilitation Tip

By providing a short overview of the information in the upcoming module you will allow students to recall any prior knowledge they have on the topic. In the overview state some of the following information, why, how and where they will put this information to use. **(Law of Readiness)**

PPT slide 24, SG page 15

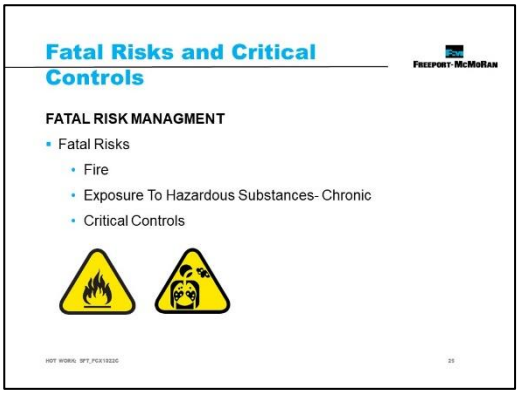
Instruction
Introduce the topics in Module 2:

- Fatal Risk Management and Critical Controls
- Define Critical Controls
- Fatal Risks And Critical Controls Common In Hot Work
- PPE
- Fire suppression
- Ventilation requirements
- Escape / Emergency Procedures
    - Emergency Radio Procedures
    - Emergency Numbers

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
    - Demonstrate the use of applicable controls.

PPT slide 25, SG page 19



Instruction
Explain each bullet

- Fatal Risk Management is a continuation of the Fatality Prevention Program. Focus is placed on identifying Fatal Risks and Critical Controls in an attempt to safeguard all employees within the Company.

- The Fatal Risk Management Program standardizes Fatal Risk communication by implementing icons, definitions, and Critical Controls for twenty-two Fatal Risks.

- Fatal Risks are based on safety issues that have resulted in catastrophic events such as severe injury or death. While all risks have a degree of danger, Fatal Risks are those risks that, when left uncontrolled, will kill you.

- After identifying a Fatal Risk, Critical Control(s) are implemented to prevent death or mitigate the consequences of the Fatal Risk. The absence or failure of a Critical Control significantly increases the risk of severe injury or death despite the existence of other controls. In short, Critical Controls help keep you from being killed. The Fatal Risk(s) and Critical Controls relevant to this course are provided below.

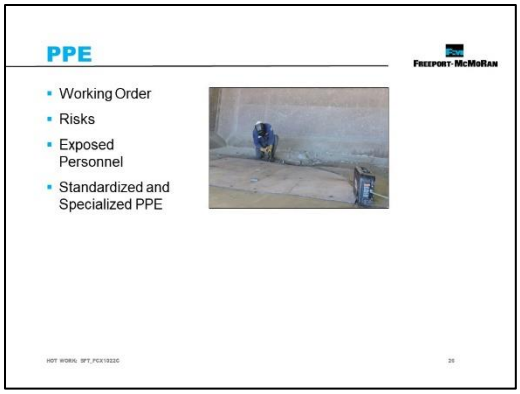
- Fire- The Fire Fatal Risk is defined as exposure to thermal, particulate, gas or vapor hazards from a fire.

    - Critical Controls
        - Alarm Systems
        - Evacuation Plan
        - Fire Suppression Systems
        - Hot Work Permit Execution
        - Rescue Systems
        - Segregation and Storage
        - PPE
- Exposure To Hazardous Substances- Chronic-Workplace exposure to carcinogens and other substances that can cause lethal disease over time (e.g. silica, arsenic, lead, welding fumes, asbestos, acid mist, etc.).
    - Critical Controls
        - Access Control
        - Handling Requirements
        - Engineered Controls
        - PPE

- Follow your site's procedures for identifying and controlling risks involved with the specific task you are performing.

Discuss site specific Fatal Risk Management and Critical Controls.

PPT slide 26, SG page 20



Instruction

Explain each bullet

- PPE can only be beneficial when in proper working order.

- Selecting the correct PPE, inspecting it properly, and wearing it correctly can protect you while performing your job.

- When you have questions about wearing, using, or caring for your PPE, ask a Supervisor or Health and Safety Representative.

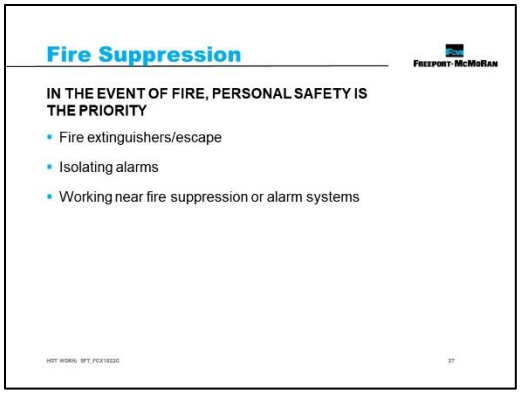
- Hearing, skin, neck, back, head and respiratory system are all at risk when performing Hot Work operations.

- Exposed personnel suitably protected from heat, sparks, slag, noise, and ultraviolet radiation hazards, through the use of fire resistive screens or shields, or other protective measures.

- Standardized and specialized PPE is required when conducting Hot Work for both the operator and attendant and/or fire watch.
    - Head, Eye Protection and Lens Shades
        - Helmets, Shields, Goggles, shall be utilized during Hot Work based on the hazard of the Hot Work task.
        - Filtered lens protects eyes from burns caused by infrared or intense radiant light. Protect face and eyes when welding, brazing, soldering and cutting.
        - Ensure you select proper Filter Lens Shade:
            - #5 for Gas Welding
            - #10 for Arc Welding
    - Hearing Protection
        - When considering hearing protection, choose the appropriate protection for the job you are performing and the area in which you are working. Regardless of the type of hearing protection you wear, ensure it fits properly, is worn properly, and allows for unrestricted functioning of any other required PPE.
    - Fall Protection
        - When performing Hot Work at heights, flame resistant fall protection (Nomex, Kevlar) is required.
    - Respiratory Protection
        - Ensure you are authorized and fit tested before using a respirator.
        - Utilize the correct respirator with the proper cartridge for the job.
    - Body Coverings
        - Fire resistant, Nomex/Kevlar, coveralls, uniforms, shirts- Never wear polyester/rayon type material when performing Hot Work. (e.g. polyester reflective vest, fleece.)
        - Leathers, full or half top leathers
        - Welding gloves
- Follow your site's procedures for identifying and donning appropriate PPE with the specific task you are performing.

Discuss site specific PPE.

PPT slide 27, SG page 21



Instruction

Explain each bullet

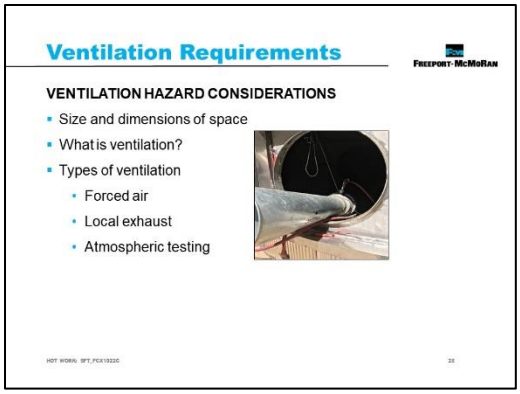
- In the event of fire, your personal safety is the priority.

- Fire extinguishers are provided to assist in your escape or to extinguish a small fire in its early stages.
    - If you have even the slightest doubt about your personal safety, do not fight the fire. Instead, exit the area immediately and notify emergency personnel.
- Often times during Hot Work isolating nearby alarm systems is necessary.

- When working on or near fire suppression or alarm equipment ensure the following:
    - When working near smoke detectors, alarm sensors or sprinkler systems, do not deactivate the entire alarm or sprinkler system.
    - Isolate the detectors, sensors or sprinkler heads in the affected area to prevent false alarms or sprinkler system activation.
    - At the completion of the work, ensure the device(s) is (are) returned to normal service conditions.
    - Make appropriate notifications to site operations.

Discuss site specific procedures, alarm systems and locations.

PPT slide 28, SG page 21



Instruction

Explain the first bullet

- A key component of effective ventilation is to take into account the hazards (chemicals, residues, type of work being done); size and the dimensions (openings, blocks to air flow) of the space.

- The goal of ventilation is to keep fresh air moving through the space, making the air safe to breathe and work in. Always be sure there is an adequate supply of blowers and flexible ducts for the types of operations performed.
    - When controlling atmospheric hazards in a confined space, there are two main ventilation types to consider: forced air and local exhaust. The work being performed, along with the configuration of the space will dictate which form of ventilation is best. Be sure to contact your health and safety representative or site Industrial Hygienist, if you are at all unsure of which option is best for you.

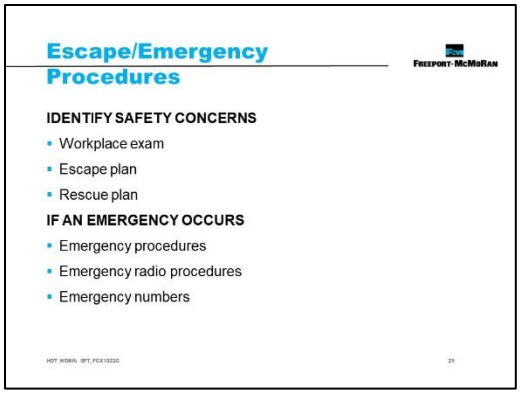
- Local Exhaust Ventilation systems effectively remove hazardous fumes and dust generated from operations such as welding, cutting, burning, and continuous brazing at or near the generation point.

- Forced Air (Dilution) systems are much more effective. Forced air ventilation is used as a primary source of air circulation or in conjunction with a local exhaust system called a Push-Pull system whenever possible.

- Where there is a reasonable possibility of that flammable gases/vapors or excessive oxygen exists, atmosphere testing must be conducted by trained personnel as part of the permit process. Additionally, periodic checks shall be conducted throughout the Hot Work process. Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL) must be below 10% Oxygen (O2) measurement must be between 19.5% and 23%.

Discuss site specific ventilation procedures and types available at your site.

PPT slide 29, SG page 22



Instruction

Explain the first bullet

- Prior to working in an area, a workplace exam must be completed, this will help with identifying any safety concerns such as clear walkways, housekeeping issues and safe access to all escape and emergency exits.

- Before conducting any type of work an escape plan is discussed with all the individuals involved.

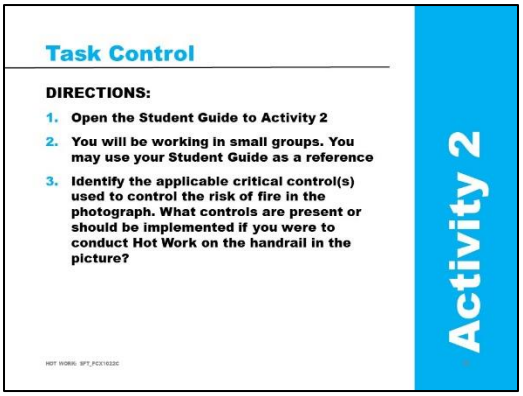
- Always do a thorough evaluation of the scope of work and develop a rescue plan that includes a way for safe/fast rescue (e.g. man-lift, scissor lifts).

- Familiarize yourself with your areas emergency procedures and do not put yourself in harm's way. If an emergency occurs, follow your site's emergency procedures.

Discuss site specific emergency procedures. (MAYDAY, who to contact? 911 and/or Security)
Discuss site specific emergency radio procedures.
Discuss site specific emergency numbers.(Security, EMS, Environmental, Fire)

ACTIVITY 2: TASK CONTROL

PPT slide 30, SG Page 23



Time

Approximately 10 minutes

Materials

- Student Guide

Purpose

- This activity gives students the opportunity to practice applying the critical controls listed in the student guide on page 19 to a common Hot Work situation.

Instruction

1. Divide class into small groups.
2. Go over the directions on the slide
3. In the Student Guide, students will utilize the photograph and guiding questions on the bottom of the page to apply controls to the job.
    - Alarm Systems
    - Evacuation Plan
    - Fire Suppression Systems
    - Hot Work Permit Execution
    - Rescue Systems
    - Segregation and Storage
    - PPE
4. Engage students in a group discussion centered around the controls on page 19. Students should identify the risks in the photograph. Answers will vary.
5. Make sure students focus on the Fatal Risk of Fire and the controls used to eliminate the risk of fire.

Facilitation Tip

Provide clear and concise instructions to avoid confusion. Students are less likely to become nervous or tense, when they understand exactly what they are supposed to do. Make sure to provide the student with plenty of feedback. Feedback is any information about the results of a process good or bad.

Break

We recommend taking a 5 to 10 minute break after the following module quiz. Allow students to stand up, stretch, use the facilities, etc. Make sure you clearly communicate what time you expect them to return and start the next module.

MODULE 2 QUIZ

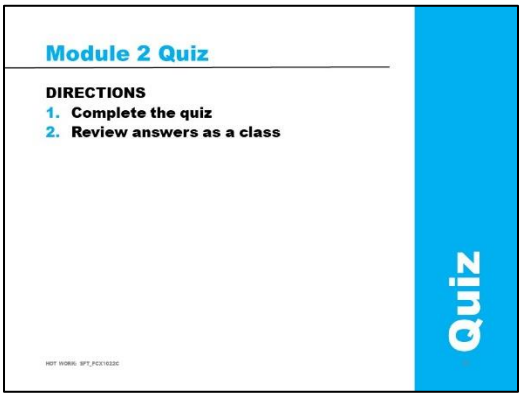
PPT slide 31-35, SG page 25

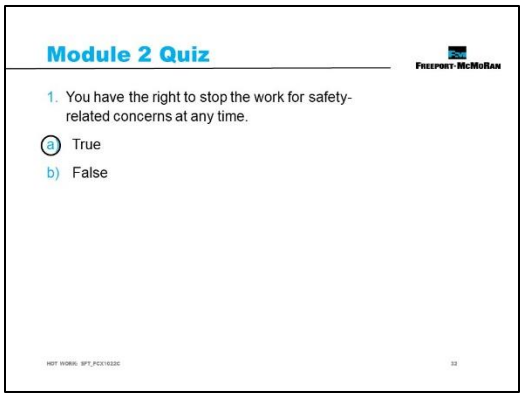
Instruction

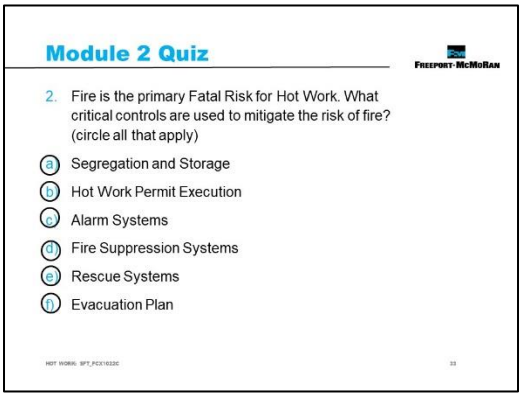
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

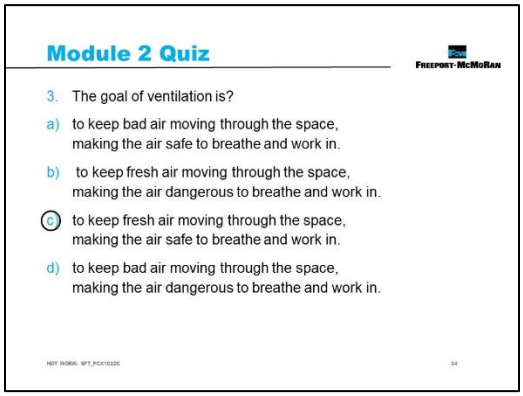
Quiz Answers

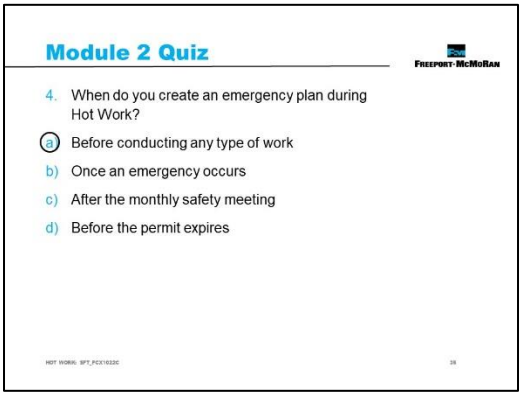
1. A (SG page 19)
2. A-F (SG page 19)
3. C (SG page 22)
4. A (SG page 23)











Break

We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

Facilitation Tip

You have just completed 2 modules on a serious topic. A key role for any instructor is to provide a positive atmosphere for learning. It may be time to visit the Learning **Law of Effect.** It states, people learn better from a positive situation versus a negative. Make sure students understand while it may be a dangerous task, by following safety precautions things will be fine. Possibly use appropriate humor to lighten the mood if necessary.

