FREEPORT-
MCMORAN

FACILITATOR GUIDE

SFT FCX1003C
CONFINED SPACE

October / 2018

VERSION 2.1

TABLE OF CONTENTS

COURSE OVERVIEW

The following is basic information about this course.

COURSE DESCRIPTION

This course teaches employees the knowledge and skills necessary to safely enter and work within confined spaces. Students will learn the characteristics, hazards, evaluation techniques, hazard control, emergency procedures, and safe entry procedures associated with confined spaces. All knowledge gained from the in-class instruction will later be demonstrated / assessed in a simulated workplace environment.

COURSE OBJECTIVES

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

- Module 1: Evaluating a Confined Space
  - Categorize confined spaces, based on the three criteria.
  - Discuss the characteristics of a permit required confined space.
- Module 2: Permit-Required Confined Space Hazards
  - Discuss hazards associated with permit-required confined spaces.
- Module 3: Controlling Confined Space Hazards
  - Analyze a scenario, evaluate the hazards, and recommend controls.
- Module 4: Entering a Confined Space
  - Demonstrate the process for entering a confined space.

COURSE PRE-REQUISITES

None

COURSE LENGTH

This course takes approximately 6 hours to complete.

CLASS SIZE

This course is designed for a maximum of 15 students. Class size may be less depending on each site's needs and the students' skills and experience levels.

TARGET AUDIENCE

This training is intended for all Freeport-McMoRan employees who may need to enter a confined space, and satisfies the requirements for training in the roles of Entrant, Attendant, and Entry Supervisor.

FACILITATOR QUALIFICATIONS

Facilitators should be well versed in Freeport-McMoRan's Confined Space Policy (FCX-HS05).

REGULATIONS/POLICIES/PROCEDURES

This course teaches to Freeport-McMoRan's Confined Space Policy (FCX-HS05).

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 is 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 participate in many hands-on activities designed to give students time to practice the knowledge learned throughout the course. Activities also provide opportunities for the facilitator to give immediate feedback on what each student does/does not do well. Facilitators should review each activity's directions in the FG before instructing students.

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 materials are needed for activities in each module:

Module	Materials
Introduction	• Activity 1: Icebreaker o Gather the appropriate materials depending on the icebreaker chosen

Module 1: Evaluating a Confined Space	• Activity 2: On the Fence
	  o Tape to affix signs to the wall
	  o Printed signs (Confined Space/Not a Confined Space)
	• Activity 3: PRCS or NPRCS?
	  o Two flip charts
	  o Markers

Module 2: Permit-Required Confined Space Hazards	• Activity 4: A Second Look at PRCSs o Flip charts from Activity 3
Module 3: Controlling Confined Space Hazards	• Activity 5: Test the Space o Worksheet (located in the SG) • **A site-specific air monitor needs to be made available to inspect and pass around the class.**

Module 4: Entering a Confined Space	• Activity 6: Completing the Permit
	  o Worksheet (located in the SG)
	  o **A confined space permit needs to be available for each student.**

Conclusion	None

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.

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.

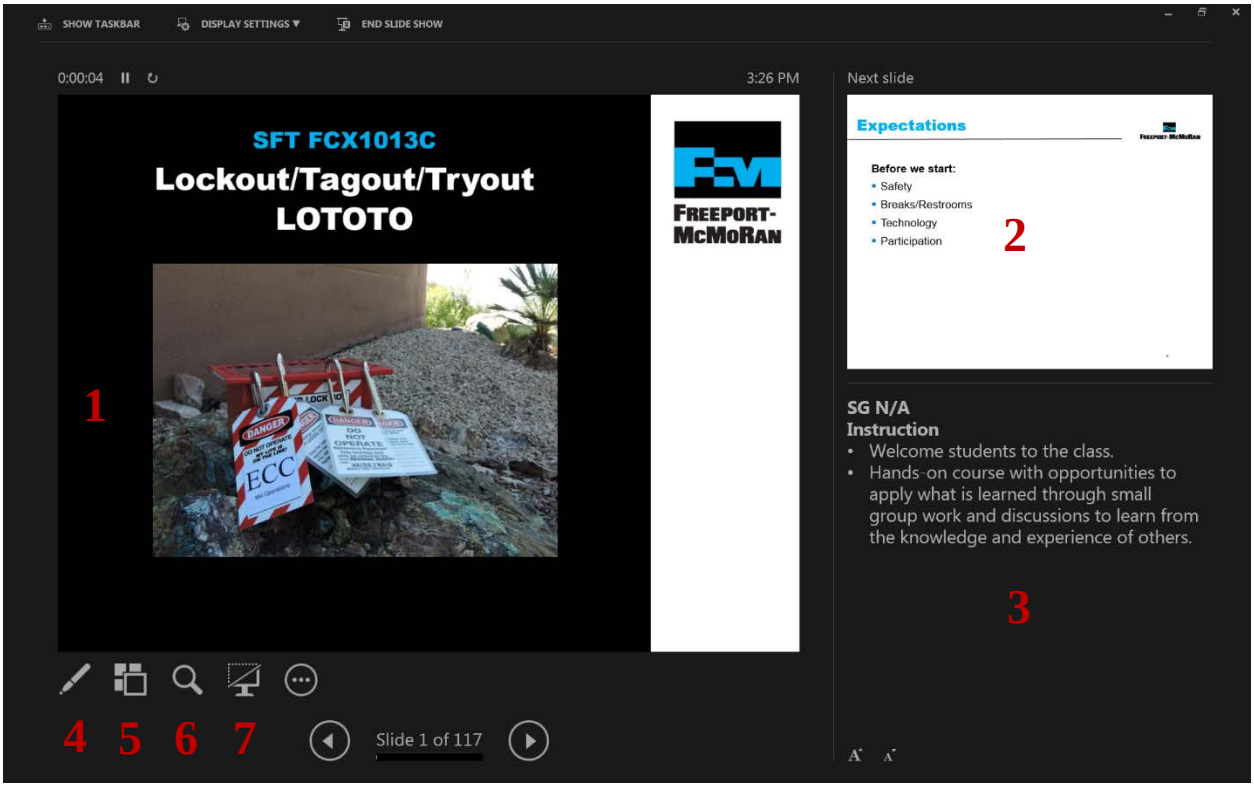
SETTING THE PRESENTATION MODE

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. 

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. **Zoom** – This icon lets the facilitator zoom in on specific aspects of the PPT.
6. **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.
7. **All slides** – This will show small images of all of the slides together on the facilitator's screen.

INTRODUCTION

Every year hundreds of workers are needlessly injured or killed when confined space guidelines are not properly followed. According to the Department of Labor, there has been an average of 92 fatalities per year over ten years (1990-2000) involving confined space entries.[1]

Many workplaces contain areas which are defined as "confined" due to the constraints that limit the employee's ability to enter, exit, or perform their job. In addition, confined spaces may be more difficult to evacuate in an emergency, or they can make access to life-saving equipment more difficult. The words "confined space" should trigger a concern for added caution whenever any activity or task is performed.

We should all have the necessary knowledge and skills to recognize the hazards and select the safe work practices necessary to deal with these hazards. This course has been developed to explain the hazards of confined space work and the procedures that are required to control them.

If at any time you have a question, either in this class or while you are working in the field, it is your responsibility to stop and seek the answers you need. Never proceed with any job if you have not been properly trained and are not sure of the correct steps to ensure you and your co-worker's safety.

ACTIVITIES

- Activity 1: Icebreaker

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 5.

TOTAL TEACHING TIME

The introduction takes approximately 30 minutes to complete.

[1] CDC - NIOSH Program Portfolio : Work Organization and .., http://www.cdc.gov/niosh/topics/confinedspace/ (accessed April 14, 2016).

PPT slide 1

Instruction

- Welcome students to class.
- Facilitator introduces self by stating position at FCX, how long you've been with the company and how long you've been in mining.
- This is a hands-on course with plenty of opportunities to apply what we are learning. Expect to be working in small groups and involved in many discussions. We all need to learn from the knowledge and experience of others.

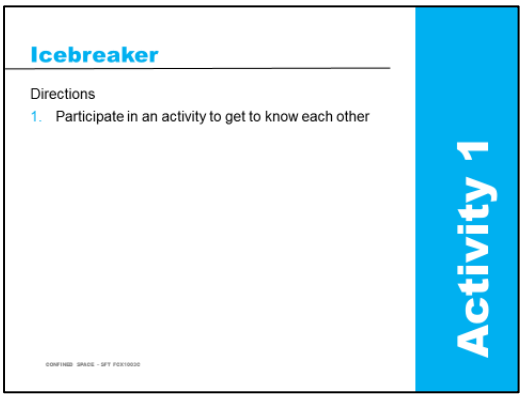
PPT slide 2

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.

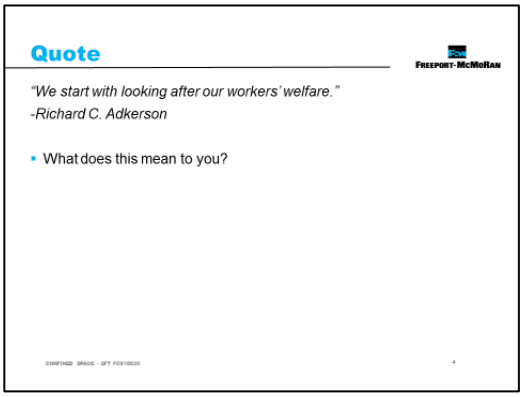
Icebreaker	Instructions
A Little Known Fact *(10-15 minutes)*	1. The facilitator will begin by stating their name, title, organization (if different than students), length of time in position and one little known fact about themselves. 2. Continue this exercise by asking each student to share the same information about themselves.
Vanity Plate *(15 minutes)*	1. The facilitator will begin by asking each student to think of a vanity plate that would best describe themselves. They can only use a combination of 7 letters or numbers. 2. Using their name card (or name tent), write their vanity plate on the inside or underside. 3. Allow 5 minutes to complete. 4. Depending on the class size, the facilitator can choose to have them share with their table group or with the entire class. • Some examples of vanity plates: a. LUV2RUN ("love to run" for a marathon enthusiast) b. HSTRYFN ("history fan" for a someone that enjoys historical events)
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 <u>all</u> 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.

Icebreaker	Instructions
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

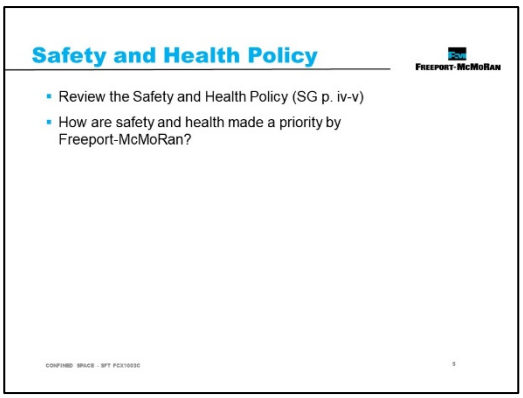
- Introduce the student guide as a resource.
- Read or have a student read the quote by Richard Adkerson. Read it aloud.
- As a class, discuss what the quote means.



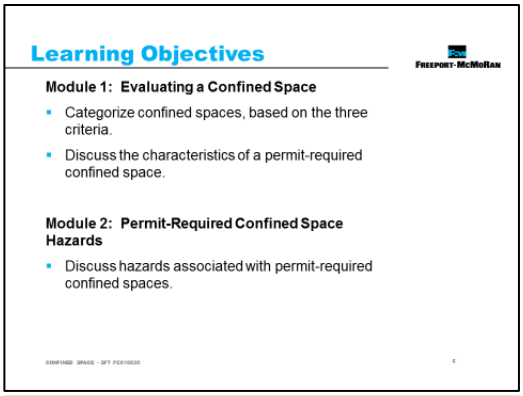
PPT slide 5, SG pages iv-v

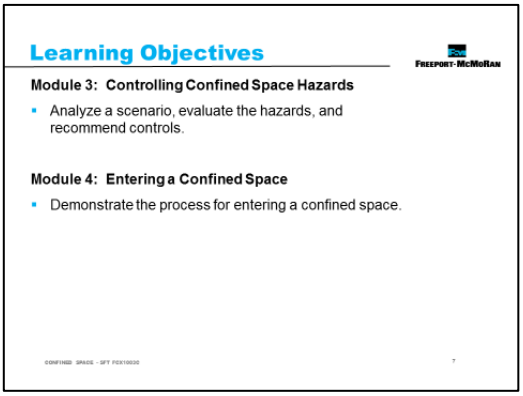
Instruction

- Discuss with the class the Corporate Health and Safety Policy. Let them know where they can find it and that it has been recently updated.



PPT slides 6-7, SG page vi

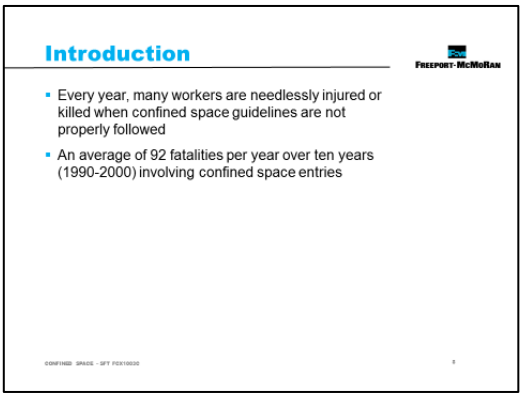




Instruction

- Before beginning these next two slides:
  - Ask the Students what they would like to get out of this course, or what they think about it?
- Read the following two slides to explain the objectives for each module. This information can be found on p. vii in their Student Guides.
- They may also find the module objectives listed on the first page of each module.

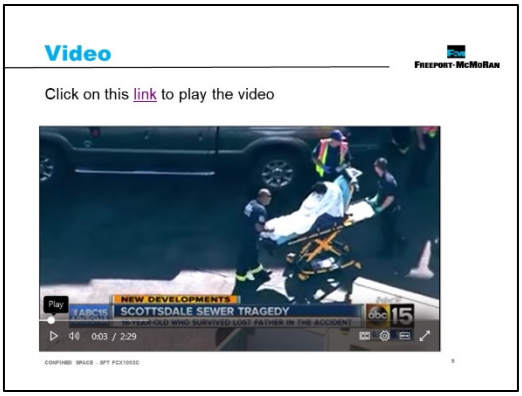
PPT slide 8, SG page vii



Instruction

- Read the statistic with the class.
- Many workplaces contain areas which are defined as “confined” due to the constraints that limit the employee’s ability to enter, exit, or perform their job.
- In addition, confined spaces may be more difficult to evacuate in an emergency, or they can make access to life-saving equipment more difficult.
- The words “confined space” should trigger a concern for added caution whenever any activity or task is performed.
- We should all have the necessary knowledge and skills to recognize the hazards and select the safe work practices necessary to deal with these hazards.

PPT slide 9

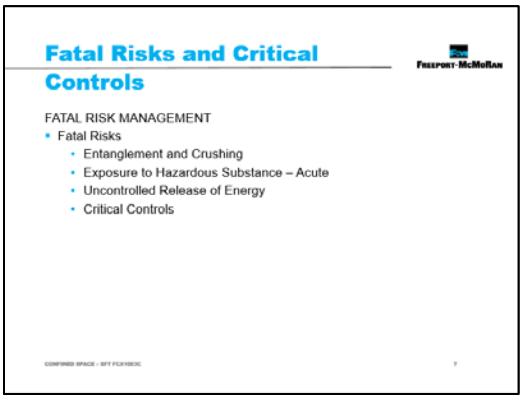


Instruction

- Click the link to make the video play. (2.5 minutes). This is a newsfeed about two deaths that occurred in Scottsdale, AZ (August 25, 2014).
- Use the video as motivation. Why do we attend training?
- Link to video: https://web.microsoftstream.com/video/8b20ae24-f7aa-441a-b27b-2320aefcce20

PPT slide 10, SG pages viii-ix

Instruction



- Discuss Fatal Risk Management.
- 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. In short, Critical Controls help keep you from being killed.
- The Fatal Risk(s) and Critical Controls relevant to this course are provided below.
    - Entanglement and Crushing
    - Exposure to Hazardous Substances-Acute
    - Uncontrolled Release of Energy
    - 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.

MODULE 1: EVALUATING A CONFINED SPACE

This module contains introductory information about the criteria needed for a confined space, the difference between a permit-required confined space and a non-permit required confined space, and the basic roles of an entry team.

LEARNING OBJECTIVES

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

- Categorize confined spaces, based on the three criteria.
- Discuss the characteristics of a permit required confined space.

ACTIVITIES

- Activity 2: On the Fence
- Activity 3: PRCS or NPRCS?

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 5.

TOTAL TEACHING TIME

This module takes approximately 1 hour to complete.

