TAKE TIME FOR SAFETY

"Hazards of Confined Spaces"

Trainer Outline

1. **This safety session should teach employees to:**
   - Know the characteristics and hazards of confined spaces
   - Understand how to follow confined space rules and regulations to protect themselves.

   Every so often you may be asked to enter a confined space. This presents special hazards. If these hazards are not controlled, the result can be serious injury or even death from asphyxiation, toxic or flammable gas exposure, mechanical hazards, untrained rescuers and electrocution.

2. **OSHA defines confined spaces as work areas:**
   - Large enough to enter and work in
   - With limited entry and exit areas
   - Not designed to be occupied for extended periods
   - Examples are tanks, silos, storage bins, hoppers, utility vaults, pits, furnaces, boilers, tunnels, trenches, sewer manholes, pipelines, crawl spaces, process vessels or underground areas
   - Confined space tasks include cleaning, painting, welding, scraping, performing repairs or maintenance
   - A **permit-required confined space** has or has the potential to have recognized serious hazard(s).

3. **Employers must test confined spaces to determine if they're hazardous**
   Failing to identify hazards and take precautions causes thousands of serious injuries, and sometimes deaths, in confined spaces. In permit-required confined spaces, OSHA allows work only with written permits, entry limits, and specific employee rules and practices. Certain hazards create permit-required confined spaces including:
   - Hazardous atmosphere, or potential for one
   - Material that could potentially engulf a person in the space.
   - Slanting walls, or sloped or tapering floor that could trap or asphyxiate an entrant
   - Any other recognized serious safety or health hazard

4. **A confined space's atmosphere may make it hazardous**
   Employees could risk death or serious illness, become incapacitated, or have trouble escaping if the confined space's atmosphere contains:
   - Levels of flammable gas, vapor, or mist more than 10 percent of their lower flammable limits
   - Airborne dust levels at or above their flammable limits, permissible exposure limits (PELs), or that prevents visibility of less than 5 feet
   - Oxygen concentration above 23.5 percent or below 19.5 percent.
   - Any condition immediately dangerous to life or health that could threaten life, cause irreversible health problems, or make it difficult to escape the space without help

5. **A confined space's atmosphere may pose fire, explosion and toxicity risks**
   Anything that could burn or explode (gasoline, methane, dust) is more likely to do so in a confined space.
   - These substances can be ignited by smoking, grinding or welding sparks, unapproved electrical equipment, or metal friction, even from nails in shoes.
   - Inhaling toxic substances such as carbon monoxide, hydrogen sulfide, or sulfur dioxide above their PELs can cause illness, suffocation, or even death.

6. **Too much or too little oxygen is a major confined space hazard.**
   - Oxygen levels over 23.5 percent create a serious fire or explosion risk
   - Oxygen levels below 19.5 percent are a dangerous health risk – 16 percent can cause drowsiness and nausea; 12 percent leads to unconsciousness; and six percent results in death
   - Methane, carbon dioxide, nitrogen, corrosion, or rust can displace oxygen

7. **A confined space may be hazardous because of engulfment potential.**
   A person could be covered, buried, or smothered in a space that contains a liquid, or a flowing solid such as sand or grain.

8. **A confined space may be hazardous because of an entrapping design.**
   If a space's walls curve in or its floors slope and taper down, you could:
   - Slip or fall into a space that is too tight to escape.
   - Get pushed into machinery in the space

9. **Confined spaces may have physical hazards**
   - Heat can build up and create the danger of exhaustion or heat stroke
   - Falls can be fatal if you're trapped with a serious injury, if you're in a toxic or low oxygen area, or of you can't get a foothold on floors or a grip on handholds to get out
   - Noise bounces off walls in confined spaces. This makes it hard to hear directions or warnings and creates the risk of hearing damage.
   - Power equipment creates injury, electrocution, fire, and explosion risks. That's why power is turned off, equipment is locked out, and pipes and valves are turned off, blocked and bled before entering.