MODULE 3: ROLES AND RESPONSIBILITIES

This module contains introductory information about only authorized, experienced, and qualified employees may conduct Hot Work and this module clearly defines those employees. Hot Work has specific roles that must be performed in order to safely conduct Hot Work. The role of fire watch is defined as well as the required training for the role.

LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Describe the roles and responsibilities of persons involved in Hot Work.

ACTIVITIES

- N/A

TOTAL TEACHING TIME

Module 3 takes approximately 15 minutes to complete.

PPT slide 36, SG page 29

Instruction

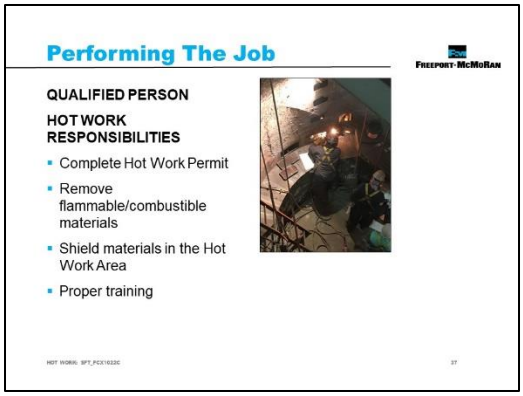
Introduce the topics in Module 3:

- Performing The Job
    - Responsibilities For A Hot Work Permit
- Supervisor
- Fire Watch
    - Locations
    - Potential Hazards
    - Duties
- Multiple Fire Watches
- Required Training

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
    - Describe the roles and responsibilities of persons involved in Hot Work.

PPT slide 37, SG page 33



Instruction

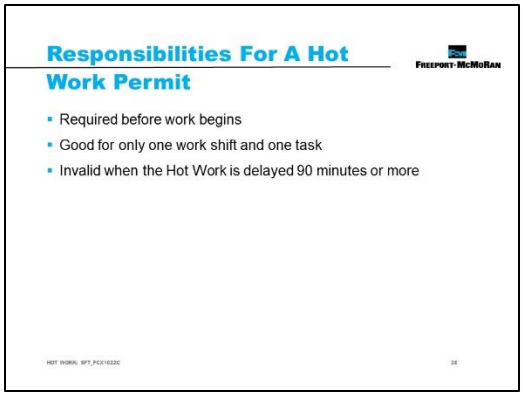
Explain each bullet

- Only authorized, experienced, and qualified employees are allowed to perform Hot Work activities.
- A Qualified Person is one who, by possession of a recognized degree, certificate or professional standing or who by knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work or the project.

- Hot Work responsibilities include:
  - Complete the Hot Work Permit Procedure if necessary.
  - Remove all flammable or combustible materials within a thirty-five foot radius of the Hot Work area. Further distances may be necessary due to the type of combustible or situation. (e.g. powder magazine; the Hot Work must be 100 feet away.)
  - If there are any combustibles in the Hot Work area and cannot be removed, shield them with non-combustible blankets or other non-combustible materials.
  - If possible, use a noncombustible spray or water on combustible floors, walls, or ceiling areas around Hot Work operations.
  - Seal any cracks and openings through which hot sparks may enter of pass through. Use a fire resistant shield to block openings.
  - Place non-combustible or flame resistant curtains or screens to protect personnel in adjacent work areas from heat, flames, UV, radiant energy and weld splatter.
  - Inspect that all cutting and welding equipment is in proper operating condition and in good repair.
  - Be sure you are properly trained in the safe operation of the equipment and the Hot Work process you are about to perform.

Discuss site specific responsibilities.

PPT slide 38, SG page 34



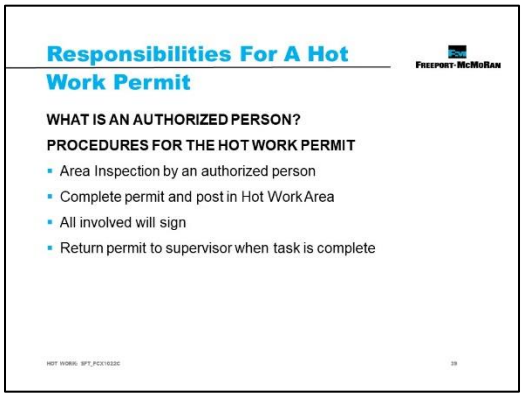
Instruction

Explain each bullet

- A Hot Work Permit is required before Hot Work operations may begin in a location outside of a fire safe designated area.
    - In the event a Hot Work Permit is necessary, the process must be initiated prior to beginning Hot Work by those who will be authorizing and performing the work.
- A Hot Work Permit is good for only one work shift and one task.
    - Anyone involved with the hot work, or assisting with the hot work, must sign the permit.
- The permit will become invalid when the Hot Work is delayed for 90 minutes or more and must be kept at the job site until 60 minutes after the job is complete and risk of fire subsided.
- When all the critical controls have been put in place and the employees have signed the permit, work may proceed as described on the permit.

Discuss site specific responsibilities.

PPT slide 39, SG page 34



Instruction

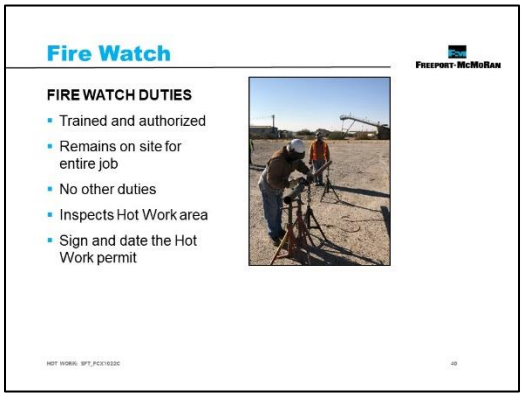
Explain each bullet

- Authorized person is someone who has the permissions, need, and knowledge to perform a specific task in a specific area. This person is accountable for the safety of the work they are performing. They can assign the responsibility for conducting the pre Hot Work inspection to another Qualified Persons, but they cannot delegate their responsibility for the overall safety of the work being performed.

- The procedures for the Hot Work Permit include:
    - The authorized person will inspect the area before authorizing a Hot Work permit.
    - The employee/Hot Work operator will complete the Hot Work permit at the job area and post until completion of the job or the duration of the permit (not to exceed the work shift).
    - All personnel involved in the Hot Work will sign the permit.
    - The employee/Hot Work operator will return the Hot Work permit to the supervisor after the task is complete or at the end of the work shift.
    - Permits will be stored and maintained by the department who initiated the permit.

Discuss site specific responsibilities for obtaining and returning Hot Work permits.

PPT slide 40, SG page 35



Instruction

Explain each bullet

- A Fire Watch is a trained and authorized person posted at the Hot Work job site and remains there for the duration of the job and beyond as required by the Hot Work permit.
    - This individual is also to provide assistance with fire control, communication and inspection of the affected area.
    - Fire Watch personnel is assigned to monitor the Hot Work areas to make sure that conditions do not change when combustible materials cannot be effectively removed, protected or shielded.
    - Fire Watch(es) are used to prevent and/or extinguish fires at the incipient (beginning) stage.

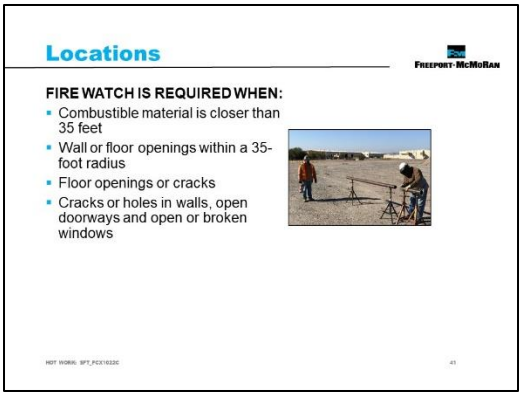
- The fire watch must observe for fire, dust accumulation, adequate ventilation, atmospheric testing, or other hazardous conditions that could endanger the safety of the workers.

- Additionally, the fire watch will perform no other functions or tasks during their assignment as fire watch.

- Before any Hot Work is permitted, the Hot Work area must be inspected by an authorizing individual responsible for identifying and implementing all precautions, and assigning the proper individual(s) to perform the work.

- Each person assigned as a Fire Watch is required to sign and date the Hot Work Permit.

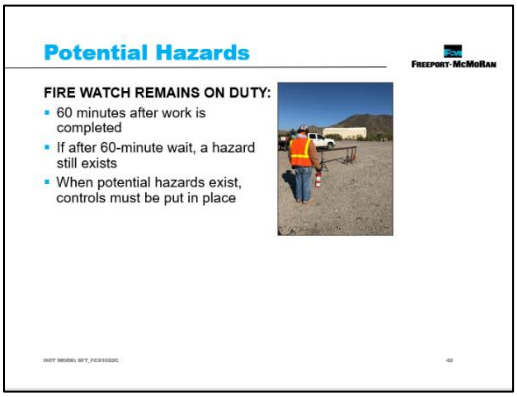
PPT slide 41, SG page 35



Instruction
Explain each bullet

- A Fire Watch is required whenever Hot Work is performed in locations where the following conditions exist:
  - Combustible material closer than 35 feet to the point of operation.
  - Combustibles are more than 35 feet away but are easily ignited by sparks.
  - Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.
  - Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor.
  - The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

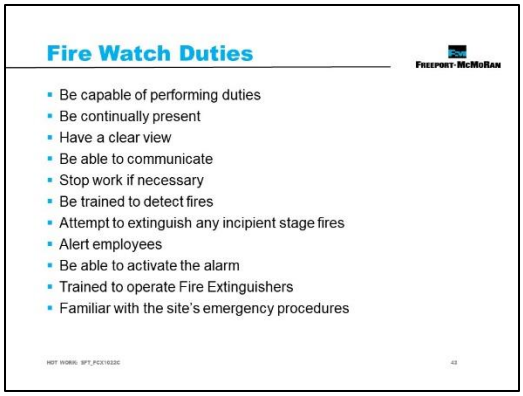
PPT slide 42, SG page 36



Instruction
Explain each bullet

- The Fire Watch must remain at the Hot Work duty for 60 minutes after the Hot Work has been completed to detect and extinguish possible smoldering fires.
  - If, after 60 minutes, the material is still noticeably hot, the surface must be cooled by appropriate means or the watch extended until such time as the risk has abated.
- When potential hazards exist, controls must be put in place when:
  - combustible materials cannot be removed, protected or shielded.
  - there is a possible exposure to welding or toxic fumes.
  - transference of heat from one space to another or to spaces below.
  - potential of fire in adjacent spaces.
  - any coverings used to protect equipment that may not be fire resistant.

PPT slide 43, SG page 38



Instruction

Explain each bullet

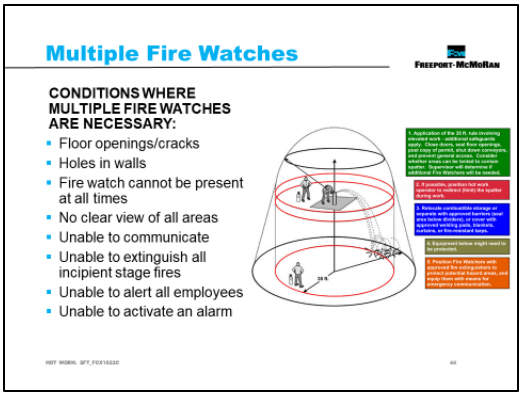
- The authorizing individual must ensure that any employee assigned as a Fire Watch is physically capable of performing the necessary duties.
- The Fire Watch must be continually present and have no other duties while the Hot Work is in progress or during the 60 minutes wait time.

- In addition, the Fire Watch must:
  - Have a clear view of and immediate access to all areas included in the fire watch,
  - Be able to communicate with workers exposed to Hot Work,
  - Stop work if necessary and restore safe conditions within the Hot Work area,
  - Be trained to detect fires that occur in areas exposed to the Hot Work,
  - Attempt to extinguish any incipient stage fires in the Hot Work area that are within the capability of available equipment and within the fire watch's training qualifications,
  - Alert employees of any fire beyond the incipient stage
  - Be able to activate the alarm if unable to extinguish a fire in the areas exposed to the Hot Work.

- Fire Watch(es) must have fire extinguishing equipment readily available and be trained in their use.
  - Fire extinguishers must be of the appropriate size and type, and need to be in place in addition to the normal area fire extinguishers.
- Fire Watches shall be familiar with the site's emergency procedures in the event of a fire

Discuss site specific duties and procedures.

PPT slide 49, SG page 39



Instruction

Explain each bullet

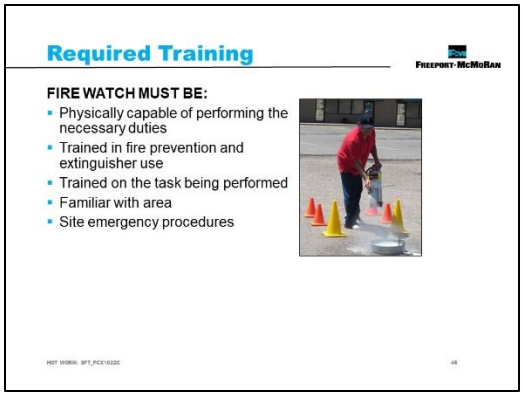
- If there are floor openings or cracks in the flooring that cannot be closed, precautions must be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor.
    - The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows. When these types of conditions exist, more than one fire watch must be assigned.

- The fire watches must observe for fire, dust accumulation, adequate ventilation, atmospheric testing, or other hazardous conditions that could endanger the safety of the workers.
    - If only one Fire Watch is on duty, performing these checks may be difficult to carry out.

- Other possible situations that may require an additional or multiple Fire Watch:
    - Fire Watch cannot be present at all times while the Hot Work is being performed,
    - Fire Watch does not have a clear view of and immediate access to all areas included in the fire watch,
    - Fire Watch is unable to communicate with all the workers involved in the Hot Work,
    - Fire Watch is unable to extinguish all incipient stage fires in the Hot Work area,
    - Fire Watch is unable to alert all employees of any fire beyond the incipient stage,
    - Fire Watch is unable to activate the alarm if unable to extinguish a fire in the areas exposed to the Hot Work.

Discuss the diagram.
Discuss site specific situations where multiple watches may be necessary.

PPT slide 50, SG page 40



Instruction

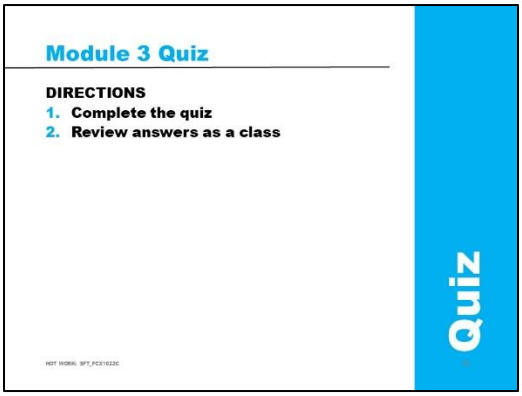
Explain the bullets

- Any individual assigned as a Fire Watch must be physically capable of performing the necessary duties and be trained in the use of any required fire extinguishing equipment.
- Individuals involved with Hot Work shall be trained in fire prevention and extinguisher use during initial training and refreshed annually.
- Fire Watch must be task-trained on the Hot Work task(s) to be performed, must be familiar with the Hot Work area, and be aware of the site emergency procedures for fire safety.

Discuss site specific training requirements.