PPT slide 11, SG page 1

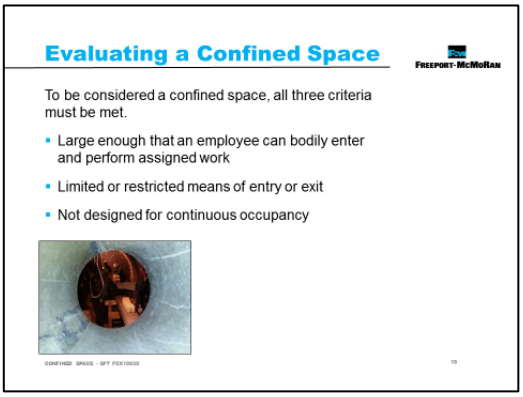
Instruction

- Upon completion of this module, the students will be able to:
  - Categorize confined spaces, based on the three criteria.
  - Discuss the characteristics of a permit required confined space.

PPT slide 12, SG page 5

Instruction

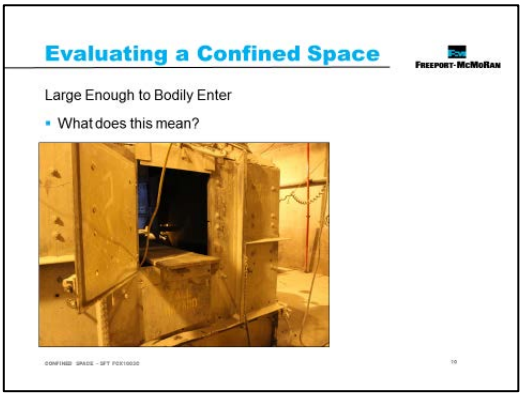
- Review the three characteristics of a confined space.
- To be considered a confined space, all three of the criteria listed must be met.



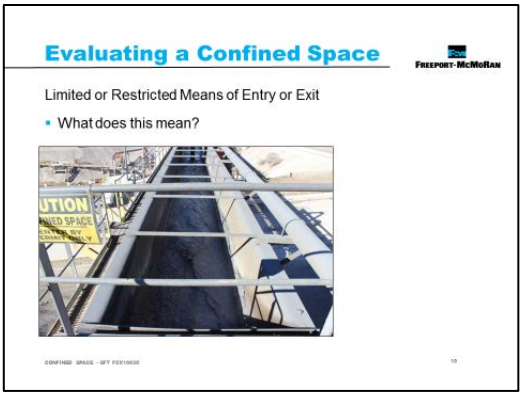
PPT slide 13, SG page 6

Instruction

- Ask the class to interpret what this criteria means.
- A confined space must be large enough for you to be able to enter with your whole body. This is only one of the three criteria for defining a confined space.
- Be aware that once any portion of your body crosses into the space, the confined space has been entered.



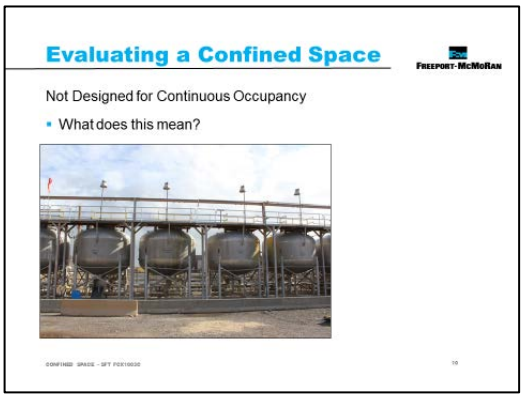
PPT slide 14, SG page 6



Instruction

- Ask the class to interpret what this criteria means.
- A space is considered to have limited or restricted means of entry or exit whenever the entrant's ability to escape or be rescued in an emergency situation would be hindered.
- This includes any time the entrant cannot walk through the access standing upright and unimpeded, or must bend, stoop, crawl or climb (i.e. ladders) in order to access the space.
- This can also apply to areas with two exits if both of them are hard to get through, or if one is blocked by construction or debris.

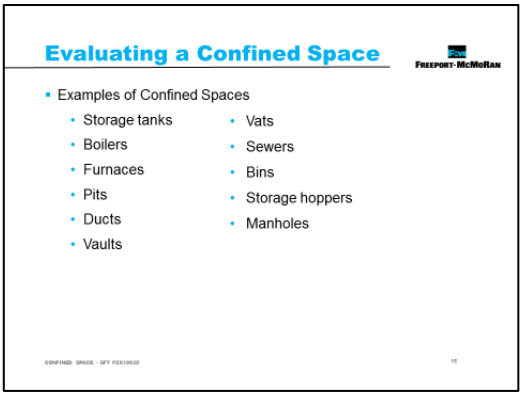
PPT slide 15, SG page 7



Instruction

- Discuss this criteria.
- Confined spaces are not designed for you to work inside them for long periods of time; while a tank may have an access door, the presence of a door does not necessarily mean that the space is not a confined space.
    - For example, an office building is designed for human occupancy, and has ventilation, illumination, fire protection, and other life safety features. Meanwhile, a storage bin is designed to contain material, and does not provide any worker protection in its design.
    - Spaces designed for continuous employee occupancy include offices, rooms, work areas, buildings, walkways, etc. Tanks, silos, bins, etc. are not specifically designed for you to work inside them for long periods of time.

PPT slide 16, SG page 7

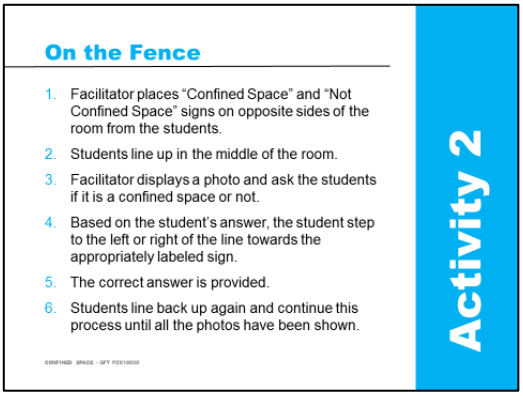


Instruction

- Review the examples provided.
- Confined spaces are found in a wide range of work areas which you could encounter throughout your site.
- Each site keeps inventory of all recognized confined spaces. These confined spaces are labeled and easy to identify.
- Due to the complexity, age, and size of our sites, there is a chance that not all confined spaces have been formally recognized. Therefore, it is important for you to be able to recognize a confined space that has not been previously identified or properly labeled.

ACTIVITY 2: ON THE FENCE

PPT slides 17-26



Time
Approximately 10 minutes

Materials

- Confined Space sign
- Not a Confined Space sign
- Tape to affix signs to the wall

Purpose

- This activity gives students the opportunity to determine if the space in the photo meets the criteria for a confined space.

Instruction

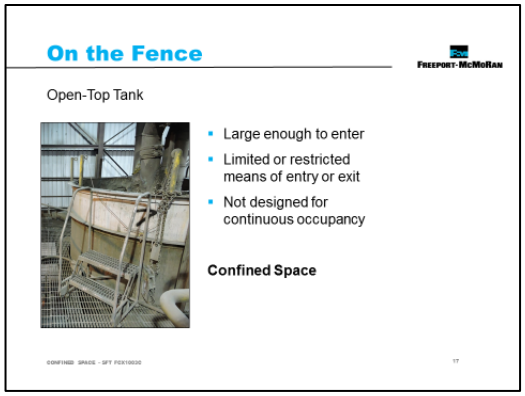
1. Copy or use the two signs in the FG (see pp. 23, 25) to label sides of the room as a confined space or not a confined space.
2. Ask the students to line up in the middle of the room.
3. Explain that you are showing a photo on the next PPT slide.
4. Using their knowledge of the three criteria necessary, students need to decide if the photo is a confined space or not.
5. Students step to the left or right of the line towards the appropriately labeled sign that matches their answer.
6. Provide the correct answer and identify the criteria(s) that is met.
7. Students line back up again and continue this process for the remaining photos.

Confined Space

Not a Confined Space

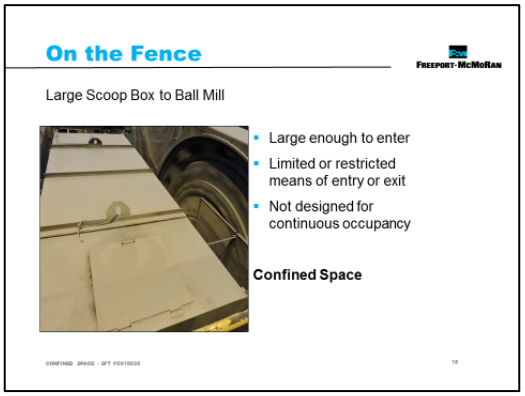
#1 Open-Top Tank
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- Not designed for continuous occupancy
- **This is a confined space.**



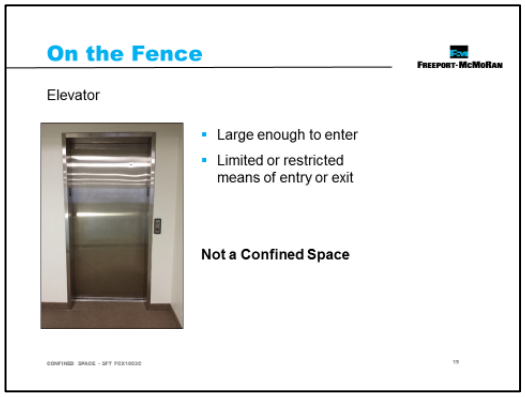
#2 Large Scoop Box to Ball Mill
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- Not designed for continuous occupancy
- **This is a confined space.**



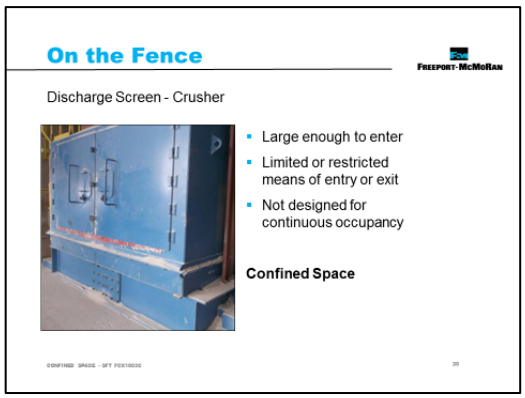
#3 Elevator
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- **This is not a confined space.**



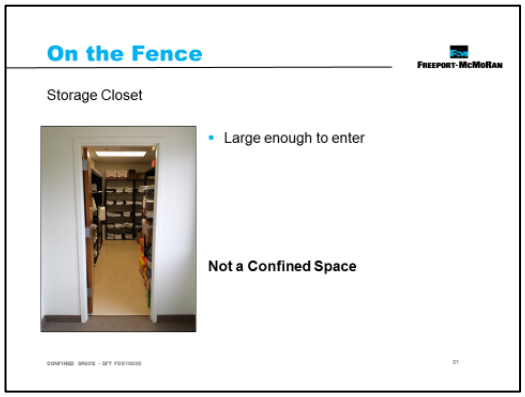
#4 Discharge Screen - Crusher
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- Not designed for continuous occupancy
- **This is a confined space.**



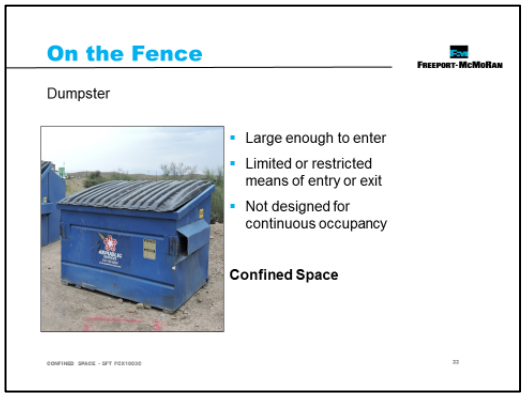
#5 Storage closet
Criteria met:

- Large enough to enter
- **This is not a confined space.**



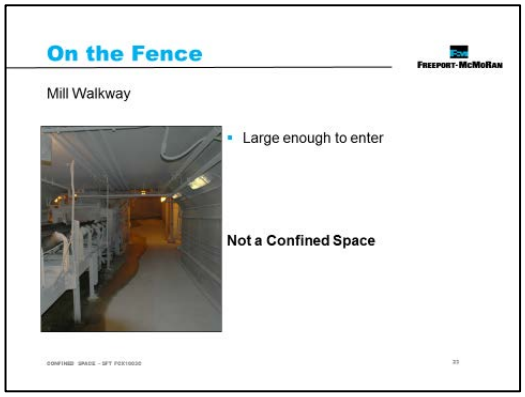
#6 Dumpster
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- Not designed for continuous occupancy
- **This is a confined space.**



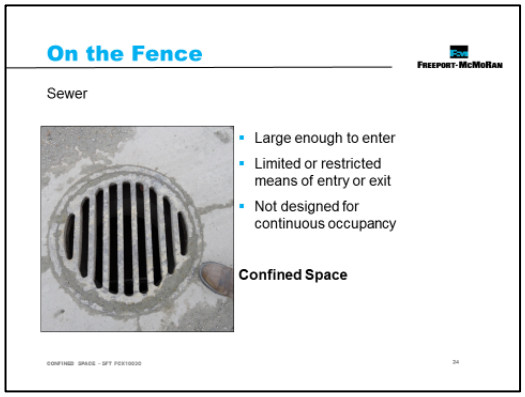
#7 Mill Walkway
Criteria met:

- Large enough to enter
- **This is not a confined space.**



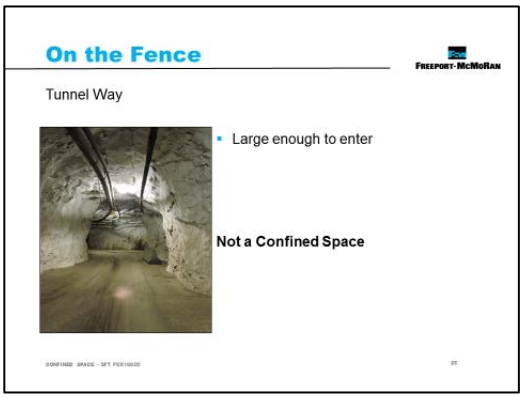
#8 Sewer
Criteria met:

- Large enough to enter
- Limited or restricted means of entry or exit
- Not designed for continuous occupancy
- **This is a confined space.**

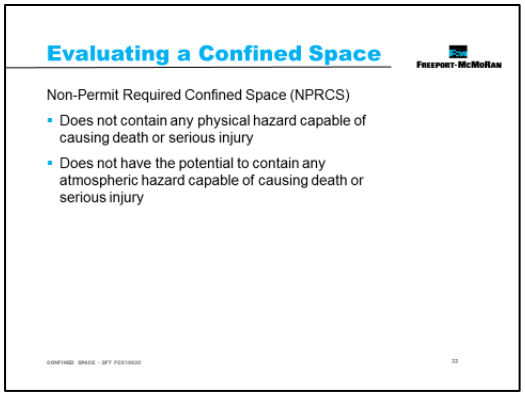


#9 Tunnel Way
Criteria met:

- Large enough to enter
- **This is not a confined space.**



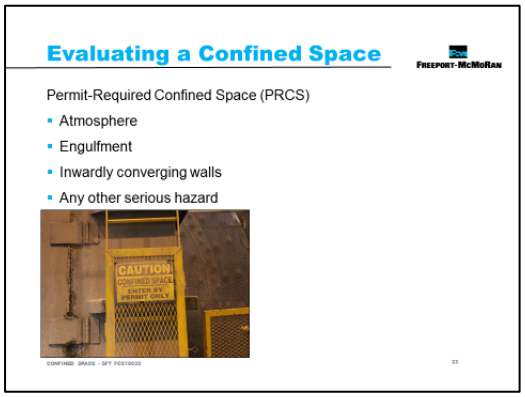
PPT slide 27, SG page 8



Instruction

- Review the conditions that make up a NPRCS.
- This classification is extremely important as there are additional steps that must be followed to ensure your safety, if it is determined you are working within a PRCS.
- Notify management if signage is missing from a suspected confined space.

