

# Confined Spaces



# Standard

- Permit-Required Confined Spaces
  - 29 CFR 1910.146





# Confined Space

- Confined space is space that:
- Is large enough & so configured that employee can bodily enter & perform assigned work
- Has limited or restricted means for entry or exit (i.e. tanks, vessels, silos, pits, vaults or hoppers)
- Is not designed for continuous employee occupancy



# Permit-Required Confined Space

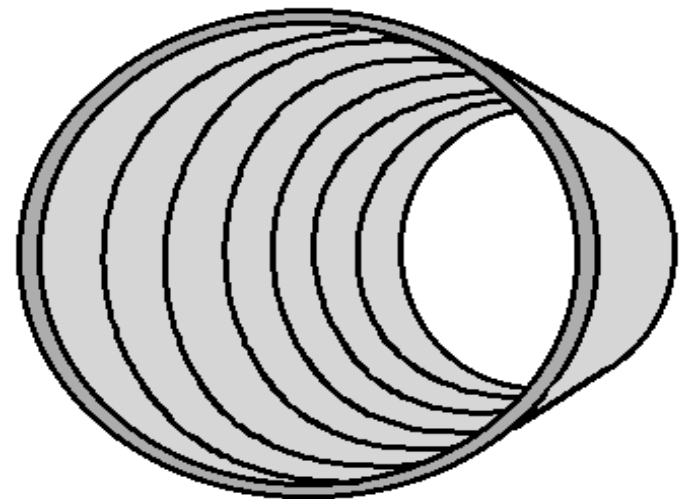
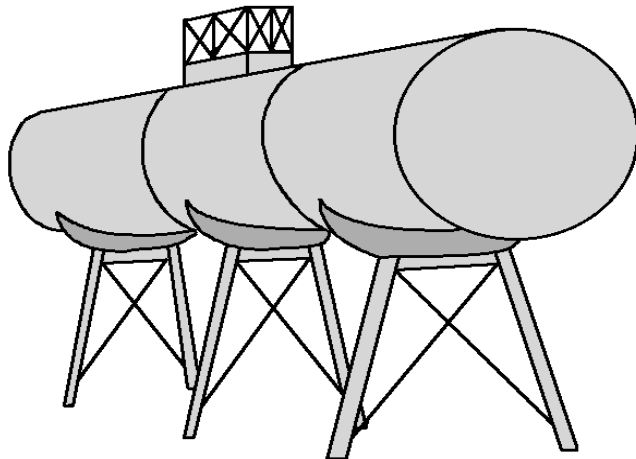
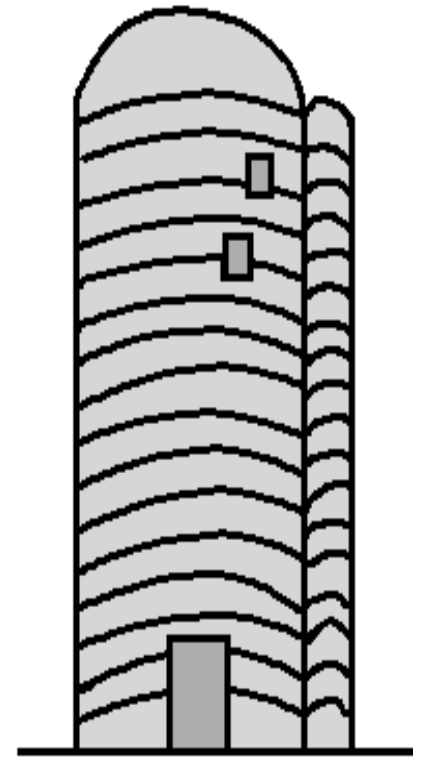
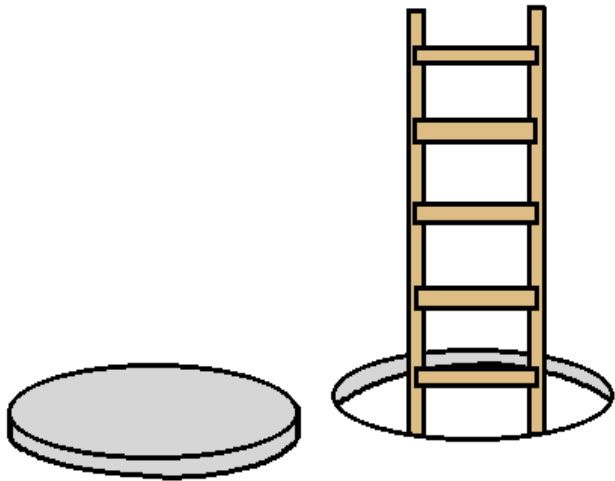
- Permit-Required Confined Space is confined space that has one or more of following characteristics:
- Contains or has potential to contain hazardous atmosphere
- Contains material that has potential for engulfing entrant