MODULE 3 QUIZ

PPT slide 46-50, SG page 39

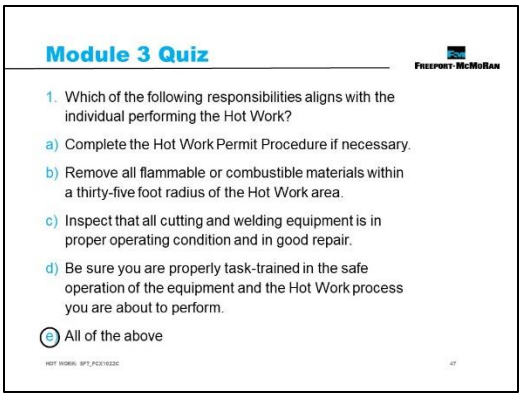


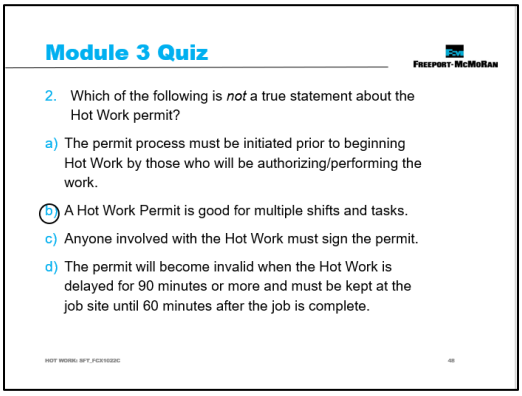
Instruction

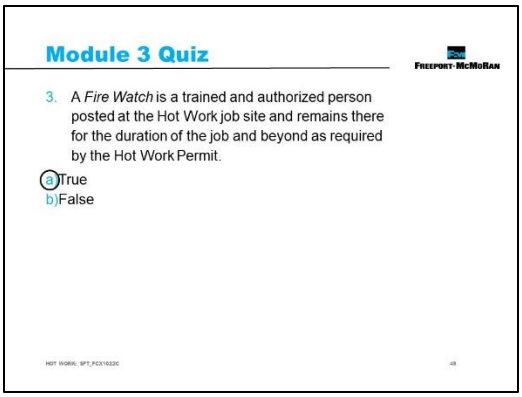
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

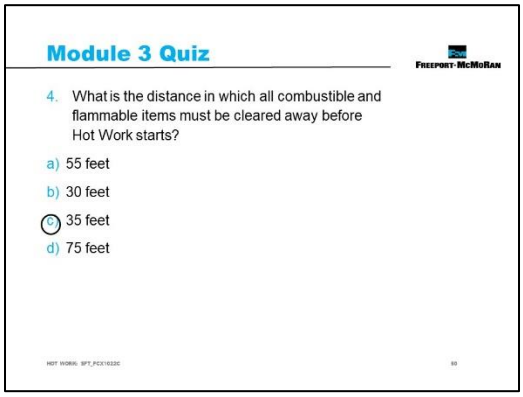
Quiz Answers

1. E (SG page 33)
2. B (SG page 34)
3. A (SG page 35)
4. C (SG page 33)









Break

- We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

MODULE 4: EQUIPMENT

This module contains introductory information about specialized Hot Work equipment, equipment hazards and how to mitigate equipment hazards.

LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Summarize the various equipment and hazards for different types of Hot Work.

ACTIVITIES

- Activity 3: Team Word Webbing

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 3.

TOTAL TEACHING TIME

Module 4 takes approximately 20 minutes to complete.

PPT slide 51, SG page 45

Instruction

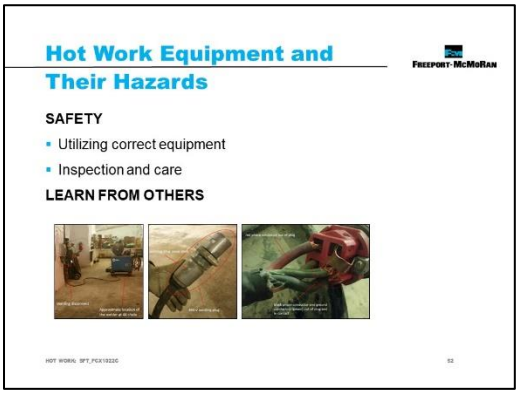
Introduce the topics in Module 4:

- Hot Work Equipment And Their Hazards
- Welding Curtains, Pads, And Fire Blankets
    - Welding Fire Blankets
    - Welding Curtains / Screens
    - Welding Pads
- Welding Equipment Hazards
- Equipment Inspection
- Injuries From Insufficient PPE
- Other Safety Considerations

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
    - Summarize the various equipment and hazards for different types of Hot Work.

PPT slide 52, SG p. 47



Instruction

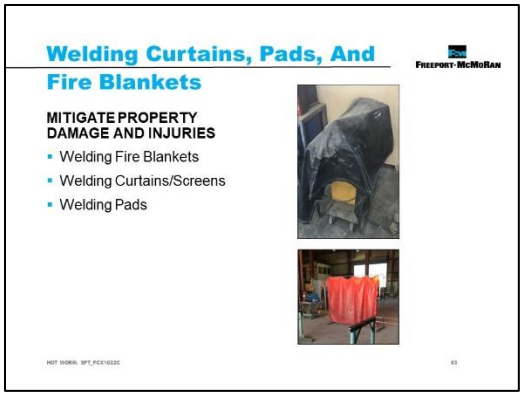
Explain the first bullet

- Safety is the critical consideration for any Hot Work project as employees face a multitude of hazards during the process.
- Safe mitigation of these hazards is achieved by utilizing the correct equipment and ensuring the equipment is safe to use.
- Inspection and care is paramount to ensuring safe working conditions.

Learn from Others

- Read the Learn from Others and discuss the incident with the students.
    - Identify the root cause and any controls that would have prevented this event.

PPT slide 53, SG p. 48-49



Instruction

Explain each bullet

- Welding Curtains, Pads, and Fire Blankets
  - Welding curtains, pads and fire blankets are all controls used to mitigate property damage and injuries. These controls do not eliminate the hazard but can be used as engineering or substitution controls. Some applications of these items only go as high on the hierarchy of controls as PPE based on its use and application. It important to know the hazards and applications of the curtains, pads, and blankets.

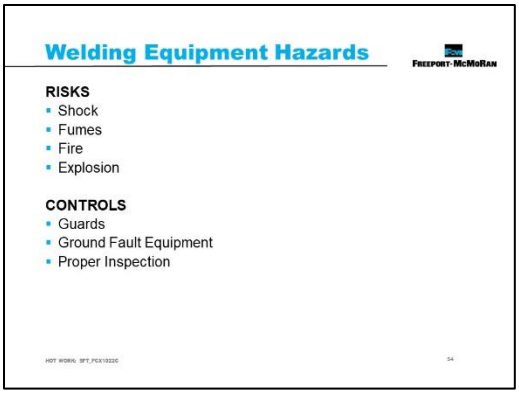
- Welding Fire Blankets
  - Welding blankets are made from a heat-resistant fabric designed to be placed in the vicinity of a Hot Work operation. They are designed to be used in horizontal applications with light to moderate exposures - such as chipping, grinding, heat treating, and light horizontal welding. Welding Blankets are heat and fire resistant, not fire proof.
  - Welding Blankets primary function is to protect machinery and prevent the ignition of any combustibles that are located adjacent to the underside of the blanket.

- Welding Curtains/Screens
  - Welding curtains and screens are also made from heat-resistant fabric but are intended to be used for vertical applications with light to moderate exposures.
  - Welding curtains and screens are designed to prevent sparks from escaping a confined area during Hot Work operation. They are also used for applications such as chipping, grinding, heat treating, and light horizontal welding.
  - Welding curtains isolate welding areas while keeping workers protected from weld flash burn, molten metal and sparks.
  - Whenever possible, all arc welding should be shielded by noncombustible or flameproof screens which will protect all individuals working in the vicinity from the direct rays of the arc.

- Welding Pads
  - The welding pad is designed for horizontal uses with severe exposures - such as those resulting from molten substances or heavy horizontal welding.
  - Welding pads are manufactured from heat-resistant fabric meant to be placed directly under the Hot Work operation.
  - Welding pads are specifically designed to prevent the ignition of combustibles that are located adjacent to the underside of the pad.

Discuss site specific regarding blankets, screens, pads.

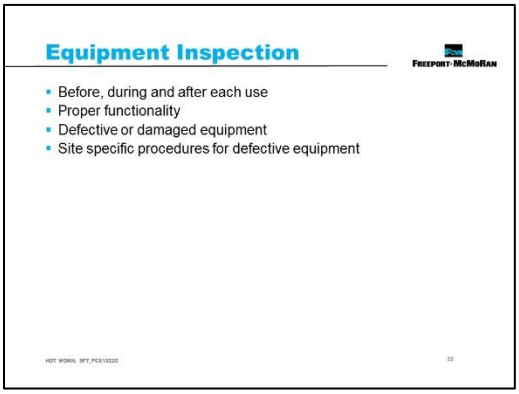
PPT slide 54, SG p. 49



Instruction
Explain the bullet

- Welding equipment can produce a risk if proper inspection and use is not adhered too.
    - Shock, fume exposure, fire, and explosions are a few risks related to Hot Work.
    - Controls are used to mitigate equipment risks such as guards and ground fault equipment.
    - Proper inspection, use of the equipment and control is vital to employee safety.

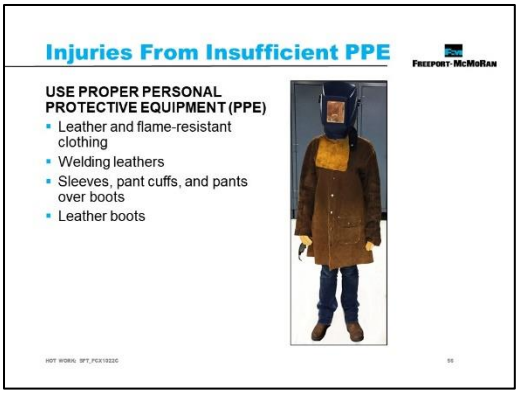
PPT slide 55, SG p. 49

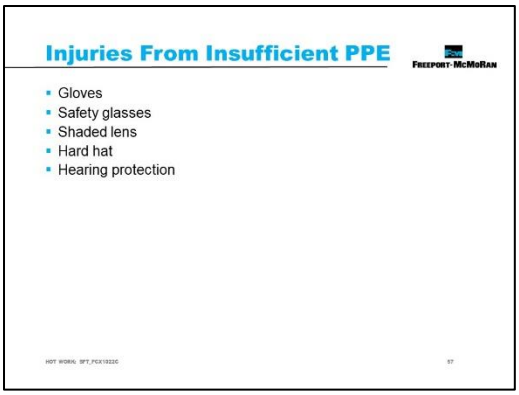


Instruction
Explain each bullet

- Equipment used in Hot Work applications can create their own hazards.
- It is vital to inspect all equipment at the start of each task in which they are to be used.
- Inspect equipment for proper functionality, to maintain safe working conditions.
- Never use defective or damaged equipment as it can lead to injury or even death.
- Follow site specific procedures for inspection of equipment.
- Follow your sites tag out procedure and remove damaged or defective equipment from the job.

PPT slide 56-57, SG p. 50





Instruction

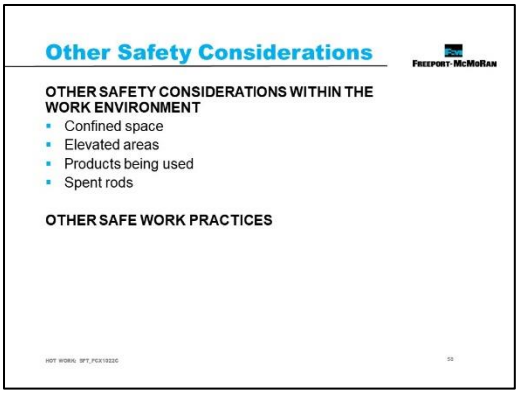
Explain the bullets

- Knowing and using the proper Personal Protective Equipment (PPE) is your best means for the prevention of burns – the most common welding injury – and exposure to arc rays.
- The correct use of the appropriate PPE will allow for freedom of movement while still providing adequate protection from Hot Work hazards.
    - Leather and flame-resistant treated cotton clothing is recommended for any Hot Work application. Synthetic material - such as polyester or rayon (e.g. reflective vests) - will melt when exposed to extreme heat.
    - Welding leathers are highly recommended when performing welding out of position - such as vertical or overhead welding.
    - When performing Hot Work, avoid rolling up your sleeves or pant cuffs, and keep your pants over the top of work boots. Do not tuck them in. Sparks or hot metal can fall into the folds and gaps and burn through the material.
    - Leather boots with 6-to-8-inch ankle coverage are the best foot protection, and metatarsal guards over the shoelaces can protect your feet from falling objects and sparks.

Slide 57

- Heavy, flame-resistant or leather is a good choice for gloves to protect yourself from burns, cuts and scratches. Keep them dry to provide protection from electric shock.
- Always wear safety glasses with side shields or goggles to keep debris from hitting your eyes. Make sure to choose the right shade lens for your Hot Work process.
- Hard hats also protect from sparks, heat and electric shock.
- If working near high noise levels, wear hearing protection such as ear plugs, ear muffs, or both to protect your ears.

PPT slide 58, SG p. 51



Instruction

Explain the first bullet

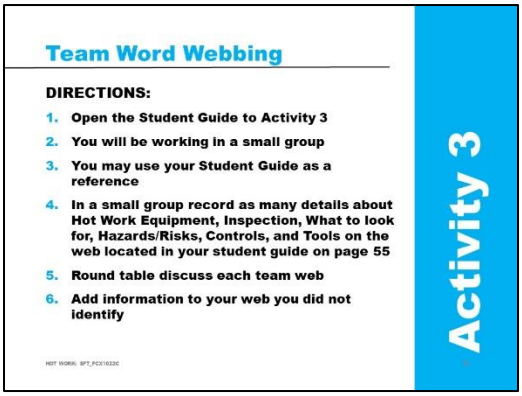
- Hot Work employees should also be aware of other safety considerations within the work environment.
    - Those working in a confined space or in an elevated area need to take extra precautions as these tasks are fatal risks and with critical controls can be mitigated.
    - Pay close attention to safety information on the products being used and the safety data sheets provided by the manufacturer.
    - Dispose of spent rods in approved containers to avoid environmental impact.

- Other safe work practices include:
    - If opening cans of electrode, keep hands away from sharp edges.
    - Remove all clutter and debris from the Hot Work area to prevent tripping or falling.
    - Never use broken or damaged equipment or PPE.
    - Never drive over or park on welding leads with vehicles or equipment.

Discuss site specific considerations

ACTIVITY 3: TEAM WORD WEBBING

PPT slide 59, SG page 53



Time

Approximately 10 minutes

Materials

- Student Guide

Purpose

- This activity gives students the opportunity to summarize the equipment and their hazards related to Hot Work.

Instruction

1. Break into small groups
2. In a small group record as many details about Hot Work Equipment, Inspection, What to look for, Hazards/Risks, Controls, and Tools on the web located in the student guide on page 55.
3. Round Table Discussion
    a) Discuss with the class any missing information from the module.
4. Discuss information shared by the students and link their responses to the module. If students missed critical items have them add the information to their webs.

Facilitation Tip

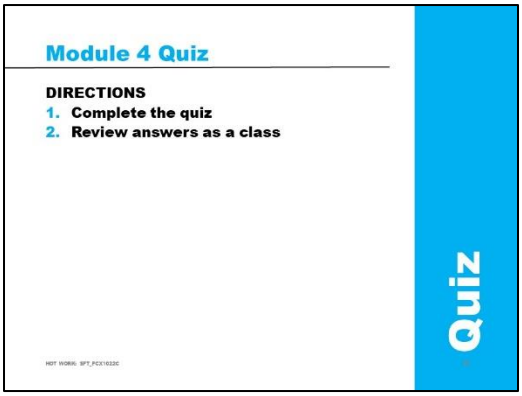
Provide clear and concise instructions to avoid confusion. Students are less likely to become nervous or tense, when they understand exactly what they are supposed to do. Make sure to provide the student with plenty of feedback. Feedback is any information about the results of a process good or bad.

Break

We recommend taking a 5 to 10 minute break after the following module quiz. Allow students to stand up, stretch, use the facilities, etc. Make sure you clearly communicate what time you expect them to return and start the next module.