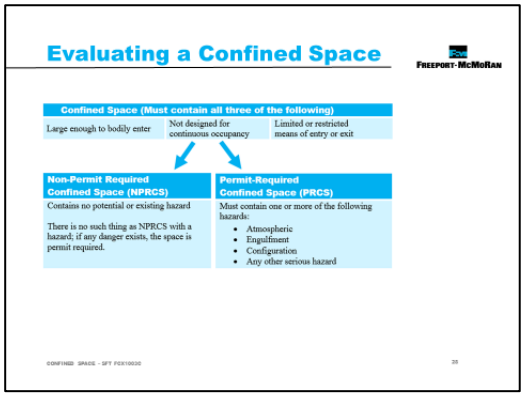
PPT slide 28, SG page 9



Instruction

- To be considered a PRCS, the confined space must:
  - Contain or have the potential of containing a hazardous atmosphere.
  - Contain a material that has the potential for engulfing an entrant.
  - Have an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
  - Contain other recognized serious safety or health hazards.
- **If a confined space contains or has the potential to contain ANY ONE of the above hazards, it is by definition a Permit-Required Confined Space.**

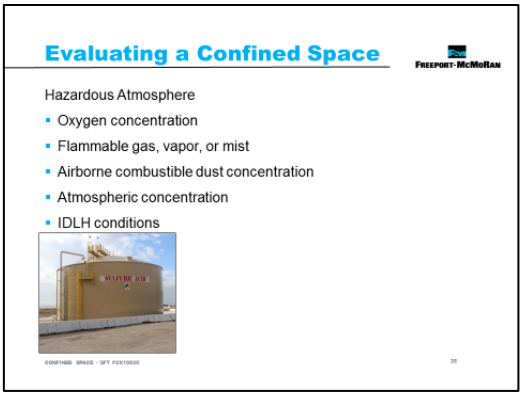
PPT slide 29, SG page 9



Instruction

- Illustration shows how to classify a space as either a NPRCS or PRCS.

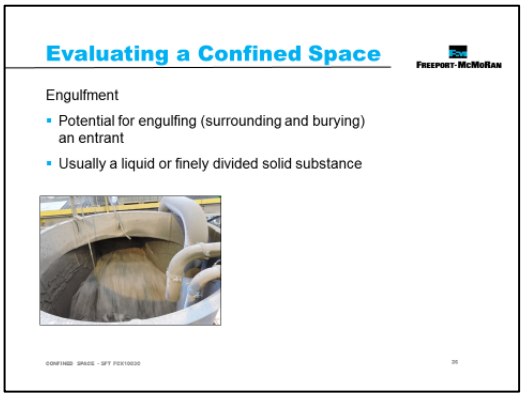
PPT slide 30, SG page 10



Instruction

- Discuss the five conditions that make an atmosphere hazardous.
    - Atmospheric oxygen concentration below 19.5% or above 23.5%.
    - Flammable gas, vapor, or mist greater than 10% of the lower flammable or explosive limit (LFL or LEL).
    - "Airborne combustible dust at a concentration that meets or exceeds its LFL"[2]
    - **Note:** *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.*
    - Atmospheric concentration in excess of the occupational exposure limit for any substance that is "capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects"[3] and which could result in employee exposure in excess of its dose or permissible exposure limit.
    - "Any other atmospheric condition that is immediately dangerous to life or health"[4] (e.g. heat).

PPT slide 31, SG page 11



Instruction

- Review the bullets.
- Grain, sand, dust, and water are examples of materials that may pose an engulfment hazard to employees.

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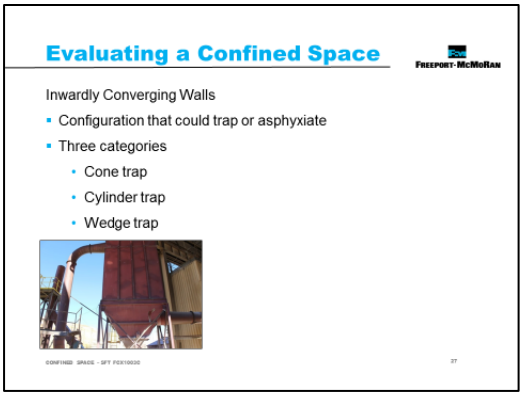
[2] See comment 1
[3] Subpart AA Confined Spaces in Construction, https://www.osha.gov/confinedspaces/1926_subpart_aa.pdf (accessed April 05, 2016).
[4] See comment 3

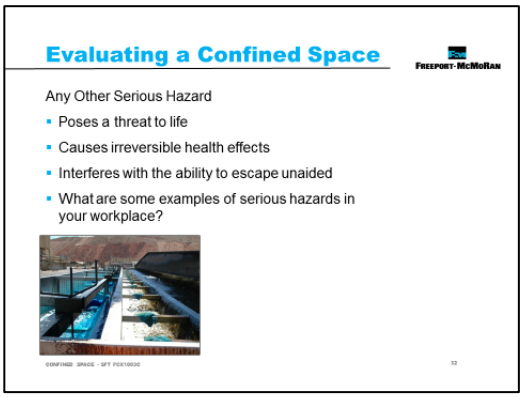
PPT slide 32, SG page 11



Instruction

- Review the bullets.
- Most entrapment hazards fall into one of three categories:
  - The "cone trap" – found in the bottom of cyclones and precipitators.
  - The "cylinder trap" – a pipe or similar opening in the bottom of a confined space big enough for someone to fall into. For example, the pipe leading up to an elevated water tower.
  - The "wedge trap" – converging walls that could entrap someone who fell into them. They are commonly found in bins, larger boilers, and sand hoppers.

PPT slide 33, SG page 12

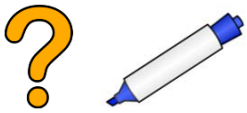


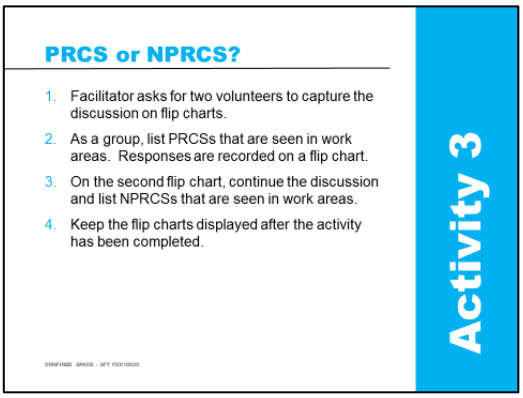
Instruction

- Review the bullets.
- This is not an all-inclusive list of the hazards that classify a space as a PRCS. It is important to determine whether exposure to a hazard in a confined space will impair the ability to self-rescue.
- The work you are performing within a confined space may be what causes the serious safety or health hazard (e.g. welding, high noise, PPE).
- Some examples of other serious hazards
  - Temperature
    - Steam
  - Moving parts
    - Agitators
    - Pumps
    - Conveyors
  - Fall hazards
  - Chemical
  - Biological
  - Wildlife
    - Rodents
    - Snakes
    - Spiders
  - Electrical

ACTIVITY 3: PRCS OR NPRCS?

PPT slide 34





Time

Approximately 10 minutes

Materials

- 2 flip charts
- Markers

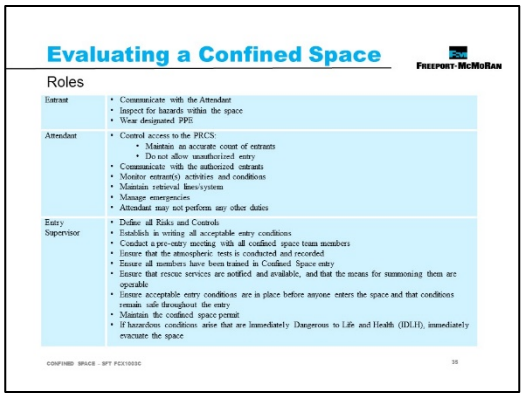
Purpose

- This activity gives students the opportunity to review the knowledge gained surrounding permit-required and non-permit required confined spaces. The students will then apply this criteria to their respective work areas.

Instruction

1. Have two flip charts set up at the front of the classroom.
2. Ask for two volunteers. Each volunteer will stand by a flip chart and label it either as PRCS or NPRCS.
3. As a group, have the students begin with PRCSs that are seen in work areas. The first volunteer will write the responses down.
4. After all the responses are exhausted, continue the discussion with NPRCSs. The second volunteer will write these responses on the second flip chart.
5. Keep the flip charts displayed after the activity has been completed.

PPT slide 35, SG page 13

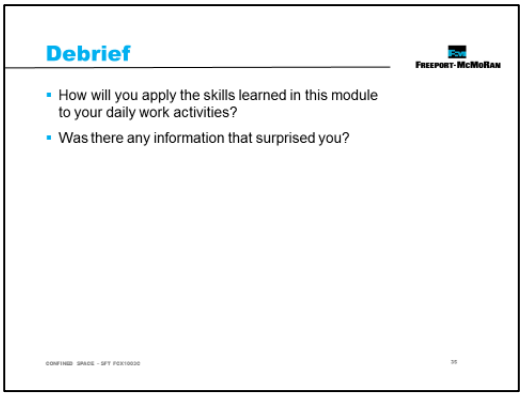


Instruction

- Confined space entry cannot be performed alone. With the risks involved, it is important that multiple people are included. This group of individuals is called the entry team.
- A typical entry team consists of an entrant, an attendant, and an entry supervisor.
- For any PRCS entry, a minimum of two individuals is necessary. These individuals will be classified as either the entrant or the attendant.
- Review the chart in the SG (p. 13).

Overview	
Entrant	• Enters the space and performs the work. • Has direct exposure to the hazards identified in the permit-required space. • Receives additional training and knowledge to perform work in that space.
Attendant	• Remains stationed outside of the confined space until the entry is terminated or he/she is relieved by another attendant identified on the permit. • Responsible for the safety of all individuals who enter.
Entry Supervisor	• Holds a key position with important responsibilities. • Oversees all aspects of the confined space entry, work, and exit procedures. • Determines if acceptable entry conditions are present at a permit space where entry is planned.

PPT slide 36

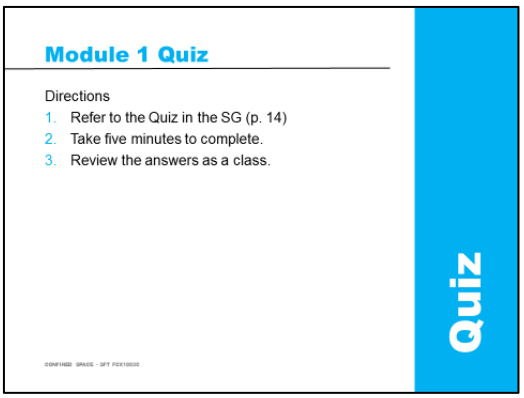


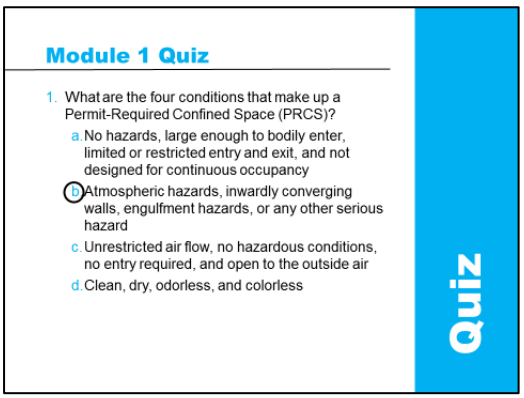
Instruction

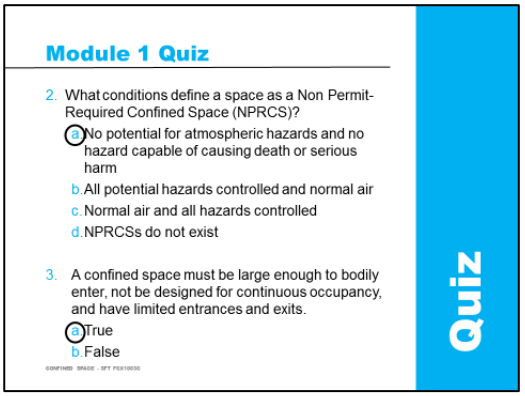
- Review the questions on the slide.
- This helps to review and refresh the information that was covered in this module.
- By asking the students to apply the information, they are further retaining the lesson.

MODULE 1 QUIZ

PPT slides 37-39, SG page 14







Instruction

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

Quiz Answers

1. Answer: b, SG page 9
2. Answer: a, SG page 8
3. Answer: a, SG page 5

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 2: PERMIT-REQUIRED CONFINED SPACE HAZARDS

This module contains introductory information about the hazards associated with permit-required confined spaces.

Confined space incidents have occurred when the workers did not realize or were unaware of the dangers or potential dangers existing in or around the space, or did not consider any new hazards that were created as a result of the work. When planning a confined space entry, you must take into account any existing hazards and any hazardous conditions that could be generated or introduced by the work you will be performing. Therefore, it is important to plan for any current or potential hazards in a confined space before entering a space.[5]

LEARNING OBJECTIVES

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

- Discuss hazards associated with permit-required confined spaces.

ACTIVITIES

- Activity 4: A Second Look at PRCSs

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 5.

TOTAL TEACHING TIME

This module takes approximately 1 hour to complete.

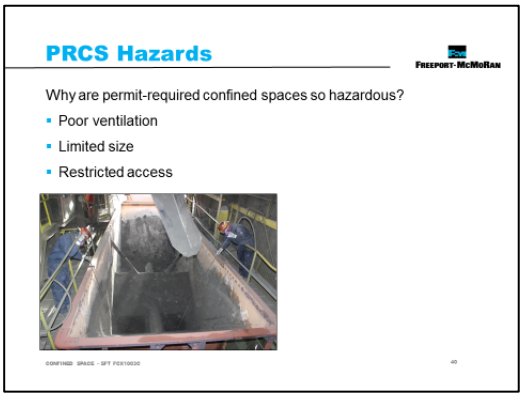
[5] Atmospheric Hazards Confined Space free online training, https://www.oshatrain.org/courses/mods/713m4.html (accessed March 24, 2016).

PPT slide 40, SG page 17

Instruction

- Upon completion of this module, the students will be able to:
    - Discuss hazards associated with permit-required confined spaces.

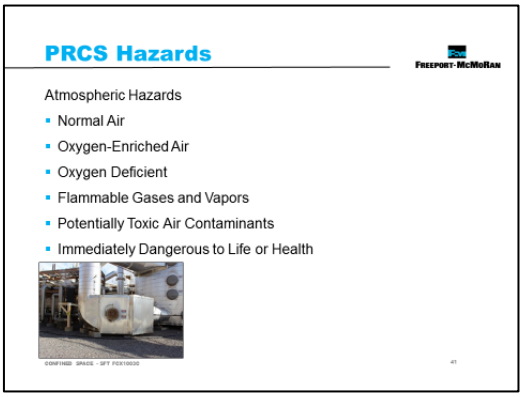
PPT slide 41, SG page 19



Instruction

- Discuss the question on the slide.
- Confined spaces typically have poor ventilation and may be of limited size and restricted access; this combination can quickly increase the potential for toxic gases, vapors, fumes and other hazardous atmospheres to develop.
- Work in confined spaces can also increase the risk of injury or death by making employees work closer to hazards than they otherwise would, or by creating additional hazards such as engulfment.
- When emergencies do occur, limited access can prohibit a timely rescue by emergency personnel.

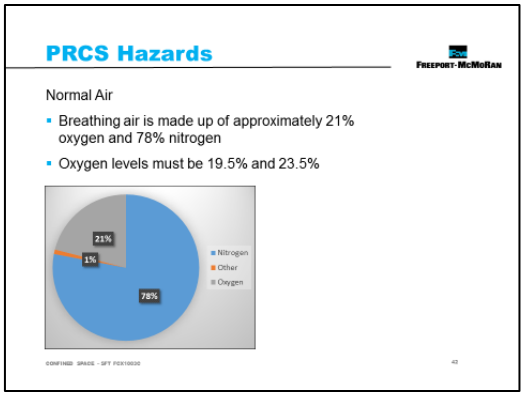
PPT slide 42, SG page 20



Instruction

- The bullets on the slide are the six factors that can affect a confined space atmosphere.

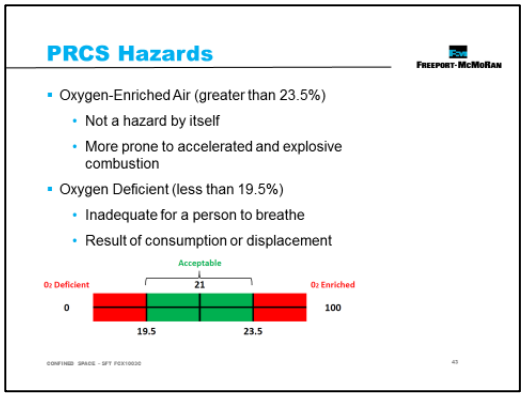
PPT slide 43, SG page 20



Instruction

- Review the chart showing the breakdown of normal air.
- Our bodies are designed to survive within small variations to these amounts. Oxygen levels must always be between 19.5% and 23.5% in order to maintain a safe atmosphere.