# Permit-Required Confined Space

- Has internal configuration such that entrant could be trapped or asphyxiated by inwardly converging walls or by floor which slopes downward & tapers to smaller cross-section
- Contains any other serious safety or health hazard

# Examples



# Characteristics

- Internal configuration
  - Open - no obstacles, barriers or obstructions within space (i.e. water tank)
  - Obstructed - permit space contains some type of obstruction that rescuer would need to maneuver around, such as baffle or mixing blade
    - Large equipment, such as ladder or scaffold brought into space for work purposes, would be considered obstruction if positioning or size of equipment would make rescue more difficult

# Characteristics

## ■ Elevation

- **Elevated** - permit space where entrance portal or opening is above grade  $\geq 4$  ft
  - Usually requires knowledge of high angle rescue procedures because of difficulty in packaging & transporting patient to ground from portal
- **Non-elevated** - permit space with entrance portal located  $\leq 4$  ft above grade
  - Will allow rescue team to transport injured employee normally



# Characteristics

## ■ Portal size

- **Restricted** - portal  $\leq 24$ " in least dimension
  - Too small to allow rescuer to simply enter space while using SCBA
  - Too small to allow normal spinal immobilization of injured employee
- **Unrestricted** - portal  $\geq 24$ " in least dimension
  - These portals allow relatively free movement into and out of permit space

# Characteristics

- Space access

- **Horizontal** - portal located on side of permit space

- Use of retrieval lines could be difficult

- **Vertical** - portal located on top of permit space; rescuers must climb down, or at bottom of permit space, rescuers must climb up to enter space

- May require knowledge of rope techniques or special patient packaging to safely retrieve downed entrant

# 29 CFR 1910.146

## Permit-Required Confined Spaces

- Scope & application
- Definitions
- General requirements (to include dev. of written plan)
- Permit-required confined spaces
- Permit system
- Entry permit
- Training
- Duties of authorized entrants
- Duties of attendants
- Duties of entry supervisors
- Rescue & emergency services
- Employee participation



# Appendices

- Appendix A - Permit-Required Confined Space Decision Flow Chart
- Appendix B - Procedures for Atmospheric Testing
- Appendix C - Examples of Permit-Required Confined Space Programs
- Appendix D - Confined Space Pre-Entry Check List
- Appendix E - Sewer System Entry
- Appendix F - Rescue Team or Rescue Service Evaluation Criteria







# Definitions

- Attendant

- Individual stationed outside one or more permit spaces who monitors authorized entrants & performs all attendant's duties assigned in employer's permit space program



# Duties of Attendants

- Knows hazards that may be faced during entry
- Aware of possible behavioral effects of hazard exposure in authorized entrants
- Continuously maintains accurate count of authorized entrants
- Remains outside permit space during entry operations until relieved by another attendant



# Duties of Attendants

- Communicates with authorized entrants
- Monitors activities inside & outside space
- Summons rescue & other emergency services
- Performs non-entry rescues as specified by employer's rescue procedure
- Performs no duties that might interfere with primary duty to monitor & protect authorized entrants







# Definitions

- Authorized entrant
  - Employee authorized by employer to enter permit space



# Duties of Authorized Entrants

- Know hazards that may be faced during entry, including information on mode, signs or symptoms & consequences of exposure
- Properly use equipment as required by paragraph (d)(4)
- Communicate with attendant as necessary to enable attendant to monitor entrant status & enable attendant to alert entrants of need to evacuate space as required by paragraph (i)(6)

# Duties of Authorized Entrants

- Alert attendant whenever:
  - Entrant recognizes any warning sign or symptom of exposure to dangerous situation
  - Entrant detects prohibited condition
  - Exit from permit space as quickly as possible whenever:

# Duties of Authorized Entrants

- Exit from permit space...
  - Order to evacuate is given by attendant or entry supervisor
  - Entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - Entrant detects prohibited condition
  - Evacuation alarm activated