MODULE 4 QUIZ

PPT slide 60-64, SG page 55

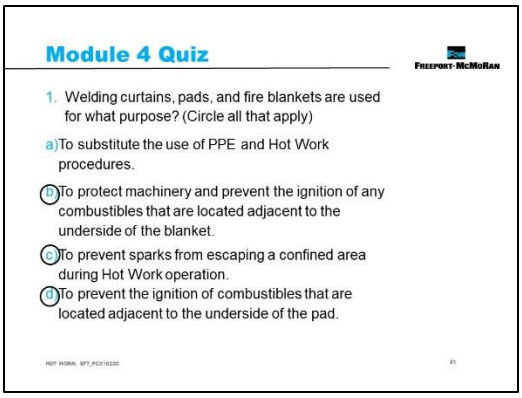


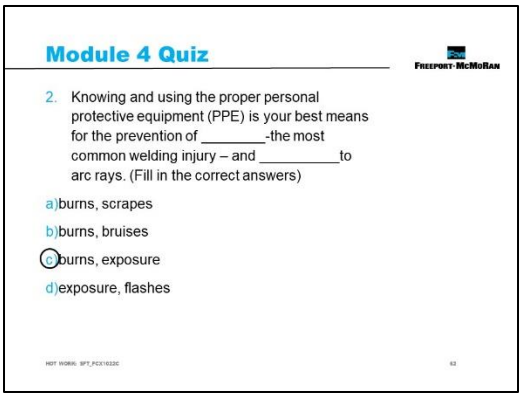
Instruction

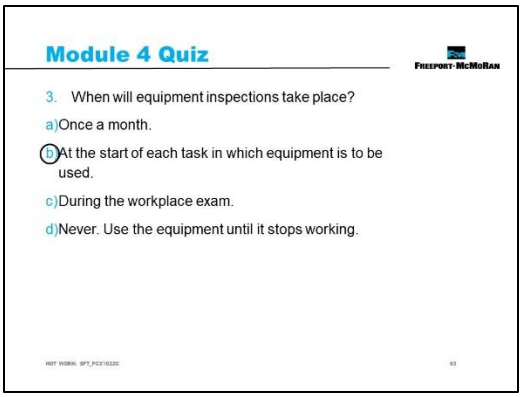
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

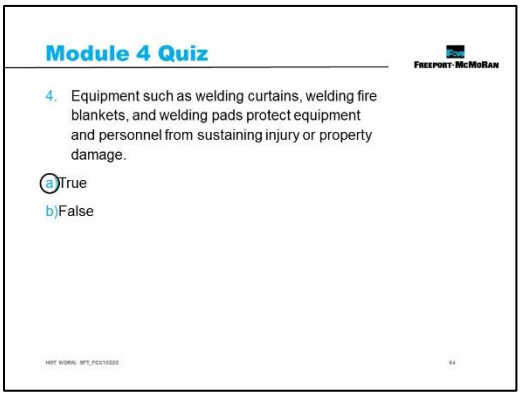
Quiz Answers

1. BCD (SG page 48-49)
2. C (SG page 50)
3. B (SG page 49)
4. A (SG page 48-49)









Break

- We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

MODULE 5: HEALTH HAZARDS

This module contains introductory information about the possible hazardous substances encountered during Hot Work.

LEARNING OBJECTIVES

Upon completion of this module, the students will be able to:

- Describe the health hazards associated with Hot Work.

ACTIVITIES

N/A

TOTAL TEACHING TIME

Module 5 takes approximately 20 minutes to complete.

PPT slide 65, SG page 59

Instruction

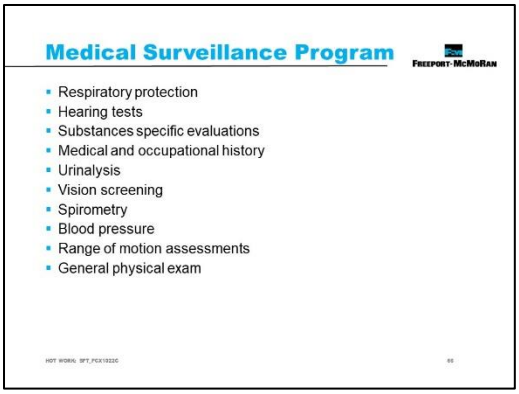
Introduce the topics in Module 5:

- Medical Surveillance Program
- Hazardous Substances And Their Health Hazards
- Hexavalent Chromium (Cr-Vi)
- Arsenic
- Manganese
- Concentrate
    - Sulfur Dioxide
    - Copper
    - Lead
    - Zinc & Cadmium
    - Cobalt
    - Mercury
- Mitigating Health Hazards
- Safety Data Sheets (SDS)
- Pipes And Surface Prep
- Sampling
- Respiratory Protection

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
    - Describe the health hazards associated with Hot Work.

PPT slide 66, SG page 63

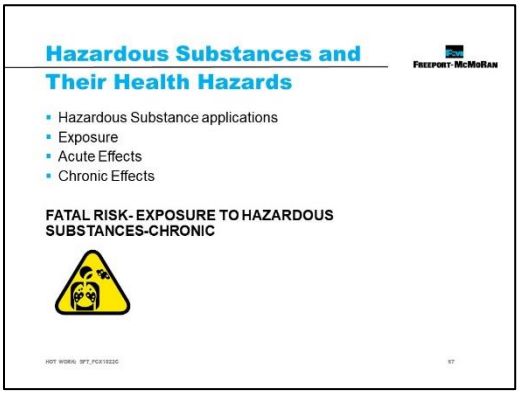


Instruction

Explain each bullet

- Medical Surveillance relevant to Hot Work activities include, but is not limited to:
    - Evaluation to wear respiratory protection
    - Hearing Tests
    - Substances specific evaluations for exposure to metals such as;
        - Chrome Vi
        - Lead
        - Manganese
        - Zinc
        - Copper
    - Medical and occupational history
    - Urinalysis
    - Vision Screening
    - Spirometry
    - Blood Pressure
    - Range of Motion Assessments
    - General Physical Exam
- The Medical Surveillance Program provides periodic and routine monitoring for workers exposed to the hazards previously mentioned. Some exposures lead to health hazards and it is important to know the effects and signs of exposure when conducting Hot Work.

PPT slide 67, SG page 63



Instruction

Explain each bullet

- Hazardous Substances are used in many applications across Freeport-McMoRan and take many different forms.
- Solids, liquids, gases, mists and fumes are often present during Hot Work activities.
- Exposure to hazardous substances can affect the body in many different ways. Skin contact, inhalation and ingestion can cause damage and controls are utilized to mitigate these risks.
- Where exposure cannot be avoided, then adequate controls will be put in place.
- Exposure can happen if controls are not properly utilized. If an employee is exposed to a hazardous substance the symptoms and exposures are divided into two categories: Acute effects & chronic effects.
- Acute effects are often immediate and result from exposures over a short duration.

- Chronic effects are slower and harder to notice, arising from weeks, months, or years of exposure to hazardous substances.

- Immediately report to the supervisor any potential overexposure to hazardous substances, or any signs or symptoms they experience consistent with site hazards, which require treatment.

- Fatal Risk- Exposure to Hazardous Substances-Chronic

    - Workplace exposure to carcinogens and other substances that can cause lethal disease over time (e.g. silica, arsenic, lead, welding fumes, asbestos, acid mist, etc.). Critical Controls
    - Critical Controls
        - Access Control
        - Handling Requirements
        - Engineered Controls
        - PPE

Discuss Site Specific FRM- Exposure to Hazardous Substances-Chronic Fatal Risk and Critical Controls

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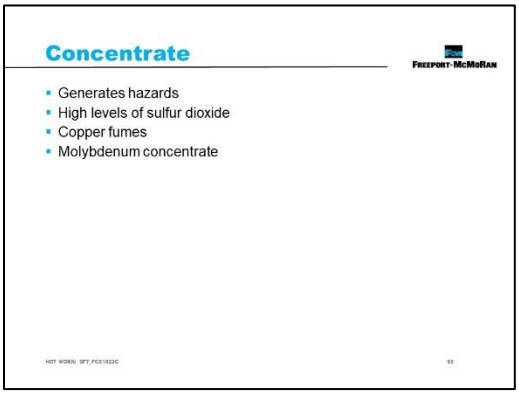
PPT slide 68, SG page 64



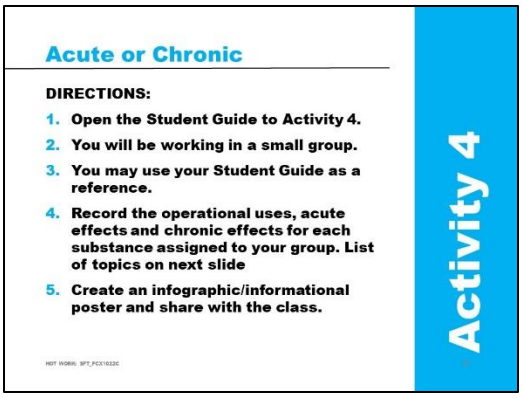
Instruction
Explain each bullet

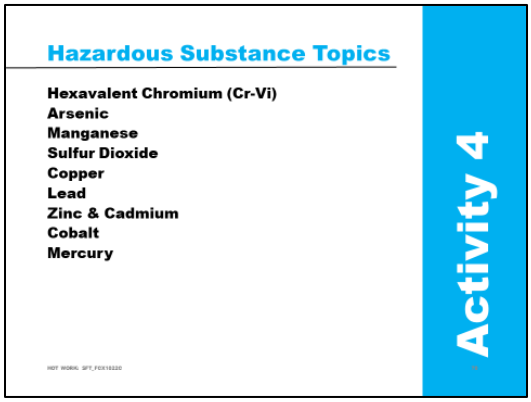
- Hot Work on anything that has been in contact with concentrate can generate hazards in addition to the hazards produced by conducting Hot Work (e.g. fume from welding, base metals used)
- Conducting Hot Work with components in contact with concentrate, release high levels of sulfur dioxide.
- Some concentrates used in the process contain higher concentrations of lead and other heavy metals to create a hazard when heated or burned.
- Copper fumes can reach hazardous levels when welding on items that have copper concentrate on them.
- Hot Work on components which have been in contact with molybdenum concentrate can generate molybdenum trioxide, is more hazardous than other forms of molybdenum.

Discuss site specific.

ACTIVITY 4: ACUTE OR CHRONIC

PPT slide 69-70, SG page 65





Time

Approximately 15 minutes

Materials

- Student Guide
- Poster/Chart Paper
- Markers

Purpose

- This activity allows students to discover the content for slides 77-90 and allows the facilitator to guide students through this content.
- This activity gives students the opportunity to describe the health hazards related to Hot Work.

Instruction

1. Break class into small groups.
2. Assign each group 1-3 hazardous substances from the module. Ensure all substances have been assigned. List of topics are on the second activity slide.
    - Hexavalent Chromium (Cr-Vi)
    - Arsenic
    - Manganese
    - Sulfur Dioxide
    - Copper
    - Lead
    - Zinc & Cadmium
    - Cobalt
    - Mercury
3. The small groups will record the operational uses, acute effects and chronic effects for each substance assigned to their group.
4. Each group will create a poster and share their findings with the class.

    The tables from the student guide are provided in the Facilitator guide for use during the activity.

Facilitation Tip

Provide clear and concise instructions to avoid confusion. Students are less likely to become nervous or tense, when they understand exactly what they are supposed to do.
Make sure to provide the student with plenty of feedback. Feedback is any information about the results of a process good or bad.

HEXAVALENT CHROMIUM (CR-VI)

Operational Use

Hot Work on stainless alloys has the potential to create elevated exposures to Hexavalent Chromium (Cr-VI). Hexavalent Chromium (Cr-VI) is often produced when stainless alloys are cut or welded.

Stainless steel and stainless are widely used in our operations; specifically in locations that use sulfuric acid, including SX Plants, EW Tankhouses, Refineries, Acid Plants, and Smelters.

Acute Effects

Hexavalent chromium irritates the nose, throat, and lungs at high concentrations, creating symptoms of itching and burning sensations, sneezing, runny nose and cough.

Breathing small amounts of hexavalent chromium even for long periods does not cause respiratory irritation in most people.

Chronic Effects

Repeated exposure to levels of hexavalent chromium manifests most obviously in the nose. Nosebleeds and sores can develop, and if exposure is severe enough, may result in the formation of a chrome hole – a perforation of the wall separating the nasal passages. Hexavalent chrome is a known carcinogen in part due to chronic irritation constantly provoking an immune response.

ARSENIC

Operational Use

Arsenic fumes can occasionally be released when cutting or welding on certain stainless steels and aluminum. More commonly, arsenic exposure is a concern at Miami's ISA and Converters as well as El Paso's tankhouse and anode casting facilities.

Chronic Effects

Arsenic is a known human carcinogen associated with cancers in the lungs, liver, kidney, and bladder. Skin diseases are also common results, manifesting with scaly appearances, lesions, warts and skin cancers.

MANGANESE

Operational Use

Manganese is a common alloy used for strengthening metal against wear. High levels of manganese can be found on metal components that are designed for impact with rocks and ore – haul truck bed liners, loader cutting edges, shovel teeth, and crush & convey components. Manganese is also present in welding wire, rods, and flux.

Manganese exposure varies depending on both the composition of the base metal and the method of welding. While manganese is necessary for the diet and is found in many foods, it becomes a health concern when inhaled.

Acute Effects

Effects on the nervous system appear even at lower levels of exposure. Differences in memory, reaction time, hand-eye coordination and mood have been noted among workers exposed to lower levels of manganese. Loss of sex drive and sperm damage has also been observed in men exposed to high levels of manganese in workplace air.

Chronic Effects

Manganese largely acts on the nervous system. Chronic exposure to high levels of manganese can lead to manganism – a condition often compared to Parkinson's due to the similarity of symptoms. Tremors, rigidness, differences in gait, and a fixed gaze are the hallmarks of manganism.

SULFUR DIOXIDE

Operational Use

Sulfur Dioxide is a byproduct in the roaster and at the agglomeration drums, due to the addition of acids. Sulfur dioxide is produced by heating sulfur-containing compounds, which can be found throughout molten sulfur unloading areas, acid plants, leaching, and SXEW areas. Some concentrates contain sulfur, and if burned will release sulfur dioxide.

Acute Effects

Sulfur dioxide reacts with moisture present in mucous membranes of the eyes and respiratory tract to form sulfurous acid, and may further convert to sulfuric acid.

Sulfurous/sulfuric acid damages structures and tissue in the lungs which are responsible for transporting oxygen and removing foreign material and mucous.

Chronic Effects

Respiratory System – decreased lung function, inflammation, asthma-like symptoms

COPPER

Operational Use

Steel associated with hot metal operations can release significant amounts of copper fume. Employees performing air-arc gouging to cut thick steel, copper fumes are a risk. Carbon monoxide can become an issue as the graphite electrode is consumed.

Acute Effects

Inhalation of fumes may cause metal fume fever.

Chronic Effects

Exposure to copper fume can irritate the eyes and upper respiratory system, metal fume fever, and skin discoloration. Repeated or prolonged contact may cause skin sensitization.

LEAD

Operational Use

Lead contamination is common in EW areas. Housekeeping practices are in place to reduce the transfer of lead from surfaces in EW areas to lunchrooms, non-work clothing, and homes.

Maintenance work in EW areas needs to consider the presence of lead fumes arising from surface contamination as a possibility.

Chronic Effects

Lead is not effectively removed by the kidneys and can stay in the body for a long time. Effects of chronic exposure include stomach pain and intestinal problems, weakness, irritability, insomnia, high blood pressure and kidney damage.

ZINC & CADMIUM

Operational Use

Galvanized steel has a coating of zinc and possibly cadmium and other metals. Hot Work on galvanized steel can generate very high levels of these metals and cause Metal Fume Fever from zinc fume, or more significant conditions from cadmium.

Acute Effects

Symptoms of metal fume fever include lethargy, headache, fever, chills, and other common fever/flu effects. Symptoms typically clear 1-2 days after exposure.

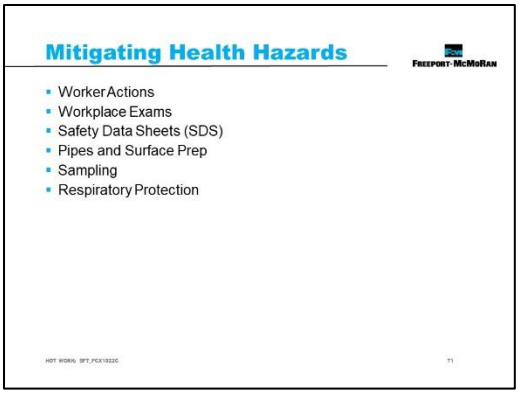
COBALT

Operational Use	Acute Effects	Chronic Effects
Cobalt is occasionally in alloys with tungsten-carbide and is found in grinding and cutting tools.	Cobalt inhalation causes respiratory sensitization, asthma-like symptoms, and decreased lung function.	Chronic exposure can result in hard metal lung disease, a form of lung fibrosis.

MERCURY

Operational Use	Chronic Effects
A process at Miami contains mercury. Mercury can absorb into other metals, and large amounts can be released when the metal is heated. Hot Work on mercury-contaminated steel can cause high levels of mercury vapor.	Mercury is a neurotoxin, causing tremors, emotional changes, insomnia, weakness in muscles, and kidney failure after prolonged exposure.

PPT slide 71, SG page 70-71



Instruction

Explain each bullet

- Impacts on employee health are related to the actions when working with components containing hazardous substances.
- Conducting workplace exams enables the employee to identify what they are working with before conducting Hot Work.