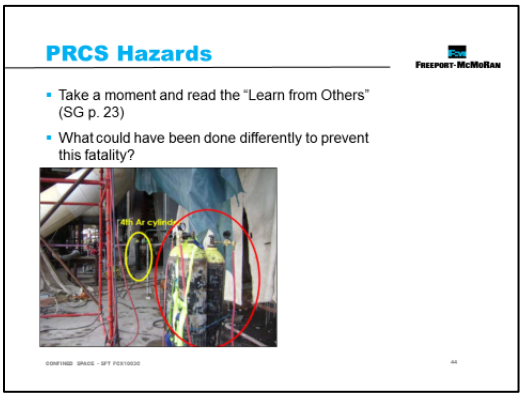
PPT slide 44, SG pages 21-22



Instruction

- Review the ranges of oxygen-enriched, oxygen deficient, and acceptable levels for oxygen in our environment.
- An atmosphere that is rich in oxygen does not, by itself, pose a hazard to people. That being said, oxygen-enriched environments can be more prone to accelerated and explosive combustion. If an ignition source is present, materials that would not normally be considered a fuel source can become one. Due to this fact, if you find yourself in an oxygen-enriched atmosphere, calmly evacuate while taking care not to risk ignition, such as dropping metal tools onto a surface or using electrical equipment that is not already in operation.
- Consumption is the process of removing oxygen from the air through usage.
- Displacement is the movement of oxygen by another gas to a different location.

PPT slide 45, SG page 23



Instruction

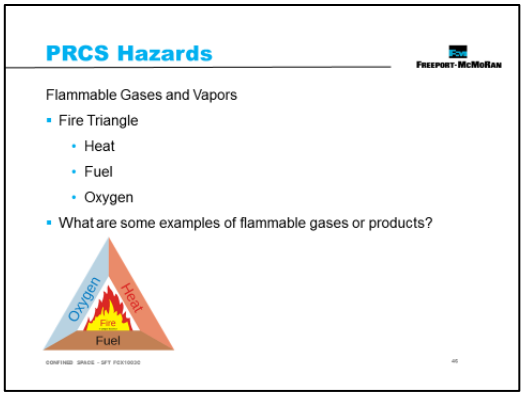
- Direct students to read the "Learn from Others." Allow a couple of minutes.
- Discuss the incident.
- Ask the students what could have been done differently to prevent this fatality?
- If the levels of oxygen in your work area are changing, there is a reason. Something is consuming or displacing the oxygen. Leave the space immediately and notify supervision so that everyone understands the reasons for the changes.
    - Can cause an accelerated heartbeat, impaired attention, impaired thinking, impaired coordination, convulsive movements and even death.
    - Most combustible gas monitors (LEL) are oxygen dependent and do not provide reliable readings below 19.5%.
    - Victims of an oxygen deficient atmosphere are often unaware of their predicament until it is too late.

PPT slide 46

Instruction

- Click on the arrow to begin the video (6 minutes). This is a CSB hazards of nitrogen asphyxiation video.
- Ask the class for some takeaways from the video.
- Link to video: https://web.microsoftstream.com/video/ecb49f8f-6d7b-42f9-aaf3-fe4512b677f0

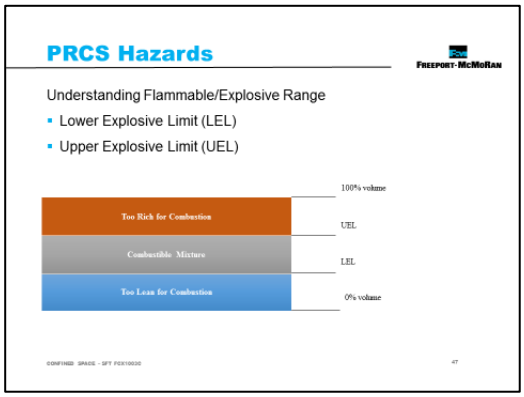
PPT slide 47, SG page 24



Instruction

- Explain the fire triangle and the three necessary ingredients to create a flammable atmosphere.
- Examples of flammable gases or products
  - Propane
  - Methane
  - Leaking oxygen/acetylene hoses
  - Hydrogen
  - Hydrogen sulfide
  - Evaporated flammable liquids (gasoline & toluene)
  - Epoxy coatings
  - Paints
  - Surface prepping solvents
  - Oils/fuel oils
  - Dust

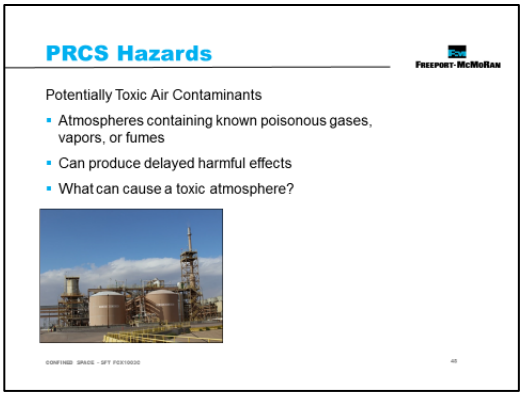
PPT slide 48, SG page 25



Instruction

- LEL is the lowest concentration (air-fuel mixture) at which a gas can ignite.
- Concentrations below this limit are too lean to burn and as a precautionary standard need to remain below 10% for entry into a confined space.
- UEL is the highest concentration that can be ignited in its upper explosive limit. Above that concentration, the mixture is too rich to burn.
- The minimum concentration of gas, vapor, or dust in the air (expressed in percent volume), which will ignite if an ignition source is present.

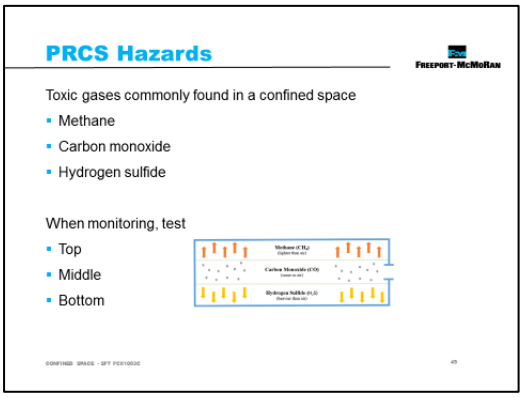
PPT slide 49, SG page 26



Instruction

- Toxic atmospheres in confined spaces can be caused by the following:
  - Products stored in the space
  - Areas adjacent to the confined space
  - Type of work being performed

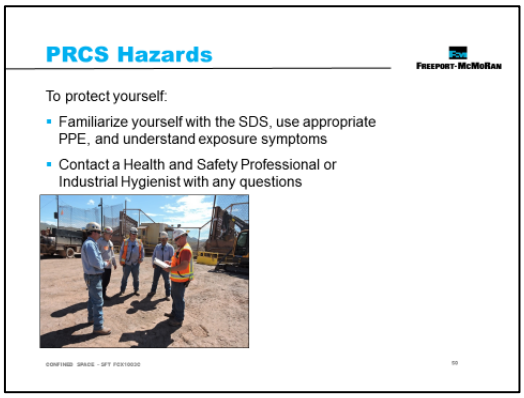
PPT slide 50, SG page 27



Instruction

- Select three different students to each read a paragraph about methane, carbon monoxide, and hydrogen sulfide.
- While you may not be exposed to these specific gases at your site, it is important to understand how certain gases will layer themselves within a confined space. Therefore, it is necessary to test all areas (top, middle, and bottom) of a confined space with properly calibrated instruments.

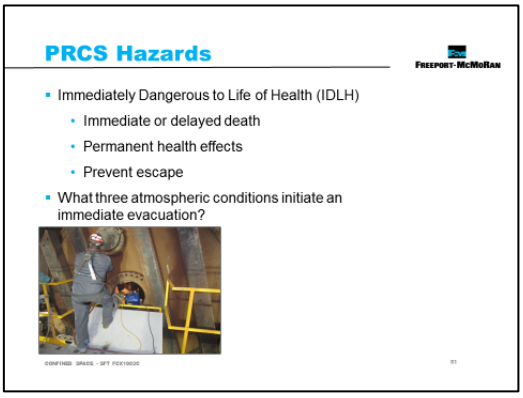
PPT slide 51, SG page 28



Instruction

- Read product labels and utilize SDS/MSDS, which refer to the manufacturers' specifications.
  - Determine appropriate type of PPE
  - Know and understand the exposure symptoms of the chemicals you are working with.
- Be aware of any chemical used or generated in your specific area, even residues that remain in the vessels.

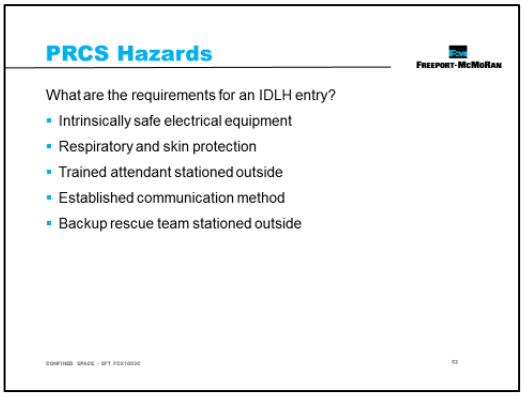
PPT slide 52, SG page 29



Instruction

- Discuss what can be a result of entering an IDLH?
- Any of these three atmospheric conditions are considered IDLH and entrants must evacuate the space immediately:
    - Oxygen-rich/deficient
    - >10% of LEL/LFL
    - Toxic gases have reached their IDLH limits

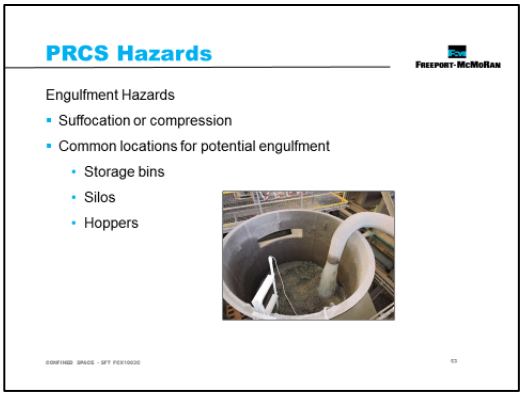
PPT slide 53, SG page 30



Instruction

- Ask the class what the requirements are for IDLH entry.
- Use of any electrical equipment in areas where a flammable atmosphere exists must be intrinsically safe. This determination is made during the pre-entry atmosphere survey. An atmosphere reading 10% of the lower explosive limit (LEL) shall be considered a flammable atmosphere for these purposes.
- Entrants use respiratory protection ("pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA") and skin protection that is appropriate for the IDLH atmosphere.
- One trained attendant or, when needed, more than one trained attendant is located outside the IDLH atmosphere.
- "Visual, voice, or signal line communication is maintained between the entrants and the attendants located outside the IDLH atmosphere."
- A backup rescue team is located immediately outside the IDLH atmosphere, and is trained and equipped with the following to provide prompt and effective emergency rescue:
    - Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA.
    - Appropriate skin protection for the IDLH atmosphere.
    - Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry.

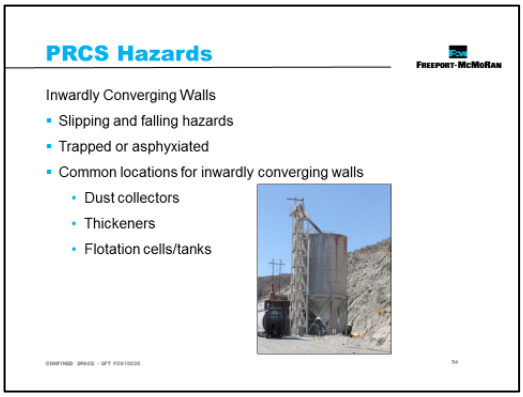
PPT slide 54, SG page 31



Instruction

- Engulfment is surrounding and effective capture of a person by a liquid or flowable solid.
- The behavior of such material is unpredictable, and entrapment and burial can occur in a matter of seconds. If the confined space is a trench or excavation, ensure that the retaining walls are sufficient and meet all applicable Trenching/Excavating standards.
- Most entrapment hazards fall into one of three categories:
    - The "Cone Trap" - found in the bottom of cyclones and precipitators.
    - The "Cylinder Trap" - a pipe or similar opening in the bottom of a confined space, big enough for someone to fall into. A good example is a pipe leading up to an elevated water tower.
    - The "Wedge trap" - converging walls that could entrap someone who fell into them. They are commonly found in bins, larger boilers and sand hoppers.

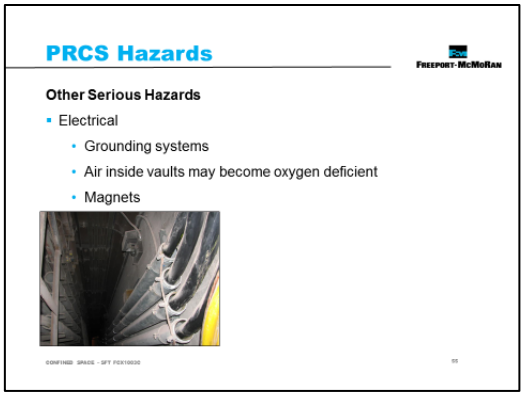
PPT slide 55, SG page 32



Instruction

- Inwardly converging walls are walls that slope or taper down to a small area, such as tanks, hoppers, and chutes.
- The hazards that inwardly converging wall can create in a confined space are slipping or falling hazards. These allow employees to enter into a smaller space. The employee then may become trapped or asphyxiated by loose materials that have fallen from the vertical walls.
- Gases or toxins that are heavier than air migrate to the smaller area creating a hazardous atmosphere by displacing oxygen causing an oxygen deficient atmosphere. Also, the smaller volume of space may increase the vapor concentration creating an explosive atmosphere. If hot work is performed, it could provide the ignition source to cause an explosion or fire.
- Review the common locations for this hazard.

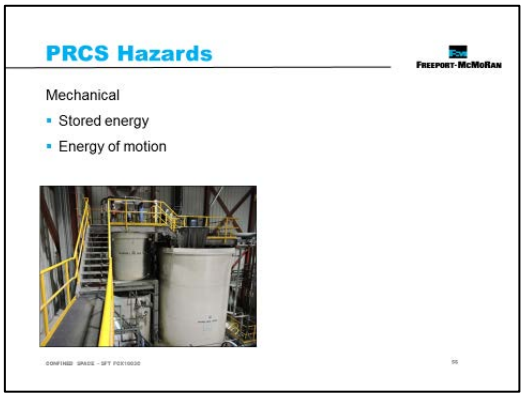
PPT slide 56, SG page 33



Instruction

- Electrical vaults and structures can result in confined space hazards, due to the fact that these areas may not be commonly entered. This is especially true for areas that are below ground level. The air inside may degrade and become oxygen deficient, or some other gas may have entered the space undetected. These electrical installations should be treated as PRCS until air monitoring has been completed.
- The most common electrical hazard found in confined spaces is a result of electric power tools and equipment brought into the confined space. The electrical hazard results because there was not an approved grounding system or the protection afforded by ground-fault circuit interrupters or low-voltage systems.
- Another electrical hazard typically found on our operating sites are magnets. The magnetic field generated by these magnets can affect pacemakers or other medical devices, as well as instrumentation that may be needed to perform the work.

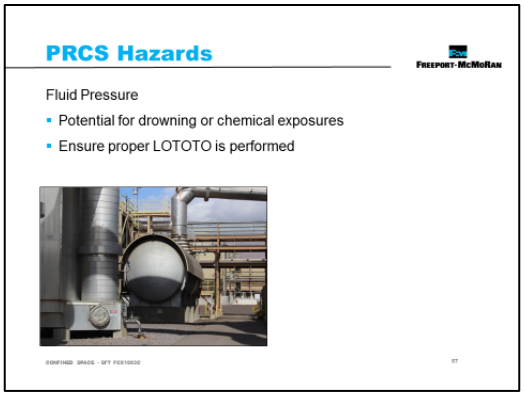
PPT slide 57, SG page 34



Instruction

- Mechanical energy can be identified as either stored energy or energy of motion, and is the second most common form of energy, behind electricity, found in our workplace.
- Mechanical hazards typically exist where electrical and mechanical equipment are inside the confined space, such as mixers, agitators, and float valves.

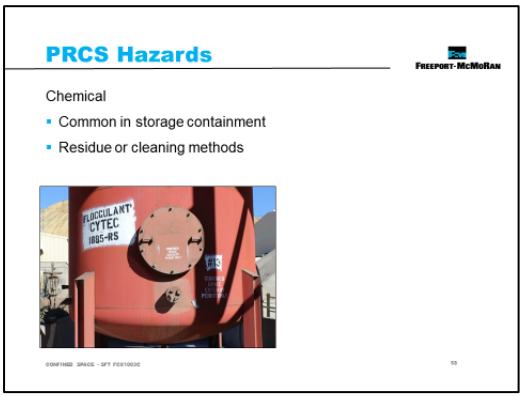
PPT slide 58, SG page 34



Instruction

- Liquids flowing into confined spaces create the potential for drowning and chemical exposures.
- If you find yourself entering a confined space that could potentially be under fluid pressure, ensure that you perform proper LOTOTO procedures.