10. **Safe procedures:**
    - Test all levels for hazardous atmospheres with calibrated equipment inside the confined space at 4-foot intervals starting at the top level. Gasses and vapors can either be lighter or heavier than air.
    - If the air is deemed unacceptable, remove the toxic substances with fans, blowers or ventilation, depending on the size of the confined space.
    - Use proper lockout/tagout procedures to deal with mechanical.
    - Train employees on the hazards of specific tools, equipment and materials.

11. **Discussion points:**
    Ask participants to name hazards of confined spaces in your workplace.

12. **Conclusion: Take confined space permits and precautions seriously**
    Sixty percent of fatalities in confined spaces are rescuers and 65 percent occur because of hazardous atmospheres where workers failed to use monitoring devices or ventilation. It is important to follow written procedures when entering a confined space and to conduct air monitoring. If these two procedures are completed, fatalities in confined spaces will decline.

13. **Test Your Knowledge**
    Ask employees take the Confined Space Hazards Quiz. By testing their knowledge, you can judge their ability to understand confined space hazards and if they need to review the topic again.

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Quiz

Hazards of Confined Spaces Quiz

1. **Which of the following does OSHA not list as a feature of a confined space?**
   a) Limited entry and exit areas
   b) More than 100 feet from a first aid station
   c) Not designed for extended occupancy periods

2. **A confined space atmosphere is hazardous when flammable gas, vapor, or mist levels top their flammable limits by more than 10 percent.**
   a) True b) False

3. **An ignition source like grinding or welding sparks could cause a fire in a confined space.**
   a) True b) False

4. **What is the worst that can happen if you inhale toxic substances in a confined space?**
   a) Skin irritation
   b) Suffocation or death
   c) Dizziness

5. **A confined space is hazardous if oxygen levels are below:**
   a) 19.5 percent
   b) 24.5 percent
   c) 5 percent

6. **You could be smothered or buried in a confined space if it contains liquid or:**
   a) High levels of oxygen
   b) A damp atmosphere
   c) Sand, grain, or any flowing solid

7. **Entrapping design means a space that's very deep or dark.**
   a) True b) False

8. **Heat stroke or heat-related exhaustion limits your ability to get out of a confined space.**
   a) True b) False

9. **Noise is a hazard in confined spaces because you may not be able to:**
   a) Wear earmuffs or other hearing protection
   b) Hear warnings or directions
   c) Get out of the space quickly

10. **Confined space conditions that could pose a threat to life, cause irreversible health problems, or hinder ability to escape without help are called:**
    a) Immediately dangerous to life or health
    b) Atmospheric hazards
    c) Physical hazards

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Quiz Answers

Hazards of Confined Spaces Quiz Answers

1. b. More than 100 feet from a first aid station.

2. a. True.

3. a. True.

4. b. Suffocation or death.

5. a. 19.5 percent.

6. c. Sand, grain, or any flowing solid.

7. b. False. Entrapping design means a space whose walls curve in or whose floors slope and taper down.

8. a. True.

9. b. Hear warnings or directions.

10. a. Immediately dangerous to life or health.

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"Hazards of Confined Spaces"

Handout

Confined Space Hazards

Take special precautions in confined spaces with one or more of these hazards:

- Gas, vapor, mist, dust or oxygen levels high enough to cause a fire or explosion.
- High levels of toxic gas, vapor, mist or dust that cause illness, suffocation, or death if inhaled.
- Oxygen levels below what you need to breath.
- Liquids or flowing solids like sand or grain that could cover, bury, or smother.
- Entrapping design – Walls that curve in, and floors that slope and taper down.
- Temperatures high enough to cause exhaustion or heat stroke.
- Fall potential worsened by damp floors, handholds, and entrapping spaces.
- Noise that could damage hearing or make it hard to hear directions or warnings.
- The potential for power and equipment injury, electrocution, fire and explosion because of a failure to turn off, lock out, block and bleed equipment before entry.
- Any condition immediately dangerous to life or health that threatens life, causes irreversible health problems, or makes it hard to escape without help.

CAUTION **DANGER** **STAY ALERT**

FIRE **HIGH HEAT** **TOXIC GAS** **NOISE**