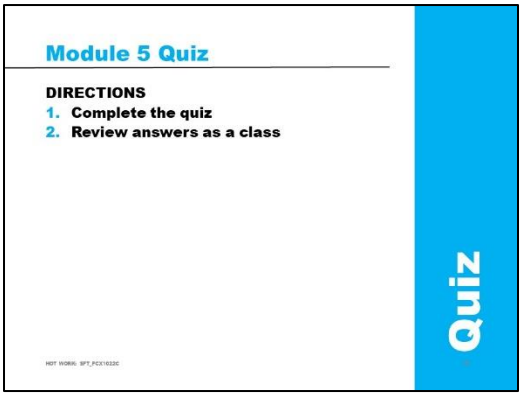
- SDS
  - The safe handling of these substances is important. If the substance is exposed to ignition or heat, substances can cause a fire, explosion or personal injury (e.g., inhalation, exposure, irritant).
  - One important factor when performing Hot Work is knowing what substances, metals, and materials you are working with. Read the Safety Data Sheet (SDS) for the materials you are working with.
  - The SDS describes the properties, hazards, and what to do if there is an accidental spill or exposure.
  - Use the SDS as a guide for making decisions on how to protect yourself when working with hazardous substances and materials.
  - For example one hot metal operation was being supplied with copper alloy that contained beryllium (this has since been eliminated).
- Pipes and Surface Prep
  - Processes throughout the company require pipes or surfaces to be repaired.
  - Always appropriately clean surfaces when practical and possible before performing Hot Work.
  - Even hosing residue off with water can remove surface contamination and concentrate on the surface.
  - Be sure to follow your site specific procedures for cleaning or prepping surfaces before conducting Hot Work.
  - Test and continuously monitor the atmosphere before working on pipes.
  - Employees can utilize critical controls such as ventilation and personal monitors to reduce the Fatal Risks.
  - Freeport-McMoRan has experienced several events where Hot Work on long pipes has ignited flammable gas inside the pipe.
  - Acid is another substance which can react with various steel alloys to generate hydrogen gas in pipes.
  - Always test and continuously monitor the atmosphere of a pipe before and during Hot Work.
- Sampling
  - Welding tasks are routinely sampled to gauge workers' exposure to a range of welding fumes.
  - Air is pumped through a filter in the worker's breathing zone, and analyzed for its chemical content.

    - This analysis allows for monitoring of the average levels of contaminants in the air throughout the work day.
    - For most welding samples, at least 13 common metal fumes are analyzed.
    - The 13 common fumes analyzed are: antimony, beryllium, cadmium, chromium, cobalt, copper, iron oxide, lead, manganese, molybdenum, nickel, vanadium, and zinc oxide.
    - Speak with your supervisor, site Industrial Hygienist, or safety representative if you have any questions.
- Respiratory Protection
    - Respiratory protection must be compatible with other PPE. For Hot Work, this commonly means selecting a respirator with low profile pads or slim cartridges rather than larger cartridges for use under a welding hood or face shield.
    - When conducting Hot Work in areas where grease or oils are used to protect the work surface from wear or rust, respirator cartridges with the R (Oil Resistant) or P (Oil Proof) designations must be used.
    - In some applications Powered Air-Purifying Respirators (PAPRs) are utilized during Hot Work. These PAPRs have configurations that include a shaded welding facemask.
    - Speak with your supervisor, site Industrial Hygienist, or safety representative if you have any questions.

Discuss your sites procedure for accessing SDS.

MODULE 5 QUIZ

PPT slide 72-76, SG page 73

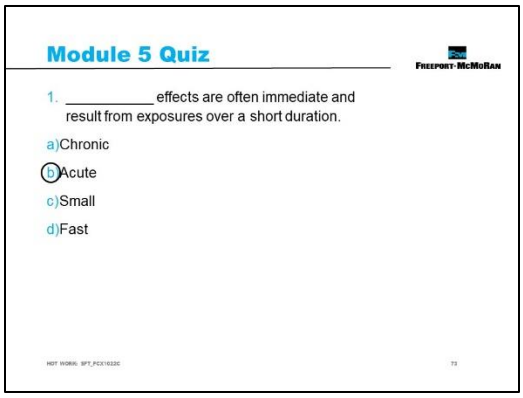


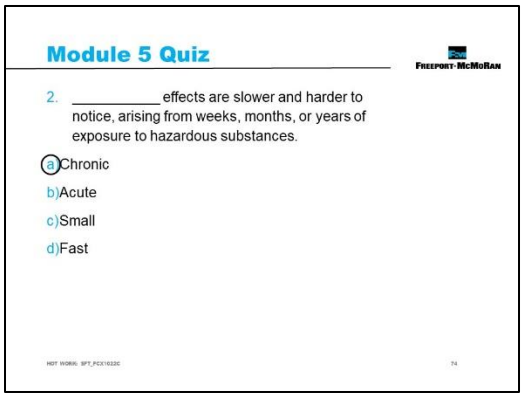
Instruction

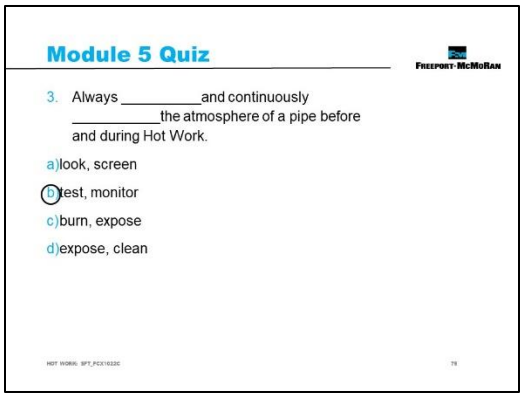
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

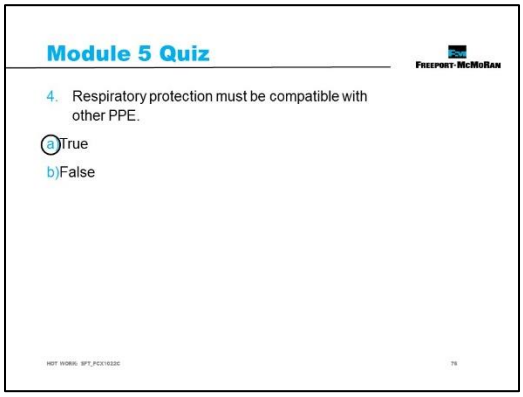
Quiz Answers

1. B (SG page 63)
2. A (SG page 63)
3. B (SG page 70)
4. A (SG page 71)









Break

- We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

MODULE 6: HOT WORK OVERVIEW

This module contains introductory information about area inspections, and the tasks performed to identify and control physical hazards. The module stresses the use of the Hot Work Permit when working in areas not safe for Hot Work.

LEARNING OBJECTIVES

Upon completion of this module, the students will be able to:

- Evaluate a scenario and conduct the necessary steps to perform the job.

ACTIVITIES

- Activity 4: Showtime

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 3.

TOTAL TEACHING TIME

Module 6 takes approximately 30 minutes to complete.

Facilitation Tip

Take moment to discuss what makes a person competent for this task. Knowledge, Skills and attitudes commonly known as KSA’s is how we define competence. You must have knowledge of the task. (Book smarts) You must have the skills or physical ability to do the task. Most importantly, you must have the proper attitude to perform the task.

Skills without proper knowledge and attitude can be dangerous.

PPT slide 77, SG page 77

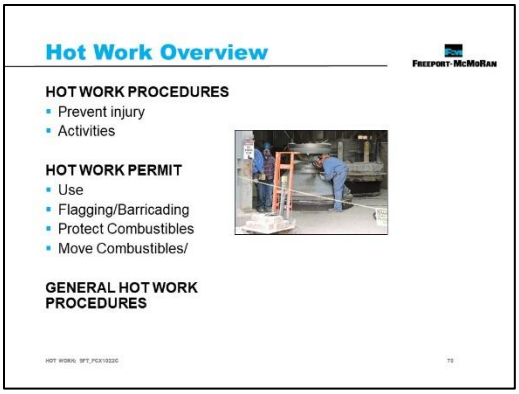
Instruction

- Introduce the topics in Module 6:
  - Hot Work Overview
  - General Hot Work Procedures
  - Area Inspection (Pre And Post)
  - Hot Work Permit
    - Time From When It Begins Until It Ends
    - Who Signs The Permit?
    - How To Complete The Permit?
    - Permit Requirements
    - Record Retention
    - Hot Work Permit Items
  - Flagging And Barricading Above, Below, And Around
  - Signage
  - Flammable Gas
  - Potential Hazards
  - Procedures To Isolate Combustibles
    - Proximity To Flammables / Combustibles
    - Checks For Hazardous Conditions
    - Hazard Control
  - Fire Extinguisher Requirements
  - Environmental Awareness

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
  - Evaluate a scenario and conduct the necessary steps to perform the job.

PPT slide 78, SG p. 81-82



Instruction

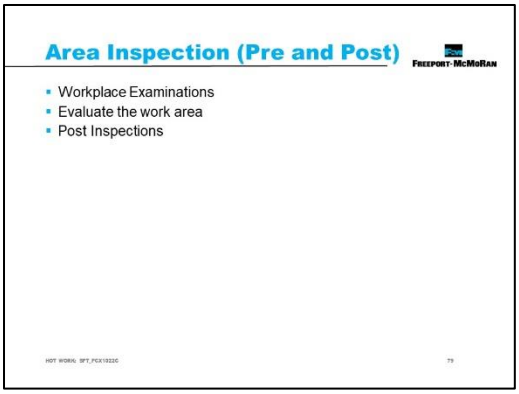
Explain each bullet

- Hot Work procedures are developed to prevent injury and loss of property from fire or explosion as a result of Hot Work in all areas and activities.
    - Some activities of Hot Work include but not limited to; welding, air arcing, brazing, soldering, heat treating, grinding, powder-actuated tools, hot riveting and all other similar applications producing a spark, flame, or heat.

- A Hot Work Permit is a document issued for the purpose of authorizing Hot Work activities and ensuring that specific fire/explosion related hazards are evaluated and effectively controlled.
    - The permit is used to ensure an area has been made safe for Hot Work by removing or protecting combustibles from ignition sources.
    - Flagging and barricading is often used in Hot Work to warn or notify employees a hazard or unsafe condition exists.
    - Employees ensure combustibles are protected from ignition by moving the work to a location free from combustibles.
    - If the work cannot be moved, ensure the combustibles are moved to a safe distance or have the combustibles properly protected against ignition.

- General Hot Work Procedures
    - The participants in Hot Work must have an attentiveness of the risks involved and understand the Hot Work processes.
    - Hot Work procedures should be applied anytime you are not working in a “fire safe” designated area.
    - When working with ignition sources a Hot Work Permit must be obtained and all hazards controlled.
    - Work that may produce flames, sparks, or heat that is sufficient to start a fire or ignite flammable/combustible materials a hot work permit must be obtained.
    - Area inspections, flagging, barricading, and signage are some ways to ensure hazard mitigation during Hot Work.

PPT slide 79, SG p. 82



Instruction

Explain each bullet

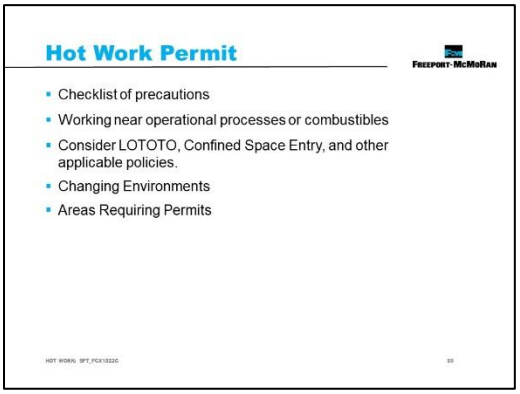
- Workplace examinations, also referred to as area inspections, pre-shift inspections, workplace inspections, and workplace exams, are procedures each site creates not only to identify and control physical hazards, but also to evaluate the critical controls already in place that protect employees from fatal risks.
- The first step for implementing Hot Work procedures is to begin by evaluating your work area – before and after Hot Work is performed by identifying combustible, flammable material and fire risks.
- If combustibles cannot be moved, then a Hot Work Permit is required. The flammable materials must be protected either with fire-resistant / insulating material and a Fire Watch must be assigned.

- Some questions to ask when conducting your workplace exam:
  - What could happen if conditions such as weather and lighting change?
  - Have you and your coworkers been trained to perform the tasks you have been given? Do not perform a task you have not been trained to complete safely.
  - Are there hazards that could originate from outside of your work area? For example, dust or gas, like vehicle exhaust, which migrates into the work area from somewhere else.
  - Are your activities creating hazards for you and others in the area? For example, working with open holes, welding above people who are walking, or using chemicals that could splash or need specific gloves or equipment to handle.

- Post inspections must be performed to ensure the risks of fire has abated and the work area is safe. The fire watch can be released once the 60 minute wait period has passed and the work no longer poses a risk of fire.

Discuss site specific area inspection procedures.

PPT slide 80, SG p. 83



Instruction

Explain each bullet

- Hot Work Permit
  - The Hot Work Permit includes a checklist of precautions, each of which must be considered and then implemented.
  - A Hot Work permit is required for Hot Work operations on or near operational processes or within 35 feet of flammable/combustible materials
  - 50 feet or more if flammable/combustible gasses are present (speak with your supervisor before working in these areas).

  - The Hot Work permit helps to guide you through the process; it is valid for one shift and task (unless the work is delayed for more than 90 minutes) and should be filed with your supervisor for a minimum of one year.

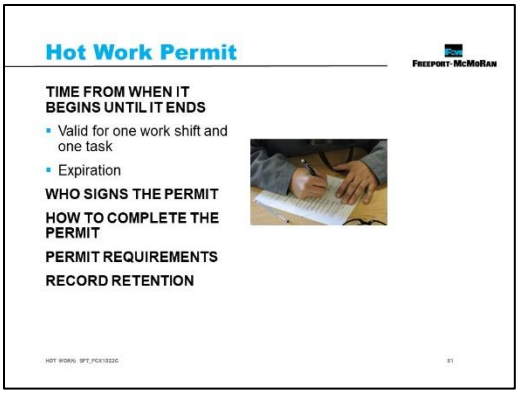
  - Other precautionary policies must be considered in conjunction with Hot Work; such as LOTOTO, Confined Space Entry, and other applicable policies.

  - Changes to the work environment or conditions affecting the Hot Work must be noted on the permit.

- In addition Hot Work Permits are required when work is performed within 35 feet of:
  - Fuel storage areas or distribution lines
  - Battery storage or charging areas
  - Cooling towers
  - Reagent storage
  - Oxygen storage areas
  - Sewer and septic systems
  - Conveyor belting
  - Tire storage areas
  - Mobile fuel and lubrication trucks
  - Storage/materials handling areas where combustible or flammable materials are present
  - Other areas designated as permit required through established signs/labeling

Examine the Hot Work Permit.

PPT slide 100, SG p. 84



Instruction

Explain each bullet

- A Hot Work Permit is valid for one work shift and one task.

- The permit expires under these conditions:
  - 90 minutes of work stoppage has elapsed.
  - Environment changes.
  - 60 minutes after the job has completed and only if the risk of ignition abated.
  - There is lack of fire watch(s).
  - Work has been stopped by anyone due to control failure or hazard recognition.

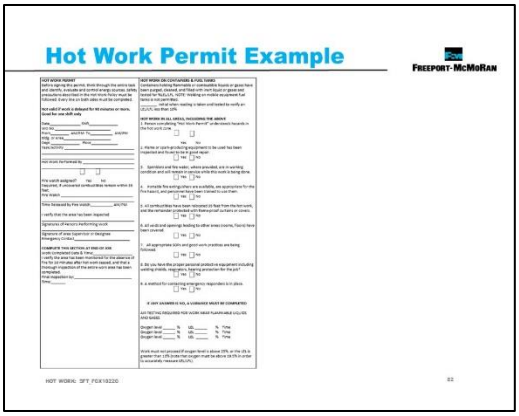
- Who Signs The Permit
  - All Persons involved with the Hot Work must sign the permit, and any changes affecting the job must be noted.
  - When parties sign the permit they acknowledge the hazards, fatal risks, critical controls, roles and responsibilities prior to the start of the task.

- How to Complete the Permit
  - Permits can be obtained by following your site specific procedure.
  - Complete all sections of the permit and don't leave any blanks.
  - Everyone involved with the Hot Work must sign the permit
  - Any changes affecting the job must be noted on the permit.

- Permit Requirements
  - The Hot Work permit must be kept at the job site until 60 minutes after the job is complete.
  - A fire watch must be maintained during this period.
  - Time may be extended beyond the 60 minute period if the Hot Work still presents a hazard.

- Record Retention
  - Permits must be kept for at least one year or until released by an auditor for disposal or as directed by the Records Retention Policy.
  - Turn all permits into your supervisor or department.