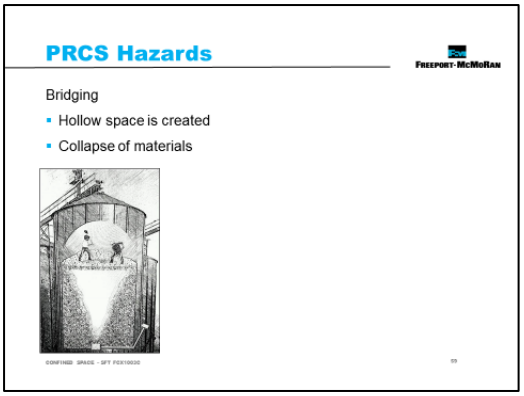
PPT slide 59, SG page 35



Instruction

- Chemical hazards in confined spaces are typical for storage containment.
- Residual material may not be compatible with cleaning solutions or methods may create potential hazards by causing a reaction or volatilization of chemicals.

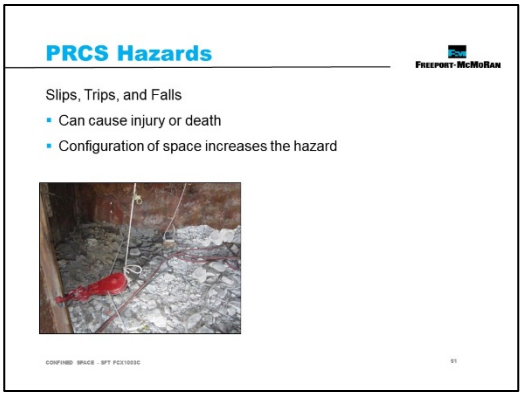
PPT slide 60, SG page 35



Instruction

- The size of the storage vessel and the amount of moisture in the stored materials are factors that contribute to bridging.
- If you are ever working in an area where engulfment or bridging could be a possible hazard, safety lines must be utilized.
- If chutes/feed lines become clogged, do not enter the bin unless necessary and attempt to resolve the situation remotely.
- If an entry is essential, ensure that you have looked at all of the potential hazards and have removed them before continuing.

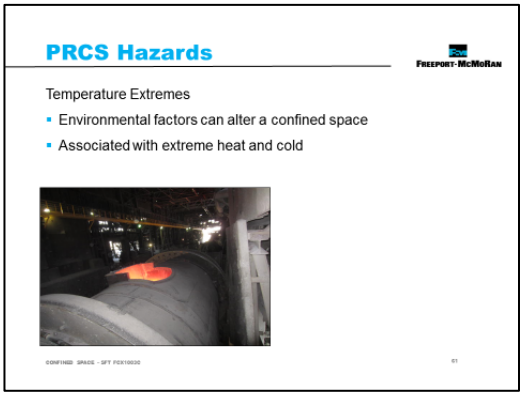
PPT slide 61, SG page 36



Instruction

- Be aware of:
  - Wet, oily and greasy ladders or surfaces.
  - Equipment, hoses, and internal structures.
- Solutions to mitigate the hazard:
  - All spills are cleaned up immediately.
  - Visual inspection is conducted.
  - Adequate illumination is provided.
  - Housekeeping is maintained.

PPT slide 62, SG page 37



Instruction

- In situations of extreme cold, your ability to use your hands effectively is substantially reduced. In circumstance like this, using tools may become more difficult and in turn, can result in injury

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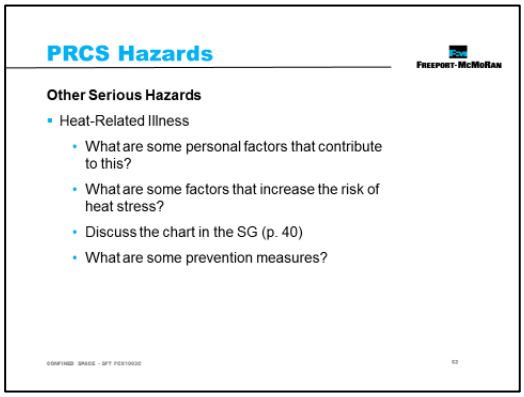
PPT slide 63, SG pages 37-40

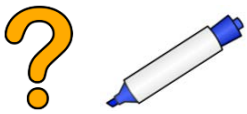


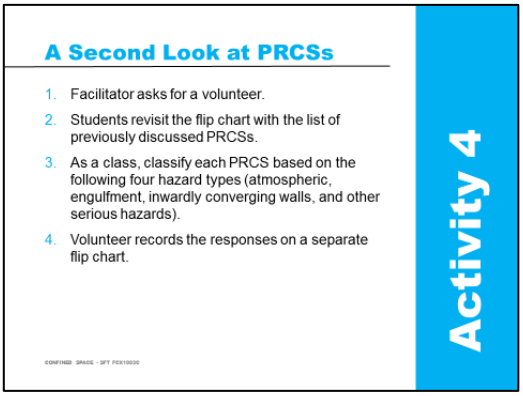
Instruction

- Factors - review the tables on page 38.
- Review the chart on page 39.
- Prevention measures
  - Acclimation
  - Drink lots of water/liquids
  - Monitor
  - Act quickly
  - Steady pace

ACTIVITY 4: A SECOND LOOK AT PRCSS

PPT slide 64





Time

Approximately 10 minutes

Materials

- Flip chart from Activity 3

Purpose

- This activity generates discussion about the hazards associated with each previously identified permit-required confined space.

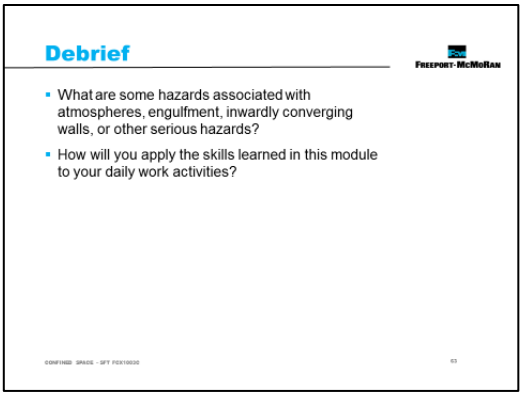
Instruction

1. Ask for a volunteer to record the class discussion on the flip chart.
2. Direct students' attention to the flip chart with the previously discussed PRCSs.
3. Ask the class to classify the previously discussed PRCSs based on the following four hazard types:
    a. Atmospheric.
    b. Engulfment.
    c. Inwardly converging walls.
    d. Other serious hazards.
4. The volunteer will capture the responses that classify each PRCS on the flip chart.
    a. Each space may contain more than one hazard.

PPT slide 65

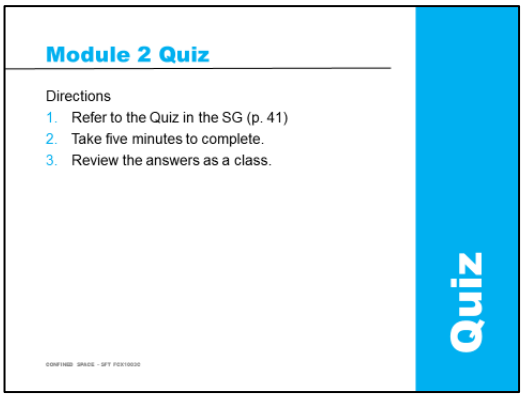
Introduction

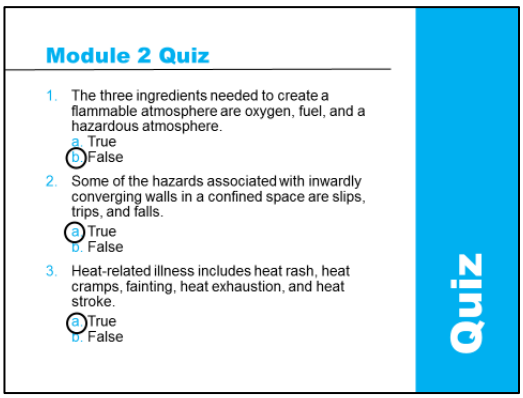
- Review the questions on the slide.
- This helps to review and refresh the information that was covered in this module.
- By asking the students to apply the information, they are further retaining the lesson.



MODULE 2 QUIZ

PPT slide 66-67, SG page 41





Instruction

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

Quiz Answers

1. Answer: b, SG page 24
2. Answer: a, SG page 32
3. Answer: a, SG page 38

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 3: CONTROLLING CONFINED SPACE HAZARDS

This module contains introductory information about the ways confined space hazards can be controlled.

Once you have identified a hazard, you must determine the best way to control it by either eliminating or reducing it to an acceptable level. Remember, acceptable entry conditions must be attained before entry and maintained throughout the duration. There are five levels of hazard control strategies used to mitigate hazards. They are listed below in the order of their effectiveness and are called the Hierarchy of Controls.

LEARNING OBJECTIVES

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

- Analyze a scenario, evaluate the hazards, and recommend controls.

ACTIVITIES

- Activity 5: Test the Space
- **A site-specific air monitor needs to be made available to inspect and pass around the class**

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 5.

TOTAL TEACHING TIME

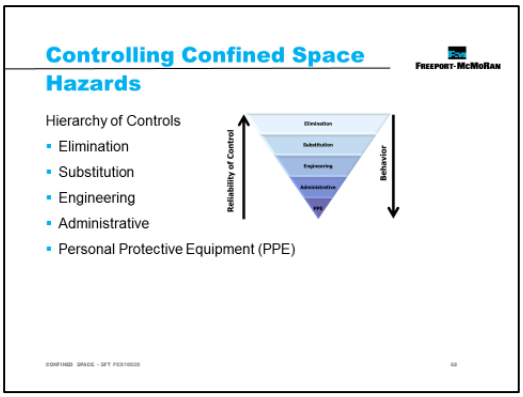
This module takes approximately 1 hour to complete.

PPT slide 68, SG page 45

Instruction

- Upon completion of this module, the students will be able to:
    - Analyze a scenario, evaluate the hazards, and recommend controls.

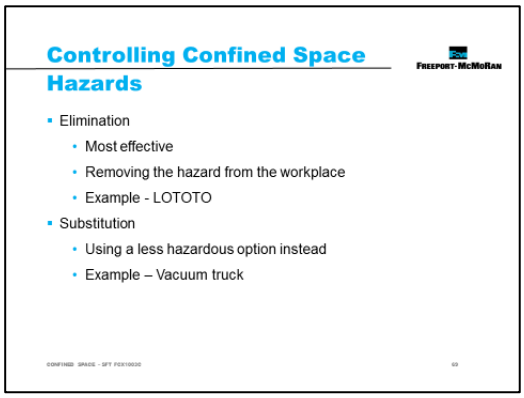
PPT slide 69, SG page 47



Instruction

- Discuss the controls as they apply to a confined space. This should be a review of the Hierarchy of Controls.
- Most of the hazards in our work areas come from some form of energy. Whether it is stored energy (suspended loads, pressurized lines, etc.); energy in motion (moving machine parts, vehicles, etc.); thermal energy (furnaces, boilers, roasters, etc.); electrical energy or others, all of them have one thing in common. They can be predicted. If a hazard can be predicted, it can be prevented.

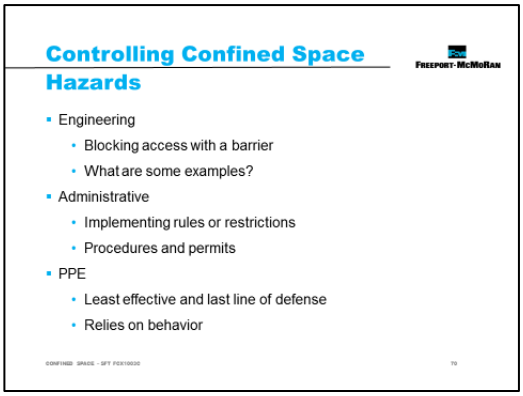
PPT slide 70, SG page 48



Instruction

- Review the control, its description, and example.
- Elimination is the process of removing the hazard from the workplace. Eliminate all hazards in the space, perform the task without ever entering the space, or control the hazards so the entrants can accomplish their tasks and exit the space safely. This control should be applied through Lockout-Tagout-Tryout (LOTOTO).
    - For example, disconnect, and LOTOTO all electrical energy sources of equipment in the confined space to eliminate the hazards; remove remnants of sludge and remove any potential trapped products or gases through continual cleaning.
- Substitution uses a less hazardous chemical, substance or practice in place of a highly hazardous one. Instead of entering a confined space to carry out an activity, consider the possibility of using alternative methods to do the job without entering.
    - For example, use a vacuum truck and an extended hose to suck out the sludge instead of entering the confined space to manually remove it.

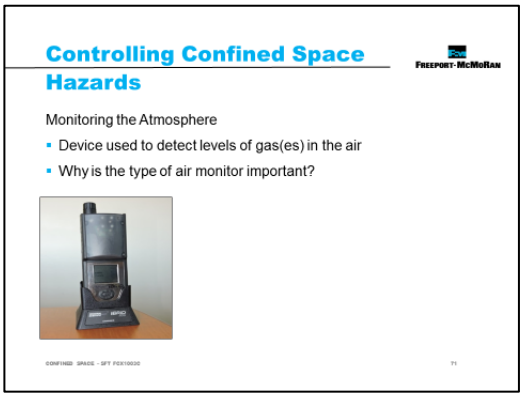
PPT slide 71, SG pages 48-50



Instruction

- Engineering controls focus on eliminating or reducing employees' exposure to the hazard. The basic concept behind this control is to block access to the hazard through some form of barrier.
    - Example: ventilation
- Administrative controls involve changing how or when employees do their jobs and control exposure to a hazard by implementing "rules."
    - The confined space procedures and permits are considered administrative controls.
    - Other examples are entry procedures and entry permits.

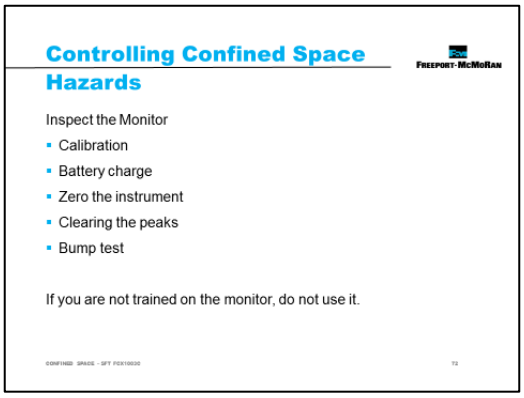
PPT slide 72, SG page 50-51



Instruction

- Each device is designed differently and has different sensitivities.
- While some are designed to detect only one type of gas, others can recognize three or more gases.
- When working in small areas, it does not take much gas at all to poison an individual, so confined space monitors are designed to detect even the smallest amount of gas. If the sensors of an air monitor detect a harmful atmospheric condition, the device sounds an alarm as a warning to alert the entry team.
- It is important that the monitor is designed to recognize the types of gases most likely to occur in your working area.
- Always speak with your area's Health and Safety representative when determining what type of air monitor to use and the acceptable entry conditions.

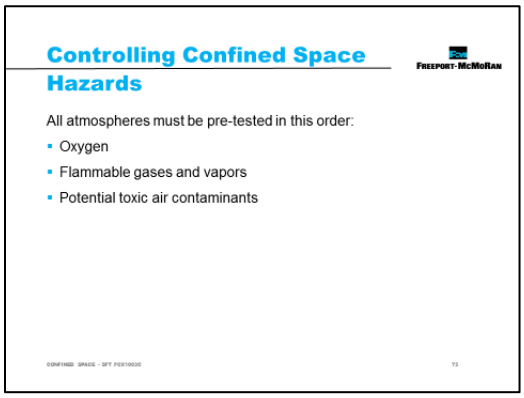
PPT slide 73, SG pages 51-52



Instruction

- Before operating an air monitor, it is important that you inspect it.
- **Ensure a site-specific air monitor is available to inspect and pass around the class.**
- Demonstrate the inspection to the class, then select a student to conduct the inspection.
- After both demonstrations are complete, pass the monitor around, allowing each student to handle it.