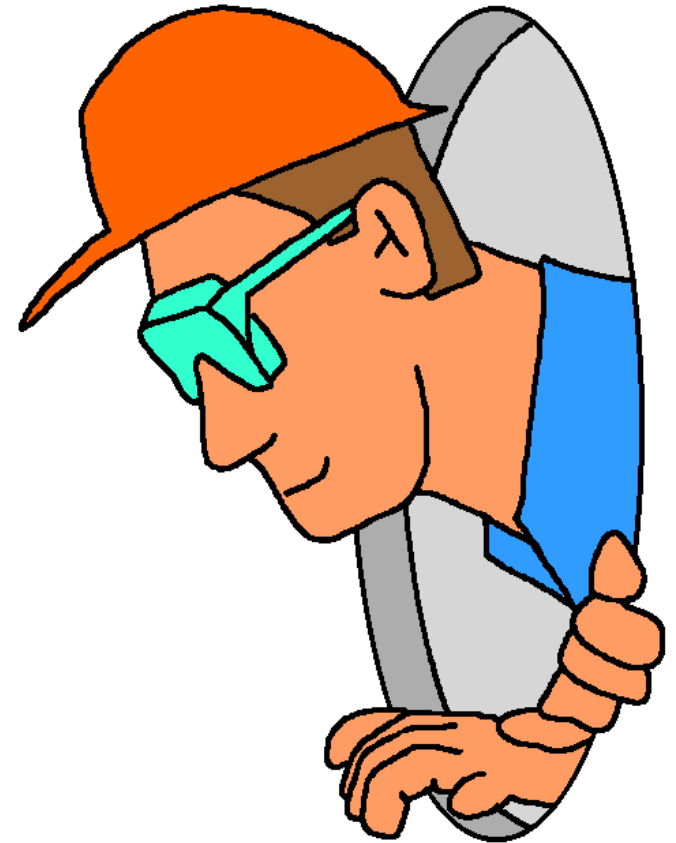
# Definitions

## ■ Engulfment

- Surrounding & effective capture of person by liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging respiratory system
- Can exert enough force on body to cause death by strangulation, constriction or crushing

# Definitions

- Entry
  - Action by which person passes through opening into permit-required confined space
  - Entry includes ensuing work activities in space and is considered to have occurred as soon as *any* part of entrant's body breaks plane of opening into space





# Definitions

## ■ Entry Supervisor

- Person (such as employer, foreman or crew chief) responsible for determining if acceptable entry conditions are present at permit space where entry is planned, for authorizing entry & overseeing entry operations & for terminating entry
- Note: entry supervisor *may* serve as attendant or authorized entrant, as long as that person is trained & equipped as required for each role filled
  - Duties of entry supervisor may be passed from one individual to another during entry operations



# Duties of Entry Supervisor

- Knows hazards that may be faced during entry, including information on mode, signs or symptoms & consequences of exposure
- Verifies, by checking that appropriate entries have been made on permit, all tests specified by permit have been conducted & all procedures & equipment specified by permit are in place before endorsing permit & allowing entry to begin
- Terminates entry & cancels permit as required by paragraph (e)(5)



# Duties of Entry Supervisor

- Verifies that rescue services are available & means for summoning are operable
- Removes unauthorized individuals who enter or attempt to enter permit space during entry operations
- Determines, whenever responsibility for permit space entry operation is transferred & at intervals dictated by hazards & operations performed within space, that entry operations remain consistent with terms of entry permit & acceptable entry conditions are maintained

# Definitions

- Hazardous atmosphere
  - Atmosphere that may expose employees to risk of death, incapacitation, impairment of ability to self-rescue (i.e. unaided escape from permit space), injury or acute illness from one or more following causes:
    - Flammable gas, vapor or mist in excess of 10% of Lower Flammable Limit (LFL)

# Definitions

## ■ Hazardous atmosphere

- Airborne combustible dust at concentration that meets or exceeds LFL
- Note: concentration may be approximated as condition in which dust obscures vision at distance of 5 ft or less
- Atmospheric oxygen concentration  $<19.5\%$  or  $>23.5\%$

# Definitions

- Hazardous atmosphere
  - Atmospheric concentration of any substance for which dose or PEL could result in employee exposure in excess of dose or PEL
  - Note: atmospheric concentration of any substance not capable of causing death, incapacitation, impairment of ability to self-rescue, injury or acute illness due to health effects is not covered

# Definitions

- Hazardous atmosphere
  - Any other atmospheric condition that is IDLH
  - Note: for air contaminants which OSHA has no dose or PEL, other sources of information, such as MSDSs that comply with 29 CFR 1910.1200, published information & internal documents can provide guidance in establishing acceptable atmospheric conditions