PPT slide 82, SG p. 85

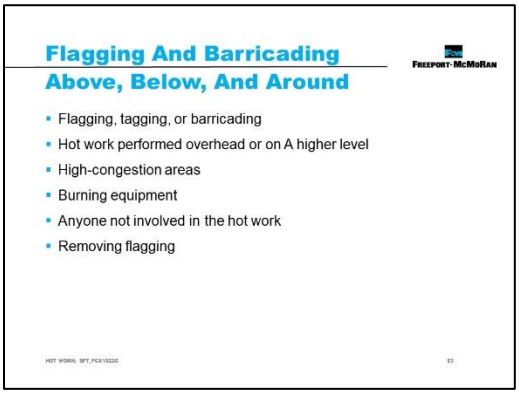


Instruction

Discuss the Hot Work Permit items

- Discuss the importance of actually doing the checks/actions versus just checking the boxes on the permit.
- Discuss how it may get them or someone they know killed if the items on the permit are not performed properly.

PPT slide 83, SG p. 86



Instruction

Explain the bullets

- Persons involved in any Hot Work situation shall have keen understanding of which flagging, tagging, or barricading to install when it comes to safeguarding an area.
    - Every employee who has received appropriate training is empowered to install barricading and flagging systems, or ensure proper installation occurs.

- When Hot Work is performed overhead or on a higher level, the pedestrian and vehicle traffic below needs to be informed.
    - Use proper flagging and/or barricading to establish a perimeter on the lower level.
    - Ensure that all exposed areas underneath are properly flagged or barricaded to prevent entry.
    - Make sure the flagged or barricaded perimeter is large enough to keep all pedestrian traffic and mobile equipment at a safe distance.

- In high-congestion areas it is a best practice to inform other work groups in the area before any flagging or barricading is established. If an evacuation is required, you'll want to be sure your barricades are not going to impede an escape route. By alerting personnel to alternate escape routes, you will help to ensure that, during an evacuation, employees are not exposed to additional hazards.

- When using burning equipment, protect personnel from sparks or metal splashes by setting up necessary barriers and guards. Arc welding or cutting must be properly shielded to prevent others from being exposed to flashes.

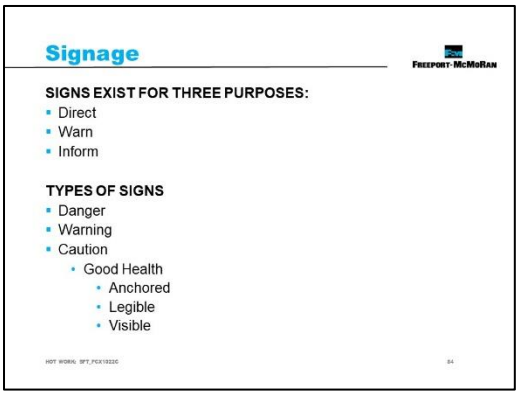
- Anyone not involved in the Hot Work being performed should not pass through a guarded or flagged area or go around a welding curtain unless
    - the employee is authorized to be in the area

- flagging and barricading policy is adhered too.

- If you are the person installing the flagging and your name is on the tag, it is your responsibility to maintain and eventually remove it.
  - All other employees are not allowed to remove flagging/ tagging installed by someone else, unless appropriate site-specific removal procedures have been performed by making all attempts to contact the initial installer, contacting supervision, or consulting with a health and safety professional to ensure hazards have been controlled.

Discuss site specific requirements.

PPT slide 84, SG p. 87



Instruction

Explain each bullet

- There are many different signs used in our work areas to communicate immediate or potential hazards. It is important to recognize and adhere to these signs as they enable us to recognize these hazards and remind us of the proper precautions to take.
- Signs exist for three purposes:
  - Direct
  - Warn
  - Inform

- Danger: Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

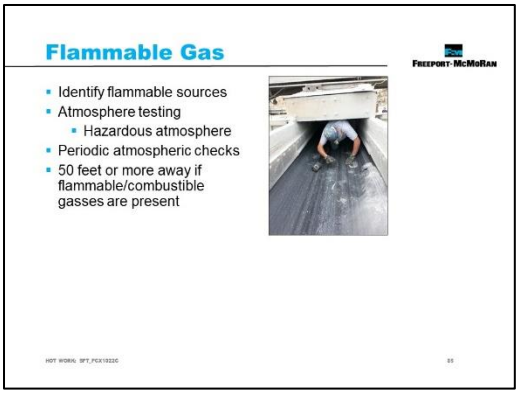
- Warning: Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

- Caution: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

- All signs must be in good health meaning they should be properly anchored, legible, and visible. If you notice signs that are falling down or are not easily visible, either fix the sign or notify your supervisor so that they can be fixed.

Discuss site specific signage. Types, locations, reporting of inadequate or damaged signage.

PPT slide 85, SG p. 88



Instruction

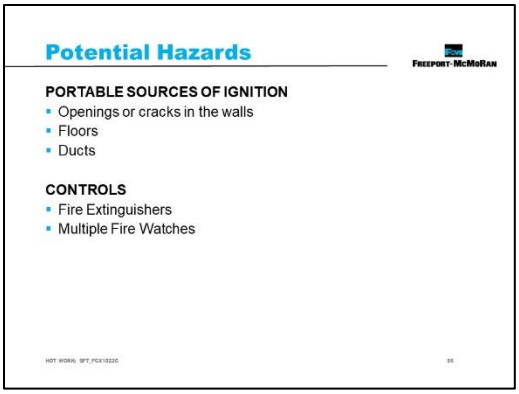
Explain each bullet

- When performing Hot Work it's important to identify any flammable source.
- Where there is a reasonable possibility that flammable gases/vapors or excessive oxygen exist, atmosphere testing must be conducted by trained personnel as part of the permit process.
- Flammable gasses will and do create conditions where employees are exposed to a hazardous atmosphere.
- A hazardous atmosphere is defined as an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one or more of the following:
    - Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL) above 10%
    - Oxygen Concentration (O2) measurement must be outside the recommended range of 19.5% and 23%.
        - Airborne combustible dust at a concentration that meets or exceeds its LFL. This concentration may be approximated as a condition in which the combustible dust obscures vision at a distance of 5 feet (1.5 meters) or less.

- Periodic atmospheric checks shall be conducted throughout the Hot Work task to ensure flammable gases are within range or eliminated during Hot Work.
- Hot Work must be 50 feet or more away if flammable/combustible gasses are present.

Discuss site specific.

PPT slide 86, SG p. 89

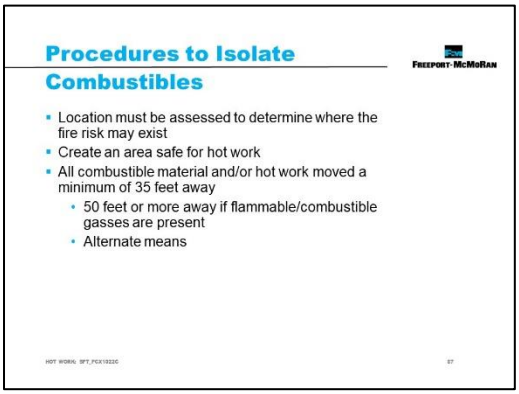


Instruction

Explain each bullet

- Hot Work is dangerous as portable sources of ignition can be introduced into areas where ignition sources do not exist.
    - Openings or cracks in the walls, floors, or ducts that are potential travel passages for sparks, heat and flames must be covered or protected as well.
- Controls such as flame resistant blankets and pads need to be utilized to reduce the risk of sparks escaping the area. If possible relocate the work or find alternate means to complete the job.
- Fire extinguishers of the appropriate size and type need to be in place in addition to the normal area fire extinguishers.
- Multiple Fire watches may be necessary to identify and extinguish fires in all areas ignition may be introduced.

PPT slide 87, SG p. 89

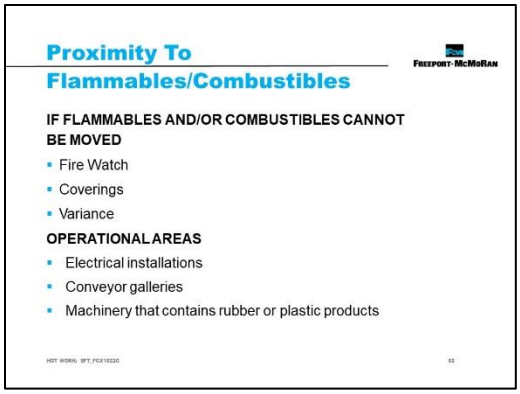


Instruction

Explain each bullet

- The Hot Work location must be assessed to determine where the fire risk may exist.
- When performing Hot Work, always strive to create an area safe for Hot Work; with all combustible material and/or Hot Work moved a minimum of 35 feet away.
    - This includes combustible flooring and combustible debris on the floor.
- Hot Work must be 50 feet or more away if flammable/combustible gasses are present.
- If possible identify alternate means to Hot Work or relocate the work to a Fire Safe Designated Area.

PPT slide 88, SG p. 89



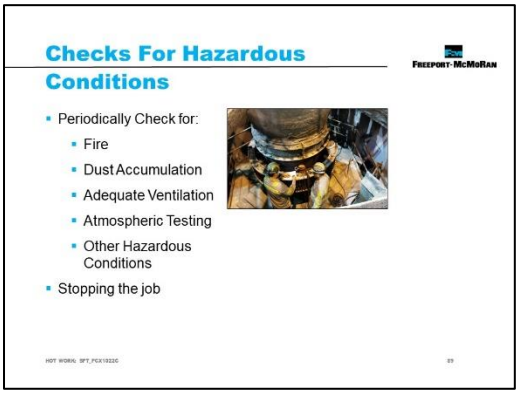
Instruction

Explain each bullet

- If a situation arises where the Hot Work must be performed and the flammables and/or combustibles cannot be moved the following measures are taken:
    - A Fire Watch(es) must be assigned.
    - If the flammables and/or combustibles cannot be relocated out of the Hot Work area the flammable and/or combustible must be covered with flame-proof curtains or covers.
    - In cases where the combustibles cannot be removed to provide at least 35 feet of separation or other requirement cannot be completed, a control method must be described in a variance request. Variances are explained later in this course.
    - Alternative Control Measures used in the Variance request must provide equal or greater precautions to prevent fires.
    - Variances should be completed for frequent tasks where alternative means of control is required.
    - Operational areas that have known, but not obvious, combustibles shall be posted with signage requiring application of the Hot Work Permit.
        - Examples of these areas include but are not limited to:
            - Electrical Installations
            - Conveyor Galleries
            - Machinery That Contains Rubber Or Plastic Products

Discuss Site Specific Combustible Areas.

PPT slide 89, SG p. 90

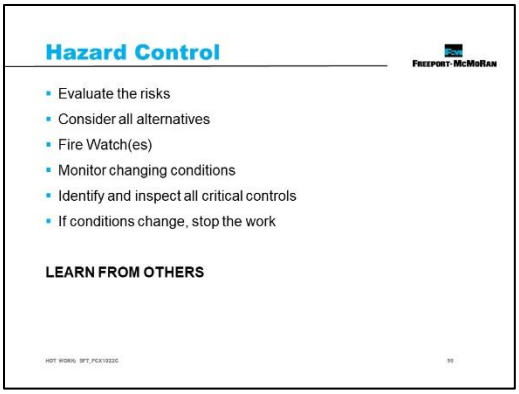


Instruction

Explain each bullet

- As your work progresses, periodic checks should be conducted to observe for: fire, dust accumulation, adequate ventilation, atmospheric testing, or other hazardous conditions.
- If a hazard is observed, Stop the Job, correct it before continuing your work.

PPT slide 90, SG p. 91-92



Instruction

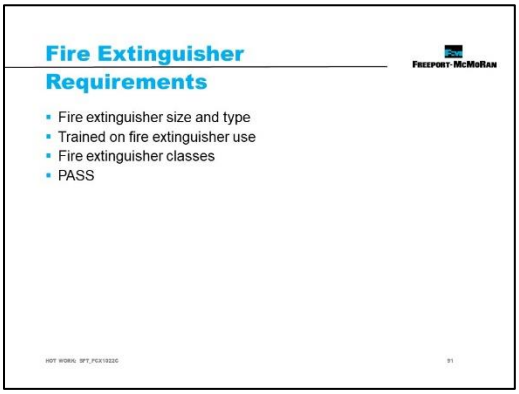
Explain the bullets

- Throughout this training, different hazards encountered in the workplace are addressed. Even though there are specific processes in place for risk analysis, every employee must be able to evaluate the risks associated with any given hazard.
- Consider all alternatives to Hot Work, prior to utilizing a Hot Work method.
- Ensure the possible consequence for your work is considered and all hazards are controlled.
- You must have a Fire Watch(es) to extinguish any fires.
- Always monitor changing conditions during Hot Work.
- While on the job, identify and inspect all critical controls already in place to evaluate if they are in proper working order.
    - Critical controls are in place so you don't get killed.
    - If the effectiveness of the critical control cannot be validated, take the necessary steps to control the risk before starting work.
    - Additionally, determine if there are ways to improve the controls and communicate all potential improvements to a Health and Safety Representative and a Supervisor.
- If conditions change or any of the following occur; stop the work.
    - The following situations indicate potential unsafe behavior or lack of controls where work can be stopped before continuing and supervision notified.
        - Lack/inadequate Hot Work Permit
        - No Fire Watch in place
        - Insufficient Fire Watches
        - Lack of fire extinguisher
        - Flammable material in the area Hot Work is being performed
        - Poor ventilation
        - Lack of signage in know areas of combustibles
        - Lack of atmospheric testing
        - Changes in the environment
        - Lack of training for affected employees

Learn From Others

- Have students read the learn from others and discuss the causes and corrective actions.
- Brainstorm what could have prevented this PFE and how this PFE will impact students moving forward.

PPT slide 91, SG p. 93



Instruction

Explain each bullet

- During any Hot Work a fire extinguisher of the appropriate size and type must be provided at the Hot Work site in addition to the normal placement of fire extinguishers.
- Personnel involved in the Hot Work must be task trained on fire extinguisher use.
- Fire extinguishers and suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment consists of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.
- Always know what materials are present and have the correct fire extinguisher to address the hazard.

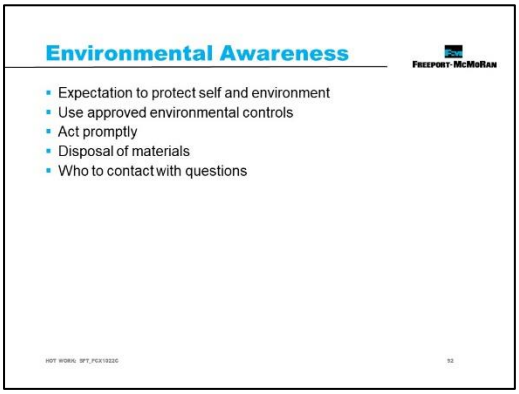
Explain the table

- Fire extinguisher classes

- If a fire develops utilize the PASS method for extinguisher use. Pull, Aim, Squeeze, and Sweep.
    - Pull the Pin,
    - Aim at the base of the fire,
    - Squeeze the lever above the handle,
    - Sweep from side to side.

Discuss site specific locations, types, and sizes of fire extinguishers available at your site.

PPT slide 92, SG p. 94



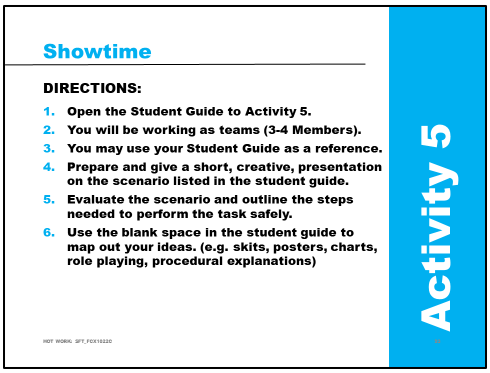
Instruction

Explain each bullet

- It is an expectation for employees to protect themselves and the environment.
- Always minimize environmental risks by using approved environmental controls.
- Act promptly and appropriately when faced with environmental concerns.
- Dispose of spent rods in approved containers and recycle materials appropriately.
- Contact your supervisor or site environmental department should you have any environmental questions or concerns.

ACTIVITY 5: SHOWTIME

PPT slide 117, SG page 97



Time

Approximately 15 minutes

Materials

- Student Guide
- A few copies of your site's Hot Work Permit

Purpose

- This activity gives students the opportunity to understand the use and application of the Hot Work Permit and the process of conducting Hot Work.