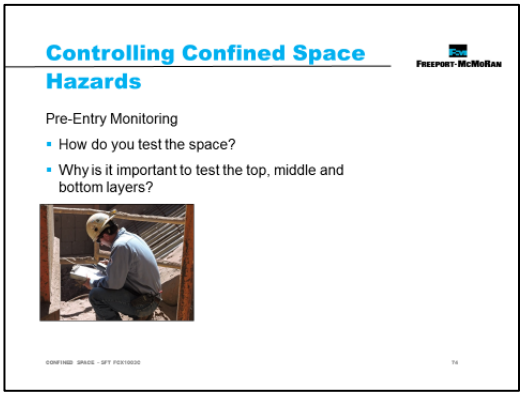
PPT slide 74, SG page 53



Instruction

- It is important that you pre-test confined spaces in the following order
    - Oxygen- is tested first because most air monitors are oxygen-dependent and will not work correctly when used in oxygen-deficient atmospheres. In addition, both oxygen-deficient and oxygen- enriched atmospheres are extremely hazardous.
    - Flammable gases and vapors- "are tested next because the threat of fire and explosion is both more immediate and more life-threatening, in most cases than exposure to toxic gases and vapors."
    - Potential toxic air contaminants- ensure you are knowledgeable about the materials you are using. Familiarize yourself with all SDSs, if chemicals are involved. Even if you are aware of the chemicals being used, you must also exercise caution in the environment. Due to the jobs being performed, some work areas can have airborne combustible dust, such as in the crusher, mill, etc.

PPT slide 75, SG page 53



Instruction

- If a potentially hazardous atmosphere exists in a space, test the atmosphere around the opening, and then gradually release/open the access-way while testing. If conditions indicate an immediate danger, back away to a safe point and then resume testing once levels have reached safe values. If your monitor alarms for any reason, immediately evacuate the space.
- Monitors are equipped with a probe that enables you to test the space several feet in front of you. This probe allows you to monitor a confined space without actually entering and lets you detect a hazard without being exposed. Pre-testing of the atmosphere should be through small cover openings or by cracking open the cover while utilizing a probe.
- Without entering, use the probe to reach farther into the confined space testing the top, middle and bottom. Remember, different gases have different properties and may be found in layers throughout your confined space.

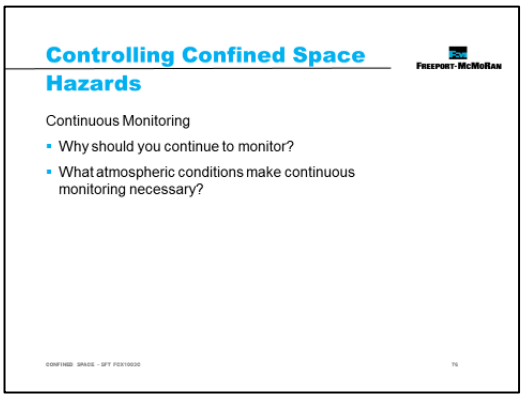
PPT slide 76, SG pages 54-55

Instruction

- Testing must occur in the areas surrounding the entrant, four feet in the direction of travel and to each side. As you move into the confined space, you must move slowly enough so that the monitor has time to complete the testing, keep this "response time" in mind before moving onto a new area.
- Review when you should test the space.
- Review the chart in the SG (page 55).

If…	Then…
The gas detector alarm goes off before I go into the space	Do not enter the space.
The gas detector registers an oxygen deficient flammable, or toxic potential, but it does not alarm	
The monitor alarm sounds while I am in the space	Evacuate the confined space immediately.

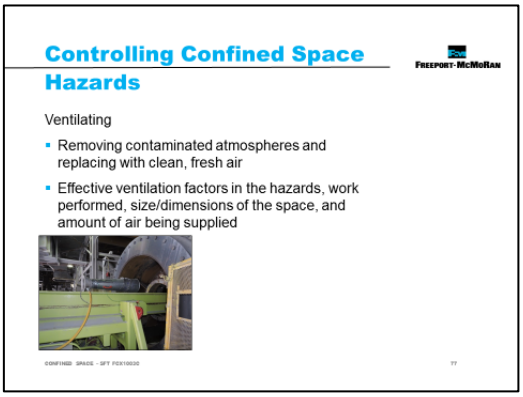
PPT slide 77, SG page 55



Instruction

- Continuous monitoring is necessary if:
  - The atmospheric hazards are not completely eliminated.
  - New or additional atmospheric hazards result from the tasks performed in the space.
  - Unacceptable atmospheric conditions could occur within the space, for example, due to activities or nearby processes.
- If any of these hazardous atmospheric conditions are present, you must continuously monitor:
  - Oxygen-rich/deficient
  - >10% of LEL/LFL
  - Toxic

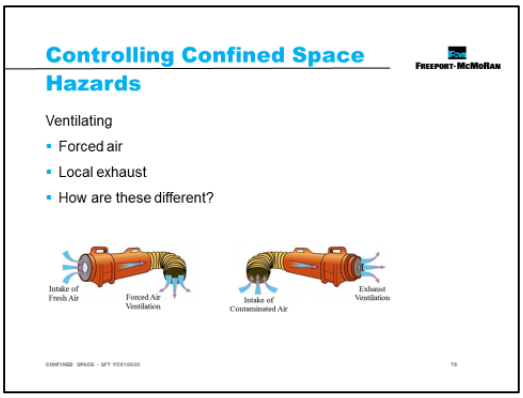
PPT slide 78, SG page 56



Instruction

- One of the primary reasons that confined spaces are so hazardous is the lack of adequate ventilation, which allows contaminants to reach concentrations that would not normally be experienced in open work areas.
- For effective ventilation to occur, the following needs to be accounted for:
  - Chemicals/residues
  - Type of work performed
  - Size and the dimensions (openings, blocks to air flow) of the confined space
  - Amount of air being supplied by the ventilation equipment
- The amount of time that is required to remove a hazardous atmosphere is dependent upon the size of the area, the concentrations of gases and the amount of air being ventilated.

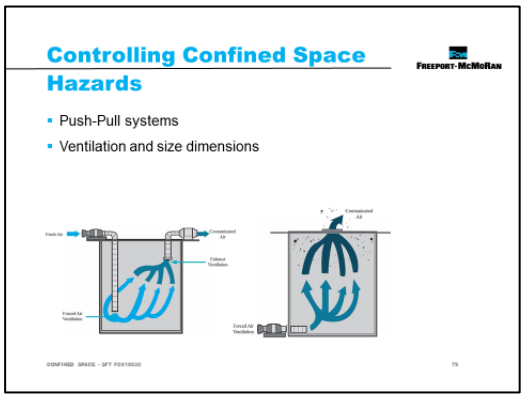
PPT slide 79, SG pages 57-58



Instruction

- Forced air ventilation works by moving (pushing) large quantities of fresh air into the space using blowers and flexible ducts. A constant supply of fresh air in enough quantity will maintain the level of oxygen within the space and dilute the level of contaminants released to acceptable levels.
- Local exhaust ventilation involves pulling air out of the confined space and in the process, removing the contaminants from inside the space. It draws air adjacent to the work, such as painting, and exhausts it to a safe area away from any access points.
- The difference between a forced air supply "push" system and a local exhaust "pull" system is that fans can "push" or blow air much farther than they can capture or "pull" it in.
- While local exhaust systems effectively remove hazardous fumes and dust generated from operations such as welding, cutting, burning, and continuous brazing at or near the point of generation, forced air (dilution) systems are much more effective. Forced air ventilation should be used as a primary source of air circulation or in conjunction with a local exhaust system called a Push-Pull system whenever possible.

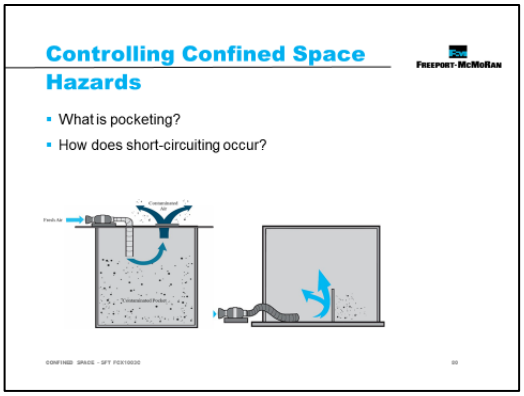
PPT slide 80, SG pages 58-59



Instruction

- Review the images on the slide.
- A push-pull system uses a combination of both forced air ventilation and local exhaust ventilation and is more efficient than using any using one ventilation system alone. The push-pull system introduces fresh air into the space while removing contaminants by exhausting them.
- When ventilating a confined space, always take into consideration the number of openings, size and configuration. For long or deep confined spaces, blow fresh air into one end (top, bottom, sides) and allow the contaminated air to exhaust from the other.

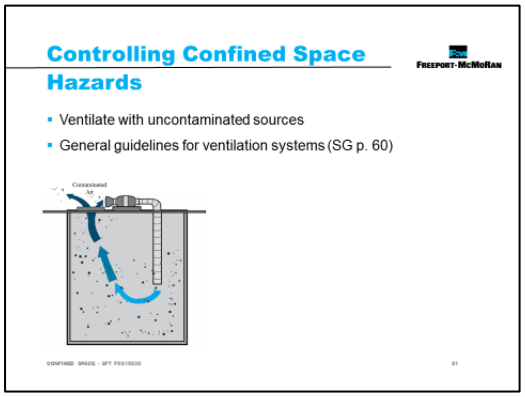
PPT slide 81, SG page 59



Instruction

- Be aware of walls, low-lying areas, secondary pits, etc. within the space as these areas may not become ventilated due to the obstructions. Make sure to ventilate the space thoroughly so that there are no contaminated pockets left, and then test the atmosphere routinely until levels stabilize at acceptable entry conditions.
- Prevent short-circuiting in a confined space that has only one opening by using a powerful blower to blow clean air into the entire space or a long ducting to reach the bottom of the space.

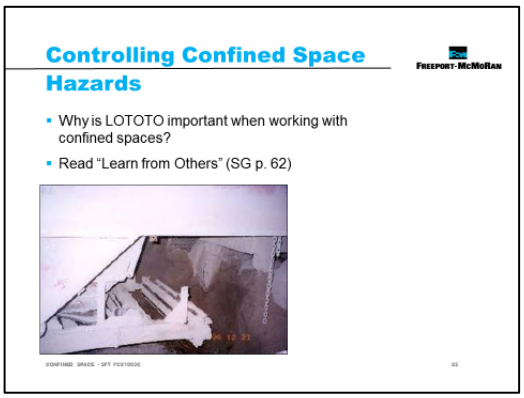
PPT slide 82, SG page 60



Instruction

- It is important to ensure that the air moving device, placed where the air is drawn into the confined space, is from a contaminant-free source. For example, it is not appropriate to set the air moving device next to a diesel generator vehicle, or compressor exhaust system where you could draw in one hazardous gas while exhausting another.
- Additionally, prevent re-circulation of exhaust air in a confined space by positioning the air intake away from the opening of a confined space.
- Always ventilate confined spaces with clean breathing air. Never ventilate with pure oxygen. Oxygen can increase the risk of fire and explosion.
- Review the guidelines in the SG page 60.

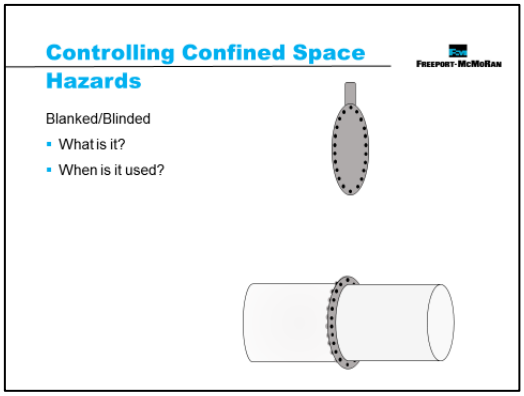
PPT slide 83, SG pages 61-62



Instruction

- This is to prevent materials from coming through pipelines or vents and to protect personnel from injury due to the unexpected energization, start-up or release of stored energy from the machines, equipment or processes while the entrant is inside. In all cases, a check is required to ensure isolation is effective.
- Accidents have occurred even when workers did take the necessary steps of disconnecting the main power source, but did not perform a crucial step for a complete lockout procedure. They failed to test the equipment to make sure the machinery was, in fact, de-energized.
- Allow the students a few minutes to read the "Learn from Others" (SG p. 62).

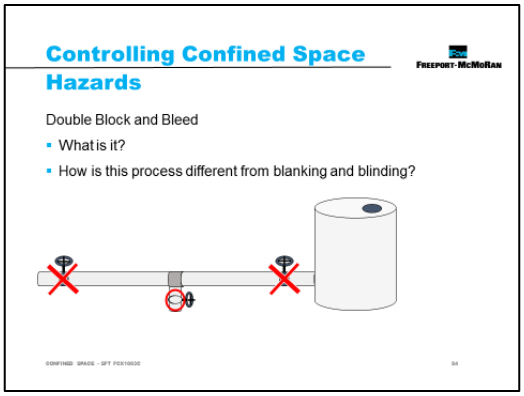
PPT slide 84, SG page 62



Instruction

- Show the animations on the slide by clicking the remote 5 times (or pressing the space bar).
- The blank or blind is the block that you put into the line or pipe at a joint. The pipeline is first bled to relieve and pressure. Flange bolts are removed to separate the pipes. The blank or slip blind, which is sometimes referred to as a pancake, is inserted between the two pipes and bolted. Blanks need to fit tightly with all bolts in place. They must be strong enough to withstand four times the pressure in the line.
- When the valve is locked-out, make sure it does not move more than a one-quarter turn (tryout). Once a line is blanked, lock-out the blank to show it shall not be removed.

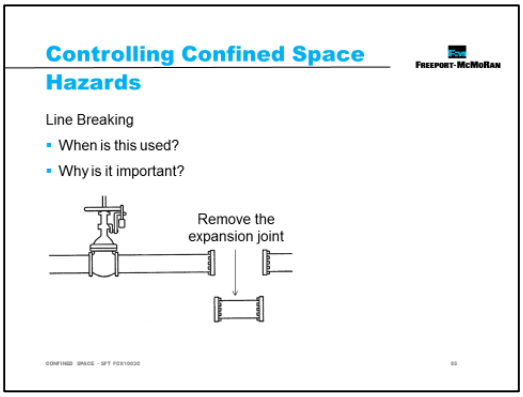
PPT slide 85, SG page 63



Instruction

- Show the animations on the slide by clicking the remote 3 times (or pressing the space bar).
  - X = double block
  - O = bleed
- Involves the use of a three-valve system when closing a line, duct, or pipe leading to the confined space being isolated. Two in-line valves are locked closed and then a drain valve, in between the two closed valves, is opened and locked so that material is prevented from flowing and drains in case of a valve leak.
- The process by which a PRCS is removed from service, and completely protected against the release of energy and material in the space.

PPT slide 86, SG page 63



Instruction

- Line breaking is another alternative to removing a spool section (or an expansion joint) of a pipe duct.
- By placing a lock through the bolt hole, you are preventing accidental re-sectioning and performing a LOTOTO of the line.

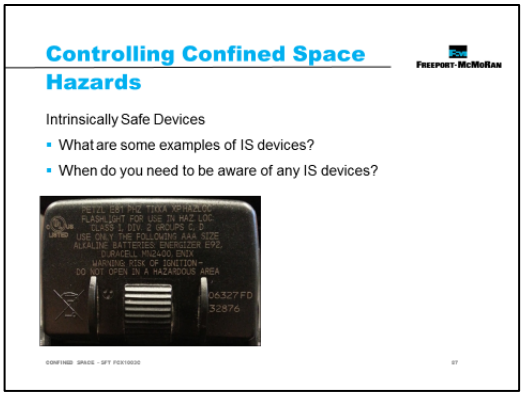
PPT slide 87

Instruction

- The 5 minute video will start when clicked.
- This video is a demonstration of blanked/blinded, double block and bleed, and LOTOTO.

https://web.microsoftstream.com/video/61e724d3-4368-4dd0-8fa0-0338184c9f08

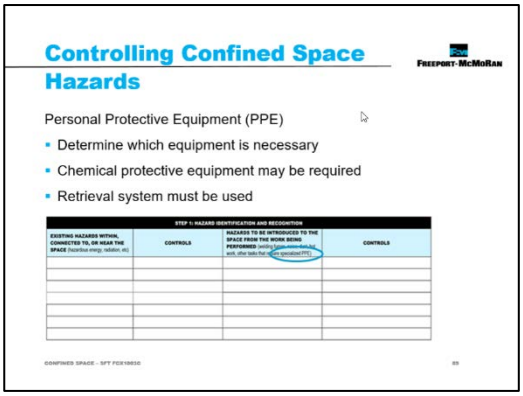
PPT slide 88, SG page 64



Instruction

- Electrical equipment of any kind can produce a spark that could potentially ignite vapors. If working with these products, electrical equipment must be rated as intrinsically safe.
- Intrinsically Safe (IS): An intrinsically safe device is designed to not introduce a source of ignition (spark).
- Electrical equipment must be IS rated if used in any areas where a flammable atmosphere could exist.