# Definitions

- Immediately Dangerous to Life and Health (IDLH)
  - Condition that poses immediate or delayed threat to life or cause irreversible adverse health effects or interfere with individual's ability to escape unaided from permit space



# Definitions

## ■ Isolation

- Process by which permit space is removed from service & completely protected against release of energy & material into space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes or ducts; double block & bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages





# Definitions

- Line breaking

- Intentional opening of pipe, line or duct that is or has been carrying flammable, corrosive or toxic material, inert gas or any fluid at volume, pressure or temperature capable of causing injury

# Definitions

- Rescue service
  - Personnel designated to rescue employees from permit spaces
- Note: rescue personnel may be industry emergency personnel, outside rescue service or combination of teams



# Rescue & Emergency Services

- Rescue and emergency services
  - Employer who designates rescue & emergency services, pursuant to paragraph (d)(9) shall:
    - Evaluate prospective rescuer's ability to respond to rescue summons in timely manner, considering hazard(s) identified





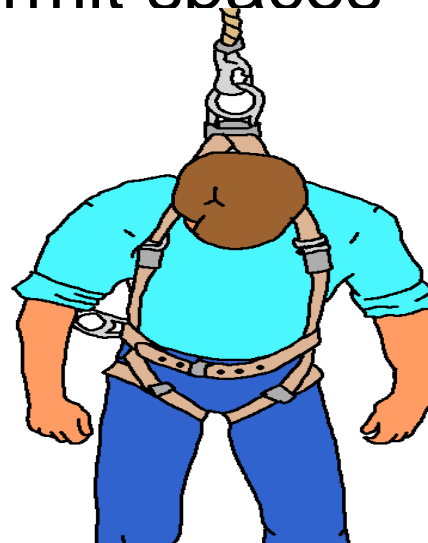
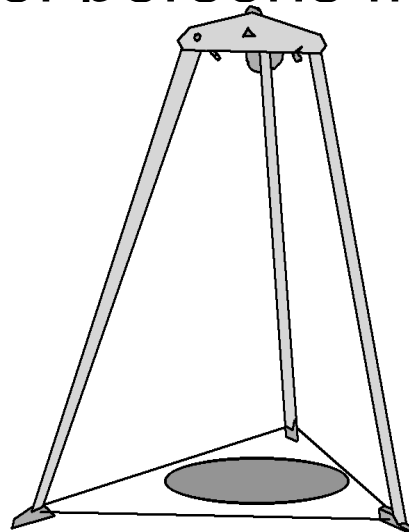




# Definitions

## ■ Retrieval system

- Equipment (including retrieval line, chest or full-body harness, wristlets, if appropriate, & lifting device or anchor) used for non-entry rescue of persons from permit spaces







# Definitions

## ■ Testing

- Process by which hazards that may confront entrants are identified & evaluated
- Testing includes specifying tests to be performed in permit space
- Note: testing enables employers to devise & implement adequate control measures for protection of authorized entrants & determine if acceptable entry conditions are present immediately prior to & during entry



# Testing Protocol

- Before employee enters space, internal atmosphere shall be tested, with calibrated direct-reading instrument, for following conditions in order given
  - Oxygen content
  - Flammable gases & vapors
  - Potential toxic air contaminants





# Other Hazards

- Unstable or dangerous work surfaces
- Falling objects
- Insects or animals
- Biological







# PRCS Signage



**CONFINED SPACE  
— KEEP OUT —  
UNLESS AUTHORIZED**



















# PRCS Written Plan Outline

- Introduction - company policy
- Definitions
- Identification of confined spaces
- Notification and warning
- Hazard identification
- Equipment for entry & rescue
- Evaluation of confined spaces
- Permits
- Authorized entrants
- Authorized attendants



# PRCS Written Plan Outline

- Entry supervisors
- Entry procedures
- Communications procedures
- Rescue procedures
- Closure procedures
- Coordination of work with contractors
- Program review and update (required annually)
- Training requirements and documentation

# Entry Permits

- Permit space to be entered
- Purpose of entry
- Date & authorized duration of permit
- Authorized entrants
- Authorized attendants
- Name & signature of entry supervisor
- Hazards of permit space to be entered
- Isolation of hazard control measures
- Acceptable entry conditions
- Results of initial & periodic atmospheric monitoring
- Rescue & emergency services
- Communications procedures
- Equipment required for entry & rescue operations
- Other necessary information & other required permits