Instruction

1. Break class into small groups
2. Assign each group either Scenario 1 or Scenario 2 in the Student Guide. Ensure both scenarios are assigned.
3. Give each group a copy of your sites Hot Work Permit to complete while completing the scenarios.
4. Students will evaluate their scenario and outline the steps they will take in order to perform the task safely using the topics from the Module.
5. If a Hot Work Permit is necessary students need to outline the permit steps in their presentation.
6. Scenario 1 provides opportunity to avoid Hot Work and segregate the work to a welding shop. Students may over look this option which creates an opportunity to provide feedback at the end of the scenarios. Point out how alternate means or avoiding Hot Work reduces the risks especially fire.
7. Scenario 2 requires the work to be conducted in the field and a permit must be obtained. Ensure the processes are explained and critiqued to ensure correct information is shared.
8. Groups will share their processes. Ensure accurate information is shared by providing feedback during presentation.
9. Identify gaps or incorrect information by referencing the modules content.

Scenario 1.

You and a coworker are welders and have been asked to repair a flange on a 90 degree 10-inch stainless steel elbow connected by bolts to 100 feet of stainless pipe. The pipe and elbow are not connected to any source.

The work is located in a semi-grassy laydown yard with fuel storage tanks 150' away.

You will be cutting off the old flange and welding a new stainless flange onto the elbow.

When complete, the repaired elbow and flange is in the same location you found it so a maintenance crew can bolt it back on later in the day.

What steps will you take to safely conduct the Hot Work on this flange?

Scenario 2.
The work is to be conducted in the laydown yard, removal is not an option.
You and a coworker are welders and have been asked to repair a flange on a 90 degree 10-inch stainless elbow connected by bolts to 100 feet of stainless pipe. The pipe and elbow are not connected to any source.
The work is located in a semi-grassy laydown yard with fuel storage tanks 150' away.
You will be cutting off the old flange and welding a new stainless flange onto the elbow.
When complete, the repaired elbow and flange is in the same location you found it so a maintenance crew can bolt it back on later in the day.
What steps will you take to safely conduct the Hot Work on this flange?

Facilitation Tip

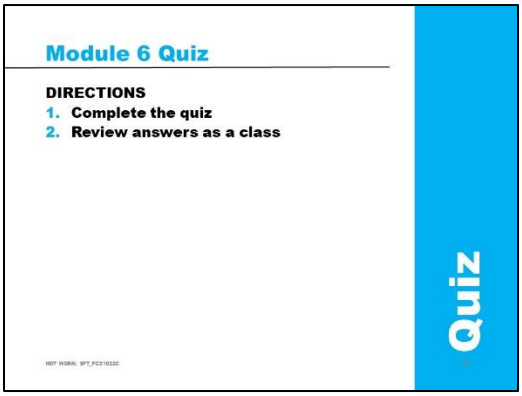
Reviews/Summaries. At a minimum, conduct a review of material at the end of an objective, day or course. This provides students another opportunity to clarify anything if needed. Before or returning from breaks is also recommended time for reviews. Whenever you as an instructor, think it is required conduct a review of material to gauge student understanding. **Law of Exercise and Regency.**

Break

We recommend taking a 5 to 10 minute break after the following module quiz. Allow students to stand up, stretch, use the facilities, etc. Make sure you clearly communicate what time you expect them to return and start the next module.

MODULE 6 QUIZ

PPT slide 94-98, SG page 97

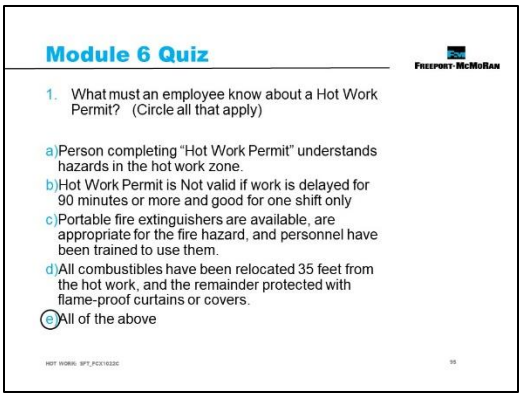


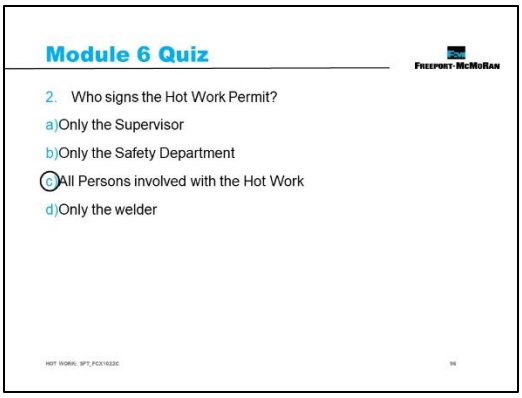
Instruction

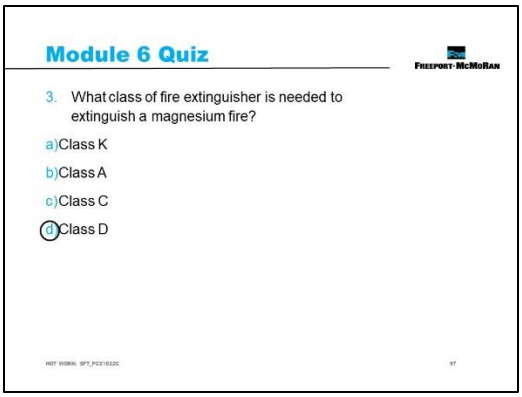
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

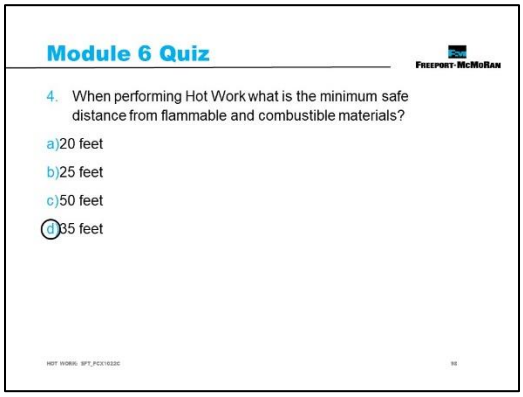
Quiz Answers

1. E (SG page 83-85)
2. C (SG page 84)
3. D (SG page 93)
4. D (SG page 89)









Break

- We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

MODULE 7: HIGH HAZARD AREAS

This module contains introductory information about High Hazard Areas and their hazards.

LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Evaluate scenarios and categorize the associated hazards.

ACTIVITIES

- Activity 5: Team Quiz

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 3.

TOTAL TEACHING TIME

Module 7 takes approximately 20 minutes to complete.

PPT slide 99, SG page 101

Instruction

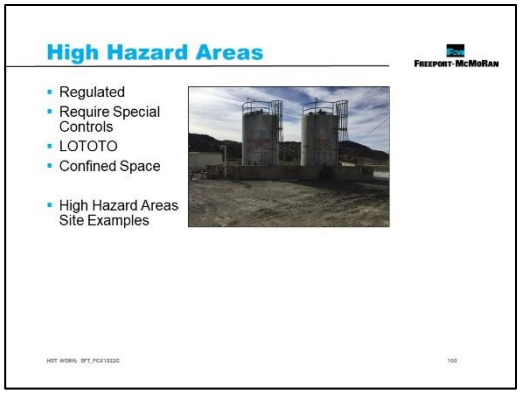
Introduce the topics in Module 7:

- High Hazard Areas
- Define High Hazard Areas
- Hot Work On Pressurized Systems
- Hot Work In Confined Spaces
- Hot Work While Working At Heights
- Welding Or Cutting From A Ladder
- Appropriate Fall Protection At Heights (Fire, Arc Rated)
- Hot Work On Or Around Conveyors/ Rubber-Lined Pipes
- Working On / In Tanks
- Flammable Vapors
- Dust Collectors
- Working Near Explosive Materials And Powder Magazine
- Variances

Review the learning objectives for the module

- Upon completion of this module, the students will be able to:
    - Evaluate scenarios and categorize the associated hazards.

PPT slide 100, SG p. 105



Instruction

Explain each bullet

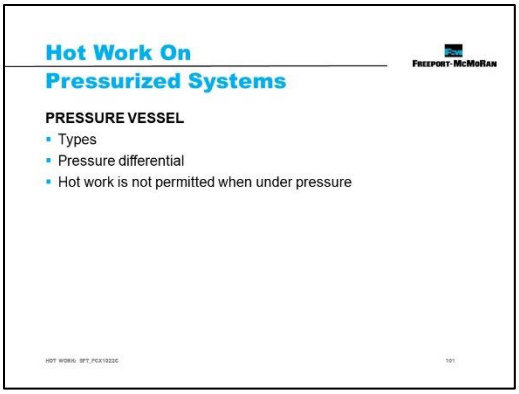
- High Hazard Areas are locations which, might explode, burn with such vigor as to approximate explosion, produce toxic fumes, or produce other dangerous effects.
    - These areas are regulated and often special controls are needed.
    - Awareness of the most common Hot Work hazards and knowing how to avoid them will help ensure a safe and productive work environment for everyone.
    - Policies such as LOTOTO and Confined Space Entry be considered in conjunction with the Hot Work Permit.
- High hazard areas such as fuel storage areas or explosive magazines have a statutory requirement that must be followed when conducting Hot Work operations.

- Examples of a few specific high hazard areas:
    - Within 100 feet of powder magazine or explosive or blasting storage area.
    - Dust collectors, ductwork, and other areas where rubber linings or combustible dust exists.
    - Public commercial buildings, warehouses, assay labs.
    - SX/EW plants and related work areas.
        - Specific precautions must be taken when cutting, welding or other spark-producing work is performed around SXEW plants. Consult pertinent SOPs before working in these areas.
    - Above or adjacent to cable trays or electrical cables.
    - Inside vessels or confined spaces.
    - Heavy equipment including haul trucks, shovels, drills, graders, dozers regardless of location where sparks or hot metal contacts combustible materials.

- Consult the H&S Department prior to beginning Hot Work operations in high hazard areas.
- If you are unsure about an areas designation consult with your supervisor and H&S department

Discuss site specific High Hazard Areas.

PPT slide 101, SG p. 106



Instruction

Explain each bullet

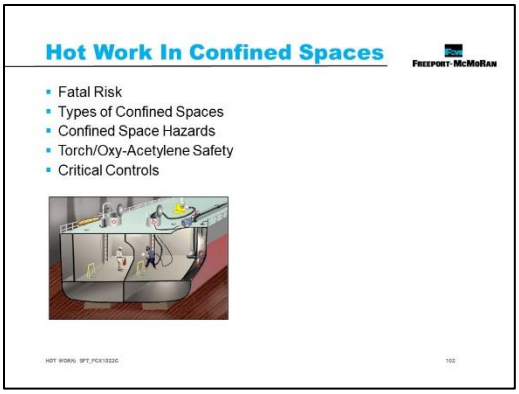
- A pressure vessel is a container designed to hold gases or liquids at a pressure substantially different from the ambient pressure at the same elevation.
    - Even a carbonated soda bottle is under pressure holding over 15 psi of pressure.

- There are a variety of pressurized vessels in our processes which may include boilers, water heaters, tanks, extinguishing equipment, air receiver tanks, and compressed gas cylinders.

- The pressure differential is dangerous, and fatal accidents have occurred in the history of pressure vessel development and operation.
- Hot Work will not be performed on any vessel that is under pressure.
- All pressurized systems must be relieved of all pressure and purged prior to completing repairs.
- Hot Work including cutting, welding or applying heat to vessels or pipes, must be done in compliance with the Hot Work Policy .
- Only certified, experienced and qualified employees will conduct this work, following approved and site specific procedures.

Discuss site specific pressurized vessel types and locations.

PPT slide 102, SG p. 106-107



Instruction

Explain each bullet

- Confined spaces present a unique safety challenge because their hazards are not readily apparent and are often not visible.
- Confined spaces are identified as a Fatal Risk and you can be killed without proper critical controls in place.
- A confined space includes underground vaults, chutes, feeders, tanks, storage bins, crushers, vessels, silos and other similar areas.
- A confined space is an area with limited means of ingress/egress, large enough to enter that is not designed for continuous occupancy.

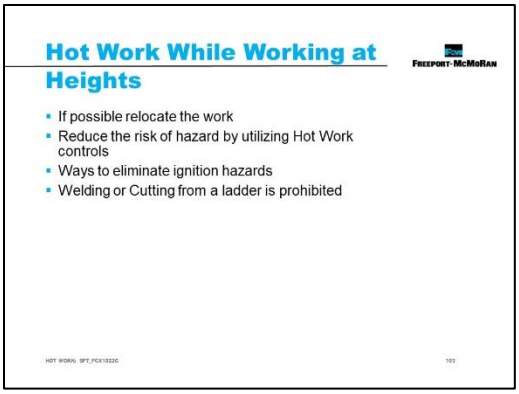
- A space entered previously with no apparent signs of danger, but conditions within a confined space can change rapidly.
- Do not assume the space is safe for entry each time.
- Because confined spaces typically have poor ventilation, limited size, and restricted access, the risk of performing a task increases quickly.
- Caution is taken as employees are working closer to hazards and limited access can prohibit a timely rescue if an emergency occurs.
- These conditions can result in hazardous situations that normally would not arise in an open workplace.

- In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, torch valves shall be closed and the gas supply to the torch positively shut off and removed from the confined space location when not in use.
- Work in confined spaces requires certain restrictions regarding what equipment can be taken inside and what equipment can be left inside when unoccupied. When conducting work in a confined space critical controls such as atmospheric testing, pre-inspection risk assessment, and respiratory protections help reduce or eliminate risk.

- The following critical controls also reduce or eliminate confined space risk of injury.
    - Ensure tanks or cylinders of compressed gases, (acetylene, oxygen, etc.) other than breathing air, are prohibited in confined spaces.
    - All welding leads, cutting torch hoses, hose extensions, etc. only be used within the space when welding or cutting is required and must be removed from the space when not in use.
    - Atmospheric Monitoring
    - Energy Isolation/LOTOTO
    - Entry Permit Execution

Discuss site specific confined spaces.

PPT slide 103, SG p. 108



Instruction

Explain each bullet

- Before working at a height, try finding a location that is already safe for Hot Work and not at an elevated location.
    - If the work cannot be relocated consider measures that protect everyone at risk such as permanent or temporary guardrails, lifts and scaffolds coupled with fall protection and standard PPE.
- Reduce the risk of hazard by utilizing Hot Work controls to contain ignition sources.
- Some ways to eliminate ignition hazards is to:
    - Relocate from the Hot Work area; or appropriately protect with fire retardant welding blankets; or the task isolated with welding screens.
    - Suspend welding blankets under Hot Work being performed. Place noncombustible screens around Hot Work below to trap sparks.
    - Utilize fire resistant fall protection including lanyards, yo-yo's and harnesses.
- Welding or cutting from a ladder is prohibited by the Working at Heights policy.
- When welding or cutting at a height is necessary relocate the work to a safe area or use an alternate approved means, such as an aerial platform.

Discuss site specific procedures.

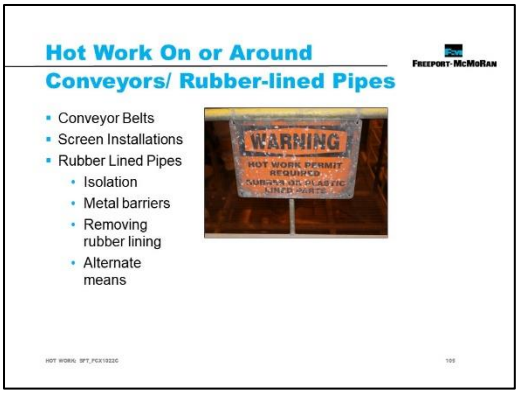
PPT slide 104, SG p. 109

Instruction

Explain each bullet

- Employees are often required to work in settings where there is a potential for fall hazards, shock, arcing, fire and burning.
- Accidents involving equipment such as ladders, scaffolds, and aerial lifts are often serious, even fatal.
- Employees working on platforms, scaffolds, or runways will be protected against falling by utilizing appropriate controls.
- Fall protection can be accomplished by the use of railings, fall protection, life lines, or some other equally effective safeguards.
- Where a fall hazard exists, adequate fall protection shall be used.
- Fall protection anchors shall be adequate to withstand the forces of the fall.
- Fall protection utilized during Hot Work at Heights shall be flame resistant.
- The H&S Department will ensure fall protection equipment is properly selected by competent and/or qualified individuals and maintain a list of this inventory for periodic review, to ensure availability and effectiveness (i.e. flame resistant harnesses for welders).