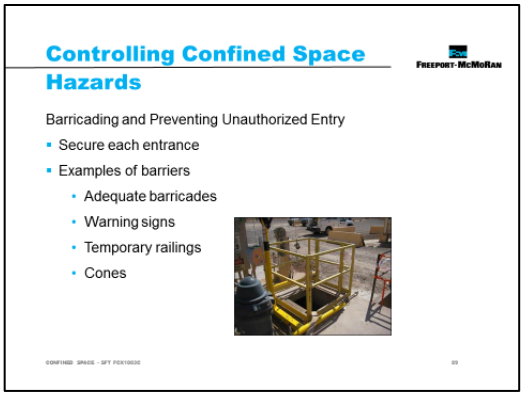
PPT slide 89, SG pages 64-65



Instruction

- All required equipment must be listed on the confined space entry permit. Remember, PPE should only be used as a last resort when controlling or reducing a hazard.
- PPE requirements vary greatly between entries but at a minimum include proper head, and eye protection and safety footwear. It may also include rubber boots, chemical protective clothing, fall protection, hearing protection, distress alarms, and respirators (either for specific hazards present or for escape).
- The PPE you wear while working within a confined space is determined by the hazards of the space. Any PPE needed to complete the entry safely must be recorded on the entry permit. PPE used for confined space entry can range from ordinary work clothes to a fully encapsulated chemical protective suit. Always read chemical labels and SDS sheets. Speak with your area's health and safety representative when deciding what chemical protective clothing may be required.
- In order to conduct a non-entry rescue in a PRCS, a full body harness and rescue line must be worn by the entrant at all times.
- If the entry supervisor determines the use of the full body harness and rescue line is infeasible or creates a greater hazard, an exemption to the policy must be requested and approved in a task review.
- Retrieval lines must also be attached to the safety harness when its use could assist with a possible rescue, and it does not create an additional hazard during the entry.

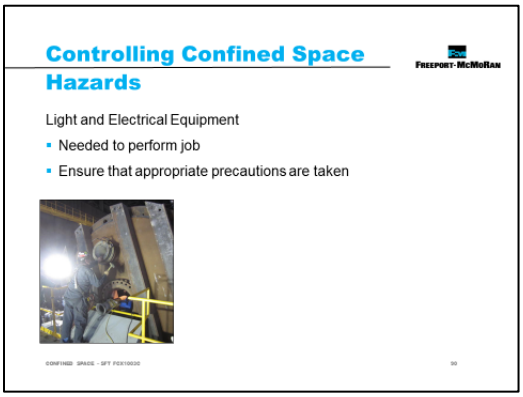
PPT slide 90, SG page 66



Instruction

- Whether you are working in a PRCS or a NPRCS, it is imperative that you adequately secure each entrance to the confined space against unauthorized or accidental entry.
- Examples include adequate barricades, appropriate warning signs, temporary railing, cones or other devices or any combination around the space.
- Selection of suitable barriers will depend on the nature of the hazard and the size of the area or equipment to be cordoned off.

PPT slide 91, SG page 67

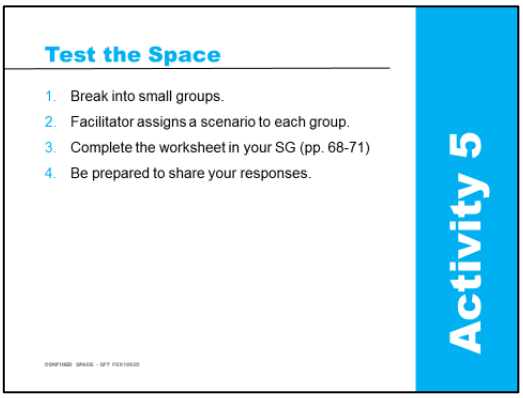


Instruction

- One of the drawbacks of a confined space is the lack of natural lighting.
- Ensure that entrants are provided with enough light to properly perform their jobs. Low voltage lighting is preferred when performing a confined space entry.
- Lighting equipment must be rated for explosive atmospheres if the potential for explosive atmospheres exists.
- A wet surface will increase the likelihood and effect of electric shock in areas where electrical circuits, equipment and tools are used. If wet or damp conditions exist inside the confined space, all electrical equipment must be GFCI protected and tested before each entry.

ACTIVITY 5: TEST THE SPACE

PPT slide 92, SG pages 68-70



Time
Approximately 10 minutes

Materials

- Worksheet located in the SG (pages 68-71)

Purpose

- This activity allows students the opportunity to analyze an assigned scenario, review the properties of the gas, and answer specific questions about monitoring and controlling for that gas.

Instruction

1. Direct the class to break into groups.
2. There are four possible scenarios for this activity. Assign one scenario to each group.
    a. If there are more than four groups, it is acceptable to assign multiple groups to the same scenario.
    b. In this situation, each group will still work independent of the other group with the same scenario.
3. Allow 10 minutes for each group to complete the worksheet.
4. Discuss responses as a class for each scenario.

Answer key
Argon

1. Inert gas, simple asphyxiant. It could displace oxygen.
2. Bottom/lower strata of confined space. Argon is heavier than air and will tend to settle in low areas.
3. Use a gas tester to continuously monitor oxygen content in space. Attendant should also be aware of and monitor for signs and symptoms of exposure.
4. Perform welding outside confined space, if feasible. If not, inspect hoses for leaks prior to entering. Place argon cylinder outside of space in a secure area. Remove hoses immediately after completing task. Do not leave hoses unattended inside space, i.e. during lunch or other breaks. Use local exhaust ventilation and/or forced air ventilation.

Hydrogen Sulfide

1. Hydrogen sulfide could be present due to anaerobic digestion of organic matter, creating a toxic and/or explosive atmosphere.
2. Bottom/lower strata of confined space. H_2S is heavier than air and will tend to settle in low areas.
3. Use of a gas tester with sensors and calibrated to detect H_2S is mandatory (do not rely on testing for explosive atmospheres). Attendant and entrants should also be aware of and monitor for odor, as well as early signs and symptoms of exposure.
4. Forced air ventilation and continuous monitoring to establish and maintain acceptable entry conditions.

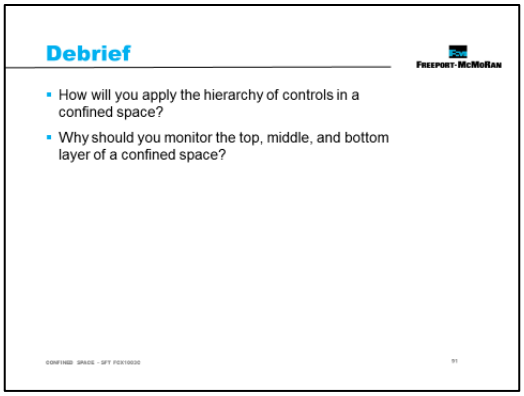
Acetylene

1. Acetylene can create an explosive atmosphere. It may also become a simple asphyxiant. Additionally, pure oxygen from an O_2 tank could create an oxygen-enriched environment, increasing the fire/explosion hazard.
2. Bottom/lower strata of confined space. Acetylene is lighter than air and will tend to settle in low areas.
3. Use of a gas tester set and calibrated to detect explosive atmospheres (LEL).
4. Forced air ventilation and continuous monitoring to establish and maintain acceptable entry conditions. Inspect hoses for leaks prior to entering. Place acetylene cylinder upright outside of confined space in a secure area. Remove hoses immediately after completing the task. Do not leave hoses unattended inside space, i.e. during lunch or other breaks. Use local exhaust ventilation and/or forced air ventilation.

PPT slide 93

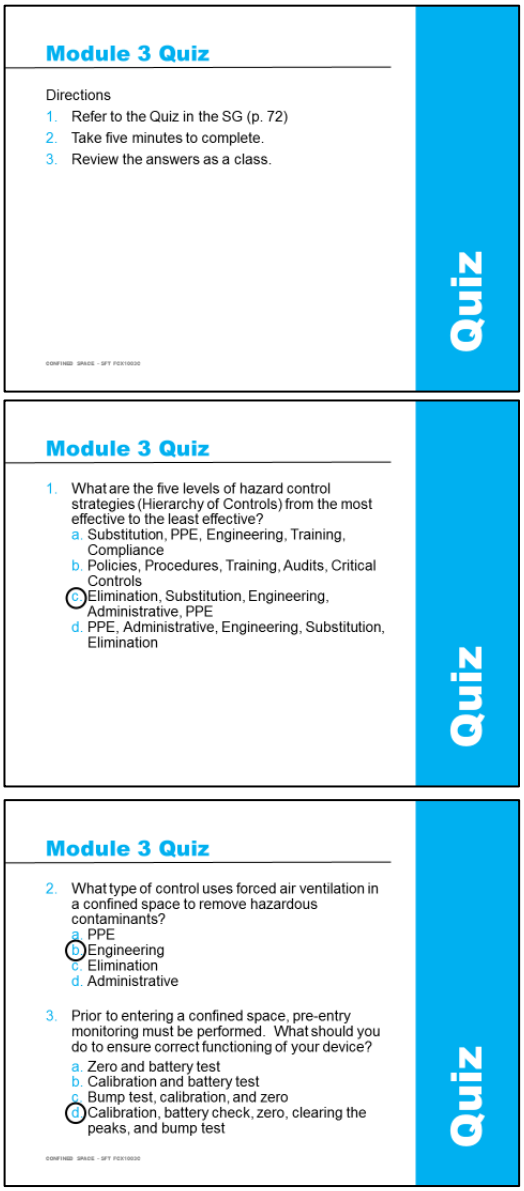
Instruction

- Review the questions on the slide.
- This helps to review and refresh the information that was covered in this module.
- By asking the students to apply the information, they are further retaining the lesson.



MODULE 3 QUIZ

PPT slide 94-96, SG page 71



Instruction

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

Quiz Answers

1. Answer: c, SG page 47
2. Answer: b, SG page 48
3. Answer: d, SG page 51

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: ENTERING A CONFINED SPACE

This module contains introductory information about the process for entering a confined space.

A confined space entry is considered to have occurred when any part of a person's body crosses the plane of an opening into the space. Before an “entry” can occur, make sure you have followed all applicable procedures.

Entries into a confined space may be for a variety of reasons. They are usually completed to perform a necessary function, such as an inspection, repair, maintenance (cleaning or painting), or similar operation which may be scheduled on a routine or non-routine basis, depending upon which site and department you are working for.

LEARNING OBJECTIVES

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

- Demonstrate the process for entering a confined space.

ACTIVITIES

- Activity 6: Completing the Permit

For further details, refer to “Activity Materials” under “Facilitator Preparation” on page 5.

TOTAL TEACHING TIME

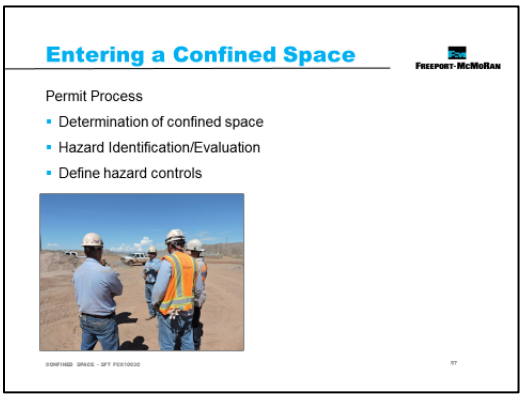
This module takes approximately 1 hour to complete.

PPT slide 97, SG page 75

Instruction

- Upon completion of this module, the students will be able to:
    - Demonstrate the process for entering a confined space.

PPT slide 98, SG pages 77-80



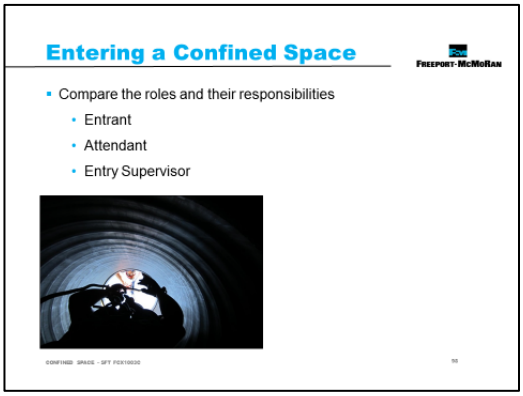
Instruction

- When entrance into a confined space is required, follow the procedures. Always adhere to any existing safe operating procedures (SOPs) for the space being entered. Ensure that everyone who is part of the confined space entry team has been appropriately trained and signed off.
- Treat all confined spaces as permit required until it has been determined otherwise.
- The first step in entering a confined space will always be the evaluation. As you evaluate the space, you are outlining and defining all of the acceptable entry conditions. This includes determining whether the space will be classified as a NPRCS or a PRCS, if it has not already been completed.
- It is important to be able to define and plan how to directly address identified hazards, suitable procedures, and specific steps that must be followed to adequately control the hazards. The plan and the controls you put in place which keep you safe are called acceptable entry conditions.
- Two forms which will help you develop and ensure these acceptable entry conditions are in place are the Confined Space Policy and Technical Supplement and the Confined Space Entry Permit.
- If you are ever in doubt regarding the classification of your space as NPRCS or PRCS, always use the confined space entry permit and procedures. Additionally, follow any other existing safe operating procedures for the space being entered and ensure that all employees who are part of your confined space entry team are trained in confined space entry.

Continued on next page

- When completing a confined space entry permit, ensure that you are reviewing your site's Hazard Identification Risk Assessment and Determination of Controls (HIRADC), sometimes referred to as a Risk Register, as the confined space may have previously been identified by your department. This register will help you by providing a list of hazards which are identified, as well as the controls that are necessary to remove them.
- Never enter a space or continue working within a confined space without ensuring that acceptable entry conditions are constantly in place.

PPT slide 99, SG pages 81-86



Instruction

- The entry team is the group of employees assigned to complete a task within a confined space.
- A typical entry team consists of an entrant, an attendant, and the entry supervisor. For any PRCS entry, a minimum of two individuals are necessary.
- These individuals are classified as either the:
  - Entrant (the individual entering the confined space)
  - Attendant (the individual staying outside of the confined space)
- Review the chart (located in the SG) for each role.

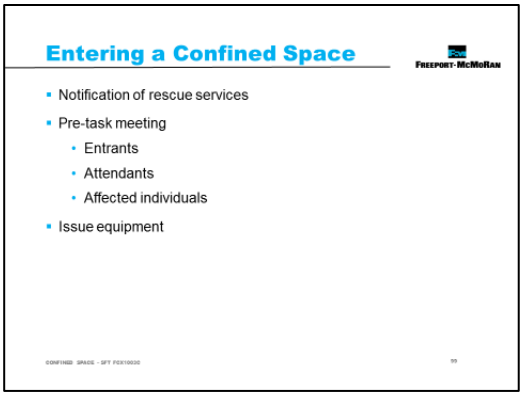
Continued on the next page

Entrant Responsibilities	Description
Communicate with Attendant	• Maintain communication with the attendant throughout the entry, alert the attendant, and exit the space where there are warning signs or symptoms of exposure to a hazardous situation, or any “red flags” are detected
Inspect for Hazards	• Inspect for hazards not previously identified during initial entry and if any arise, call for the entry team to evacuate the space until they are communicated and controlled
Stop Work and Evacuate the Space	• Immediately exit the confined space whenever o Air monitor alarms o Air monitor stops functioning normally o Uncontrolled hazard is suspected or observed o Any entrant experiences signs or symptoms of exposure to hazards o Communication link between the entrant and attendant is broken o Conditions outside the space threaten the entrant or attendant o Attendant calls for an evacuation
Wear Designated PPE	• Each authorized entrant into a PRCS must o Properly use designated equipment o Use a full body harness at all times o Use a retrieval line attached to the safety harness o Wear all required PPE

Attendant Responsibilities	Description
Control PRCS Access	• Continuously maintain an accurate count of authorized entrants by name in the PRCS. • Do not allow unauthorized persons to enter the area.
Communicate with Entrants	• Communicate with the authorized entrants at all times to monitor entrant status and to alert the entrants of the need to evacuate the space.
Monitor Entrant Activities	• Monitor entrant and working area to ensure acceptable entry conditions are maintained. • Watch for o Any hazards inside or outside of the confined space. o Entrants showing any signs or symptoms of exposure to hazards.
Maintain Retrieval Lines	• Tend any retrieval lines used in entry. • Ensure that lifelines remain taut when entrants enter spaces where unconsolidated material is stored, handled, or transferred.
Stop Work and Evacuate the Space	• Immediately stop work and evacuate the space when any one of the following takes place o The attendant detects • A non-acceptable entry condition. • Behavior changes in entrants. • A situation outside the confined space that may endanger the entry team. o The air monitor alarms. o Any new or uncontrolled hazards are introduced
Manage Emergency Situations	• If an emergency arises o Immediately call for the entrants to evacuate the space. o Call for emergency assistance, if necessary. o Initiate non-entry rescue. o Prevent unauthorized rescuers from entering the space.

Entry Supervisor Responsibilities	Description
Define All Risks and Controls	• Establish in writing all acceptable entry conditions listing all the hazards and the procedures, actions, controls, and equipment needed to ensure a safe entry on the permit (Include any hazards that may result from the work being performed).
Conduct Pre-Entry Meeting	• Conduct a pre-entry meeting to ensure that all hazards and associated controls have been established and that they have been communicated with all individuals involved or impacted.
Ensure Complete Atmospheric Testing	• Ensure that the required atmospheric tests are o Conducted and recorded in alignment with the monitoring procedures in the policy to classify the space. o Conducted immediately prior to the entry to accurately reflect conditions at time of entry. o Conducted throughout the entry, if required.
Verify Entry Team Training	• Ensure all members have been trained in Confined Space entries.
Ensure Rescue Team Training	• Ensure that rescue services have been notified and are available, and that the means for summoning them are operable.
Verify Safe Entry Conditions	• Ensure acceptable entry conditions (procedures, equipment, and resources) are in place before anyone enters the space and that conditions remain safe throughout the entry.
Maintain Confined Space Permit	• Maintain the confined space permit o Authorize entry by signing the entry permit after all conditions for space entry have been met. o Post the completed, signed permit at the entrance to the space. o Terminate the entry and cancel the permit when entry operations are complete or when uncontrolled hazards arise in or near the permit space. o File the original cancelled permit with the appropriate department.
Evacuate Space, if IDLH Conditions Exist	• If hazardous conditions arise that are IDLH, immediately evacuate the space and cancel the permit.

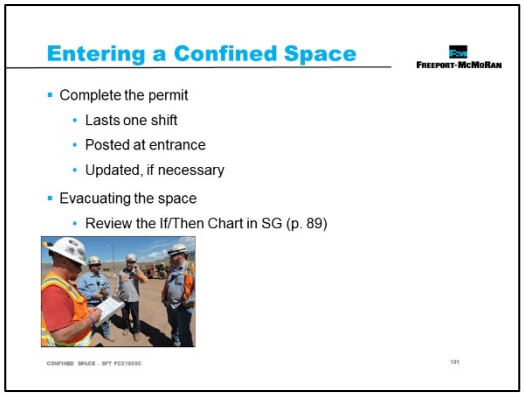
PPT slide 100, SG pages 87



Instruction

- Rescue services must be notified of any planned entry into a PRCS, which ensures their availability and informs them of the location and hazards involved. Some sites may rely on main gates, dispatch, control rooms, or security to act as a connection between the entry team and rescue services. Ensure that any group who acts in this manner has made contact and verified rescue services are available and on standby. Ensure that you know your site specific requirements.
- Once your entry team has been designated, the entry supervisor will perform a pre-task meeting for all entrants, attendants, and any other employees who may affect conditions of the confined space to explain the hazards, acceptable entry conditions, required PPE, testing and all communication procedures.
- Ensure the required equipment is available.

PPT slide 101, SG pages 88-89



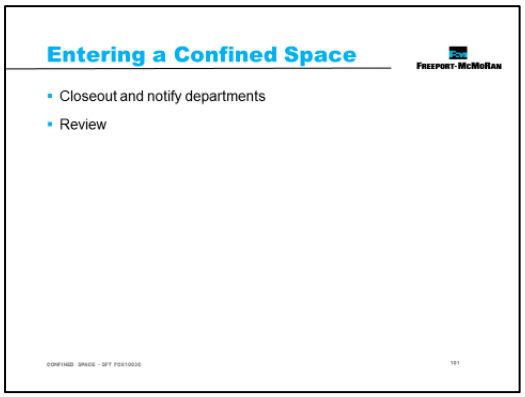
Instruction

- Complete the permit and keep a copy posted at the space. A new permit must be completed at the start of each shift and/or when the entry crew changes.
- The permit will be updated anytime safety or health conditions inside the space change during entry. Safe entry into a confined space is dependent upon effectively controlling all aspects of the job.
- This permit is a safety checklist to make sure nothing is overlooked.

Continued on next page

If…	Then…
Atmospheric monitor detects an atmosphere that falls outside of the acceptable entry conditions	**All entrants <u>must</u> immediately evacuate the confined space and permit must be canceled.**
The monitor stops functioning normally	
The monitor alarm sounds while I am in the space	
An uncontrolled hazard is suspected or observed	
An entrant experiences signs or symptoms of exposure to hazards	
The communication link between the entrant and attendant is broken	
When conditions outside the space threaten the entrants or attendant	
The attendant calls for an evacuation	

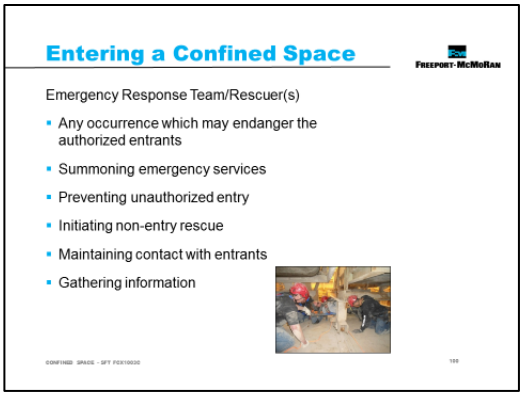
PPT slide 102, SG pages 89-90



Introduction

- Notify the appropriate departments and rescue services after entry operations are complete. Contact the main gate, control room, etc. so that rescue services are now able to stand-down.
- Review the entry operations to determine if measures taken were adequate to protect employees. If evacuations were necessary, or additional hazards identified during the entry, ensure that these issues are communicated with management and your health and safety representative. In this way, these items can be included in future hazard assessments and communicated to other co-workers who may enter the space.

PPT slide 103, SG pages 90-91



Instruction

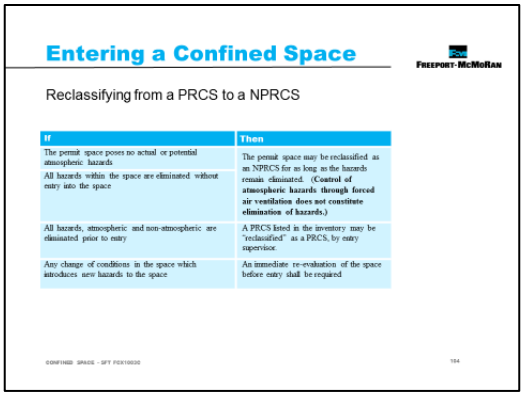
- If an emergency occurs within a confined space, it is imperative that everyone on the confined space entry team knows what to do.
- A confined space emergency is any occurrence inside or outside the space, including failure of hazard control or monitoring equipment, which may endanger the authorized entrants.
- The period of time for successful rescue is very limited. While the attendant's job during a confined space entry may seem unimportant, when an emergency situation arises how you react may be the deciding factor on whether a rescue attempt is successful or becomes body retrieval. The job of the attendant, in an emergency, is not to personally rescue the victims, but to implement the rescue plan.

1. **Summoning Emergency Services** - As soon as you determine that entrants may need assistance to escape from any confined space, follow your plan and call for help.
2. **Preventing Unauthorized Entry** - Do not enter the space. Keep others from entering if they have not been trained as a Confined Space Rescuer.
3. **Initiating Non-Entry Rescue** - Utilize retrieval lines, to remotely rescue the attendants within the space. For horizontal, level entry, this may be a harness and lifeline tied to a fixed object outside the space. For vertical entry, an approved rescue hoist device is required.

   Non-entry retrieval should not be initiated if:
   - There is no visual or verbal confirmation that the entrant can be moved safely.
   - The employee cannot be seen or communicated with.
   - There are physical hazards in the retrieval path that could injure the entrant or inhibit the retrieval process; for example life lines have become entangled.
4. **Maintaining Contact with Entrants** - If possible, maintain contact with entrants. Assure them that help is on the way and keep them calm.

5. **Gathering Information** - When rescue services arrive, it is imperative that they are provided with up to date information regarding:
   - The hazards within the space.
   - The number and condition of the entrants.
   - Any related mechanical or system information that may prove useful to the rescue.

PPT slide 104, SG pages 92

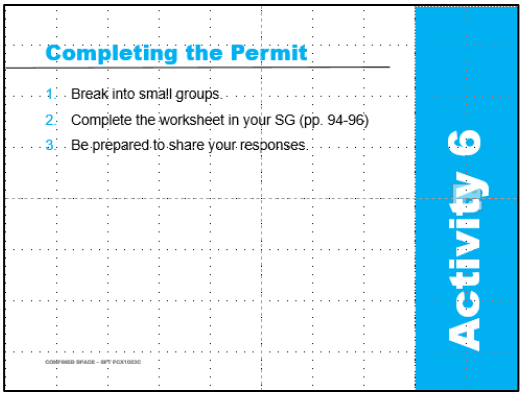


Introduction

- Any change of conditions in the space which introduces new hazards to the space shall require an immediate re-evaluation of the space before entry.
- Always assume that a confined space is Permit-Required. When reclassifying the space to Non-Permit Required, document that all hazards in the space have been eliminated.
- Use the first step of the Confined Space Entry Permit, the site's Risk Assessment, HIRADC or another form that contains:
  - The date.
  - The location of the space.
  - The reasons for the determination.
  - The signature of the person making the determination.
  - This document shall be made available to each employee enter the space.

ACTIVITY 6: COMPLETING THE PERMIT

PPT slide 105, SG pages 93-98



Time
Approximately 15 minutes

Materials

- Worksheet located in the SG (pp. 94-99)
- **Ensure you have a confined space permit available for each student.**

Purpose

- This activity allows students to apply all of their knowledge gained, analyze a scenario, and complete a confined space permit.

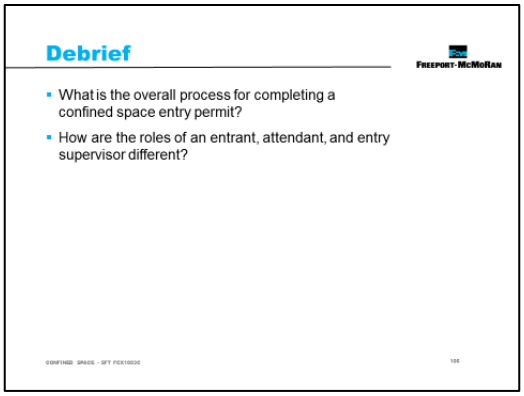
Instruction

1. Direct the class to break into groups.
2. Allow 10 minutes for each group to complete the worksheet (located in the SG).
3. Discuss responses as a class for each section of the confined space permit.

PPT slide 106

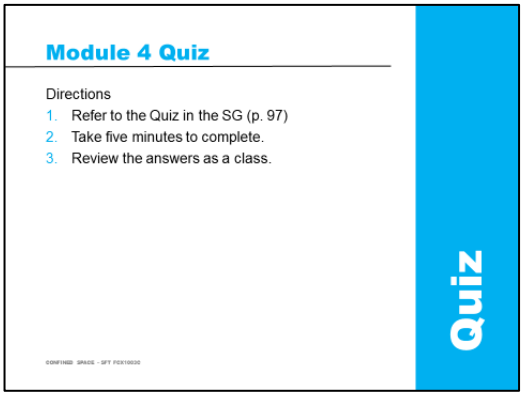
Introduction

- Review the questions on the slide.
- This helps to review and refresh the information that was covered in this module.
- By asking the students to apply the information, they are further retaining the lesson.



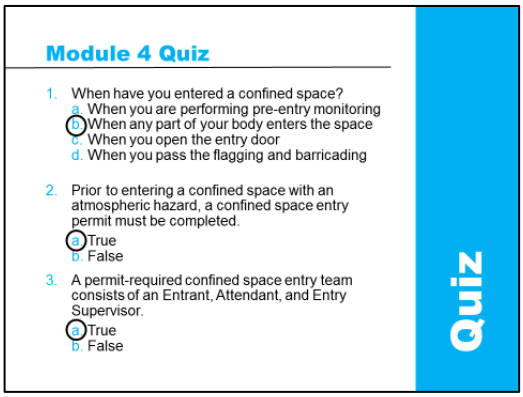
MODULE 4 QUIZ

PPT slide 107-108, SG page 99



Instruction

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



Quiz Answers

1. Answer: b, SG page 79
2. Answer: a, SG page 81
3. Answer: a, SG page 83

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

Ultimately every confined space entry is different. Recognize the hazards before entering your confined spaces, and remember "**Predictable = Preventable**." If you have the proper procedures in place and you follow them, even if something goes wrong, the situation can be controlled. By developing a well thought out plan defining the acceptable entry conditions and communicating the steps needed to ensure you and your co-workers safety, lives can be saved. Ask tough questions that might reveal problem areas, and then ensure corrections are made.

By making sure that no production need is ever more important than you and your co-worker's safety, we can ensure that everyone makes it home safely. Working safely is more than a condition of employment, it is our livelihood.

After the successful completion of this course, you will have satisfied the training requirements for the roles of Entrant, Attendant, and Entry Supervisor.

ACTIVITIES

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

For further details, refer to "Activity Materials" under "Facilitator Preparation" on page 5.

TOTAL TEACHING TIME

The conclusion takes approximately 1 hour to complete.

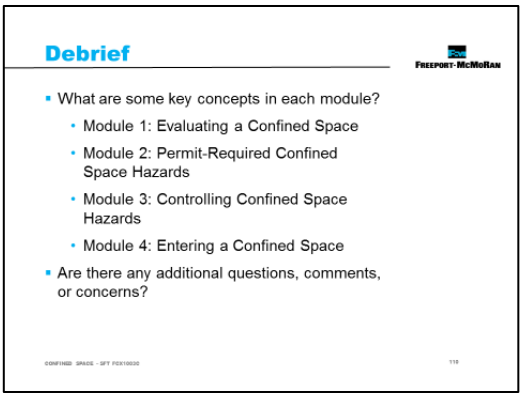
PPT slide 109

Instruction

- Complete a final review session

PPT slide 110

Instruction

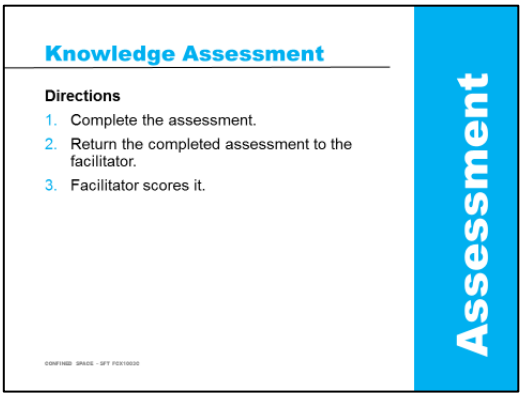


- As the objectives for each module are reviewed, ask if there are any lingering questions, comments, or concerns.
- Module 1
  - Categorize confined spaces, based on the criteria.
  - Discuss the characteristics of a permit required confined space.
- Module 2
  - Discuss hazards associated with permit-required confined spaces.
- Module 3
  - Analyze a scenario, evaluate the hazards, and recommend controls.
- Module 4
  - Demonstrate the process for entering a confined space.

PPT slide 111

Instruction

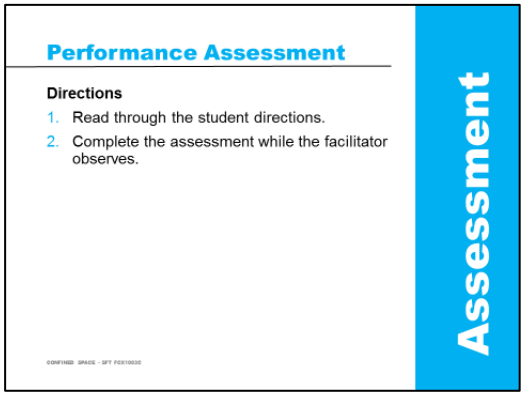
- Have students complete the knowledge assessment.



PPT slide 112

Instruction

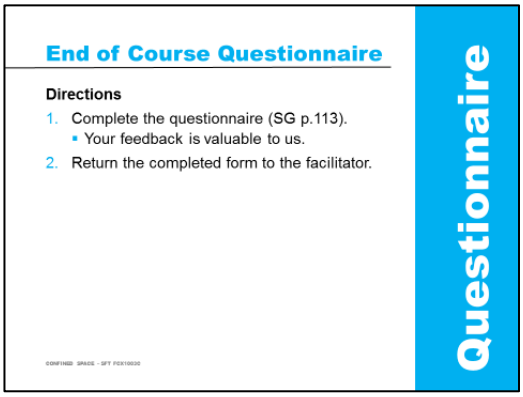
- Have students complete the performance assessment (see the assessment for further details).



PPT slide 113, SG page 113

Instruction

- Have students complete the Student End of Course Questionnaire (in SG p. 113).



FACILITATOR FEEDBACK SURVEY

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