PPT slide 105, SG p. 110



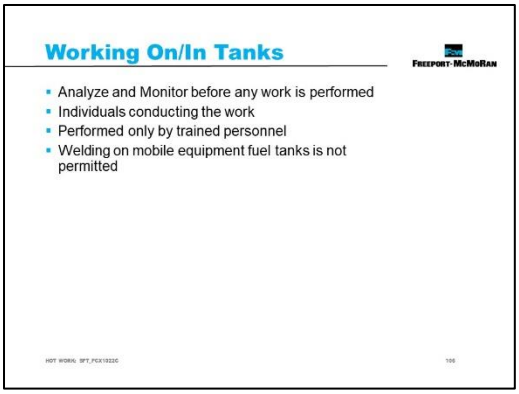
Instruction

Explain each bullet

- When Hot Work is performed within 35 feet of a conveyor belt or screen installations or where sparks, hot slag, or flame contacts these systems; special precautions shall be taken to control the risk of a fire.
    - Conveyor belts and screens shall be either isolated from the Hot Work through the installation of solid metal barriers or otherwise covered using fire resistant materials.
    - Work around conveyors, screens or rubber lined pipes requires special attention to the risk of fire.
        - These components often contain rubber and when a heat or ignition source is introduced they can catch fire.
    - Wherever possible, remove rubber lining from immediate heat affected zone.
    - During repairs, aggressive and active efforts must be made to limit fires from spreading and minimize risk to employees and equipment.
    - If possible use alternate means to complete the Hot Work task.
- Consult the site H&S department prior to beginning Hot Work operations in high hazard areas.

Discuss site specific locations and rubber lined areas.

PPT slide 106, SG p. 111

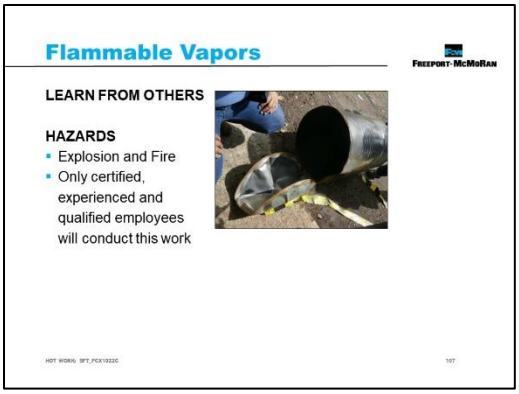


Instruction

Explain teach bullet

- Employees will effectively analyze the hazards and conduct atmospheric monitoring before and during Hot Work on/in tanks to provide advance warning of flammable atmospheres.
    - Sometimes a tank or vessel that contains or has contained flammable, combustible or other hazardous substance vapors, liquids or solid residues must be cut or welded. In order to perform work in or on tanks/vessels strict procedures must be followed for the repair or work that has the potential to create a fire, explosion or other hazard.
- Before any work is performed on a tank or a container that has held flammable, combustible, hazardous substances; the tank or container shall be made safe.
- Individuals conducting the work shall have a comprehensive understanding of the following:
    - The characteristics of the material that is stored or was previously stored in the tank or container.
    - The Fatal Risks and hazards associated with the work conducted.
    - The Critical Controls around confined spaces and vessels.
    - The procedures for safeguarding the tank or container prior to conducting the work.
- Working on tanks or containers that contain or have contained hazardous substances shall be performed only by trained personnel who understand the associated hazards and who are sufficiently qualified, trained, or educated to safely carry out the necessary operations.
- Work performed by contractors must be closely monitored to ensure critical controls meet regulatory and best practice standards for welding on stationary fuel storage tanks.
- NOTE: Welding on mobile equipment fuel tanks is not permitted. These must be sent to the manufacturer for repair or replaced with a new tank.

PPT slide 107, SG p. 112



Instruction

Learn from others

- Read and Discuss the learn from others in the student guide

Explain each bullet

- When working around any flammable areas there are two primary hazards associated with flammable and combustible liquids: explosion and fire.
- When vapors of a flammable or combustible liquid are mixed with air in certain proportions and an ignition source like a spark or a flame is present, an explosion can occur.
- Hot Work must be 50 feet or more away if flammable/combustible gasses are present.
- Containers which previously held flammable or combustible liquids are treated with care. Vapors present in the container may explode if a spark or flame is introduced. Never grind on tanks, barrels or containers that once held flammable or combustible liquids unless thoroughly cleaned.
- Containers holding flammable or combustible liquids or gasses must be purged, cleaned, and filled with inert liquid or gasses and tested to ensure that the LEL /LFL is below 10%. These controls shall be incorporated into the site standard operating procedures.

- Only certified, experienced and qualified employees will conduct this work.

PPT slide 108, SG p. 113

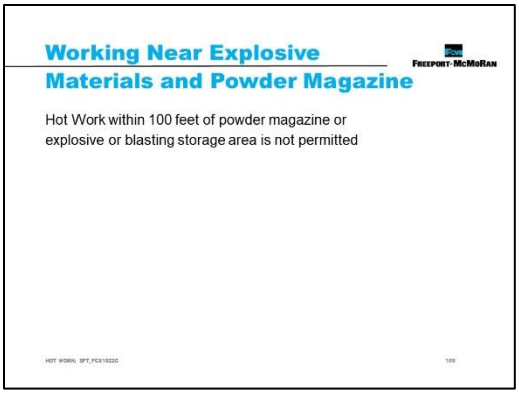
Instruction

Explain each bullet

- Combustible dust hazards are a risk in many areas of a plant, but one of the most common locations is the dust collection system.
- A dust collector is a device or combination of devices for separating dust from the air handled by an exhaust ventilation system.
- Dust collectors create high concentrations of dust resulting in combustible conditions should a spark or flame be introduced.
- Often these systems include rubber lined parts. Employees must ensure any and all rubber lined parts are controlled.
- Dust collectors, ductwork, and other areas where rubber linings or combustible dust exists are considered high hazard areas.

Discuss site specific locations and procedures for dust collection systems.

PPT slide 109, SG p. 113



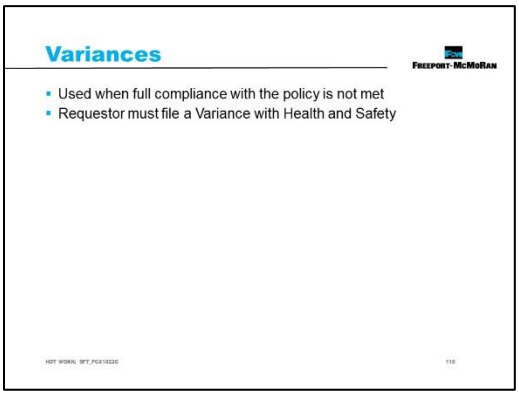
Instruction

Explain each bullet

- Hot Work within 100 feet of powder magazine or explosive or blasting storage area is not permitted.

Discuss site specific procedures for these areas.

PPT slide 110, SG p. 113



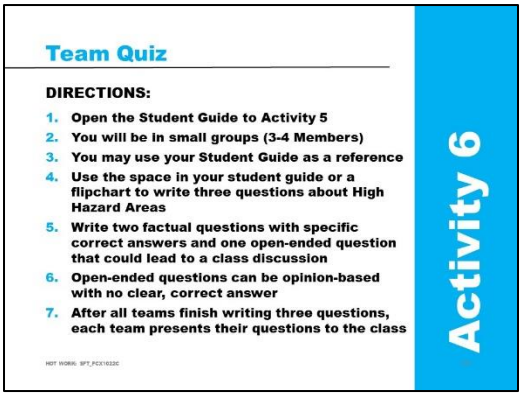
Instruction

Explain the bullet

- Periodically, there are special circumstances when full compliance with the policy is not met.
- In such cases, the Requestor must file a Variance with Health and Safety, in accordance with the Freeport-McMoRan Variance Process Policy.
- The approved and completed variance form must be kept on file with an SOP or other work procedure established for future action.
- The company policy also states that an engineer or other qualified individual must review the work to be performed, provide justification for the exemption and give alternate safety controls to minimize or eliminate the risks.

ACTIVITY 6: TEAM QUIZ

PPT slide #111, SG page 117



Time

Approximately 10 minutes

Materials

- Student Guide

Purpose

- This activity gives students the opportunity to identify and discuss High Hazard Areas.

Instruction

1. Go over the directions on the slide.
2. Break class into small groups
3. Students may use your Student Guide as a reference
4. Students will use the space in the student guide or a flipchart to write three questions about High Hazard Areas
5. Students will write **two factual questions** with specific correct answers and **one open-ended question** that could lead to a class discussion
6. Open-ended questions can be opinion-based with no clear, correct answer
7. After all teams finish writing three questions, each team presents their questions to the class.
8. Information shared by the students must be correct and link their responses to the module. If students miss critical items provide specific feedback.

Facilitation Tip

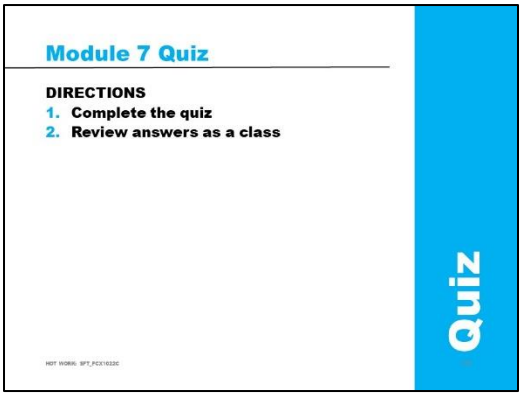
Provide clear and concise instructions to avoid confusion. Students are less likely to become nervous or tense, when they understand exactly what they are supposed to do. Make sure to provide the student with plenty of feedback. Feedback is any information about the results of a process good or bad.

Break

We recommend taking a 5 to 10 minute break after the following module quiz. Allow students to stand up, stretch, use the facilities, etc. Make sure you clearly communicate what time you expect them to return and start the next module.

MODULE 7 QUIZ

PPT slide 112-116, SG page 117

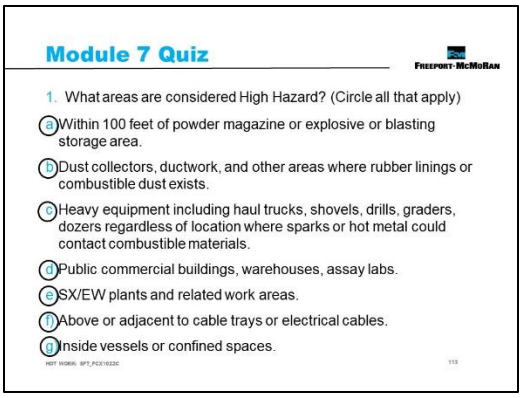


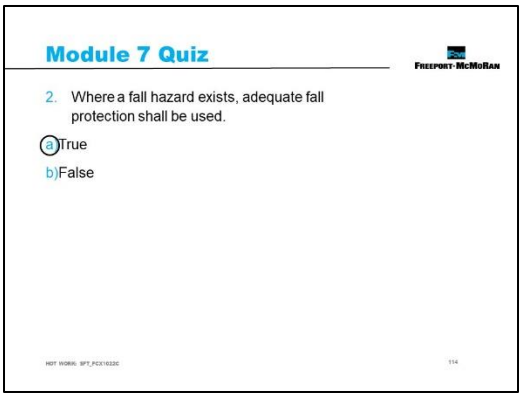
Instruction

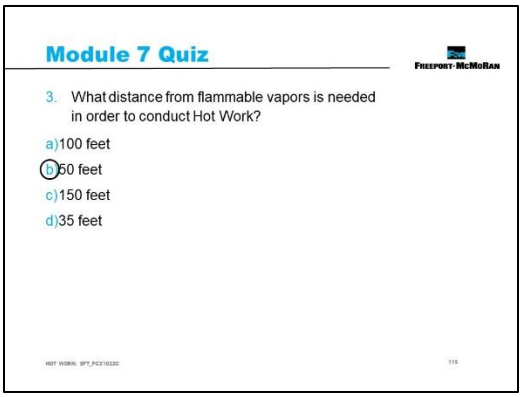
- Students will write answers to the quiz questions in the SG.
- Review the answers as a class.

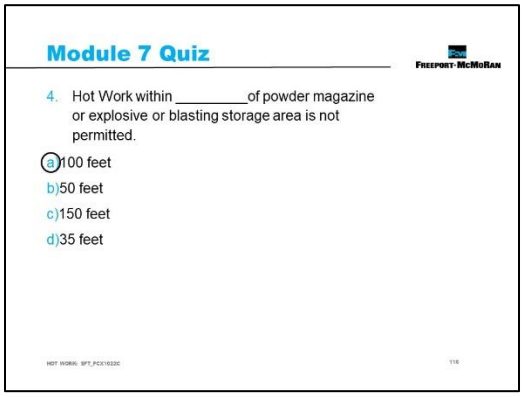
Quiz Answers

1. A-G (SG page 105)
2. A (SG page 109)
3. B (SG page 112)
4. A (SG page 113)









Break

- We recommend taking a 5-10 minute break after this module. Allow students to stand up, stretch, use the facilities, etc. Clearly communicate what time you expect them to return to start the next module.

CONCLUSION

The conclusion is a course overview and introduces the assessment and evaluation.

ACTIVITIES

- Knowledge Assessment
- Student End of Course Questionnaire (in SG)

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 3.

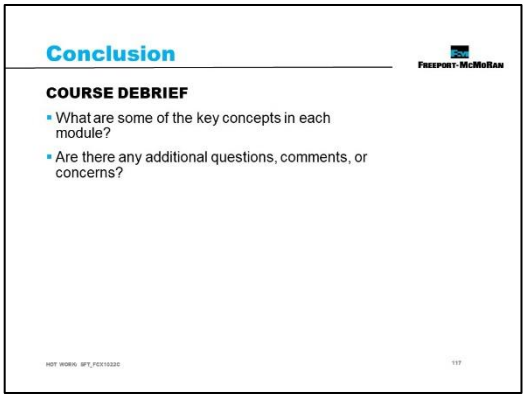
TOTAL TEACHING TIME

The conclusion takes approximately 10 minutes to complete.

PPT slide 117, SG page 119

Instruction

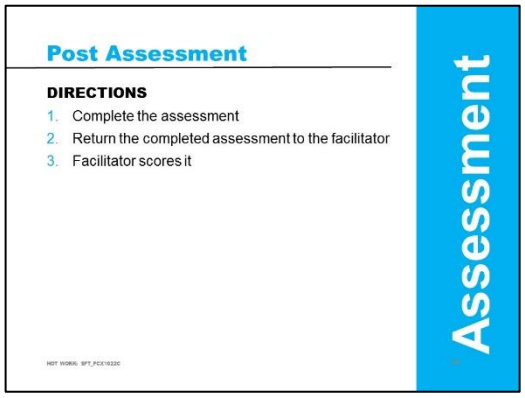
- Have students break into groups of 2 or 3. Assign each group a module, and have them discuss 3 important concepts that they learned from that module. After a few minutes, ask each group to share their discussion.
- Ask if there are any questions, comments, or concerns.



PPT slide 118

Instruction

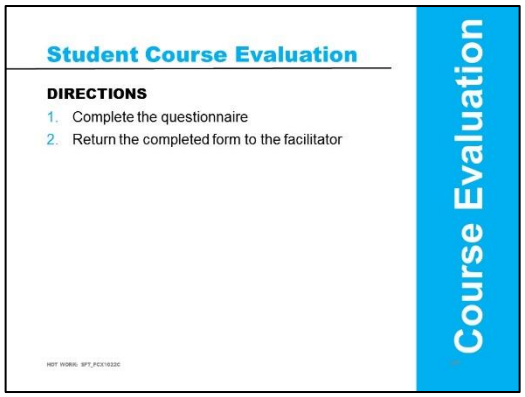
- Have students complete the assessment.



PPT slide 119, SG page 131

Instruction

- Have students complete the Student End of Course Questionnaire (in SG).



FACILITATOR COURSE EVALUATION

Course Name	
Facilitator Name	

1. What worked well in the course? Please explain.
2. Were the topics effectively sequenced? If not, please provide suggestions for change.
3. Was the content up-to-date with current processes, equipment, etc.? If not, please provide specific examples.
4. Was the content at the appropriate level of difficulty? If not, please provide examples.
5. What in the course needs improvement? Please provide specific examples.
6. Were the teaching materials (PPT, FG, etc.) of high quality? If not, please provide examples.
7. Were there any inaccuracies or missing content? If so, please provide examples.
8. Do any of the issues you've identified need to be addressed immediately? If so, please list which ones.

Thank you for taking the time to complete the survey.
Please mail to: Mine Training Institute, Attention: Suzanne Anderson, 18550 S. La Canada Drive, Sahuarita, AZ 85629
Or scan and email to: sanderso2@fmi.com