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Confined Spaces in Construction

Overview of Subpart AA 1926.1200 – 1213





Introductions...



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Setting the Stage...

- Examine Subpart AA Requirements
 - *Definitions*
 - *Multi-Employer Coordination*
 - *Training*
 - *Defining Rescue Options*
 - *Identifying Rescue Services*
 - *Permit Process*
 - *Air Monitoring Equipment & Use*
 - *Entry Activities*



Definitions

Developing a Common Understanding



Competent vs. Qualified Person

29 CFR 1926.32(f) states:

"Competent Person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

29 CFR 1926.32(l) states:

"Qualified" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work, or the project.



Can Training make You a Competent Person?



More than Just a Title

OSHA's definition provides a **COMPETENT PERSON** must have:

1. Capability / Knowledge / Skill to Identify Hazards
2. Authority to Take Action – Given Only by Employer!!
 - **Needs to be Present at the Work Location**
 - **Is the Job Foreman/Superintendent the Correct Choice?**

OSHA's definition provides that a **QUALIFIED PERSON** must have:

- Ability to Solve Job & Task-specific Problems at the Worksite
- There may be a Requirement for More Technical or Engineering Knowledge based on the Specific Job or Task

In relation to OSHA:

Competency is Demonstrated, Not Certified.



Authorized & Designated Person

29 CFR 1926.32 (d) states:

"Authorized Person" means a Person Approved or Assigned by the Employer to Perform a Specific type of Duty(s) or to be at a Specific Locations(s) at the Jobsite.

29 CFR 1926.32 (i)

"Designated Person" means *"Authorized Person"* as defined in paragraph 1926.32 (d).



Entry Team Members

AUTHORIZED ENTRANT:

- Enters Permit Space to Perform Work.

ATTENDANT:

- *Single Focus:* Monitor Entrant(s) Condition!
- Maintains Continuous Communication

ENTRY SUPERVISOR:

- Reviews & Signs the Entry Permit
- Authorizes Entry & Cancels Permit
- Verifies All Equip't, Precautions, Rescue, etc..



What is a

PERMIT REQUIRED
CONFINED SPACE?



Permit Required Confined Space

4 Conditions for a Permit-Required Confined Space



A permit-required confined space is a confined space that contains a serious safety or health hazard.

Examples: *Sewer Systems, Utility Manholes, Vessels, Silos, Storage Bins, Hoppers, Vaults, Pits, Tanks, Tunnels, Equipment Housings, Crawl Spaces, Ductwork, Pipelines, etc.*



PERMIT REQUIRED = POTENTIAL

- **Hazardous Atmosphere**
- **Engulfment** (*Overcome, Immerse, Submerge*)
- **Internal Configuration Could Trap or Asphyxiate**
- **Any other Safety or Health Hazard(s)**



Permit Space Hazards

Atmospheric

- Oxygen, Flammable, CO, H₂S, Nitrogen, Ammonia

Engulfment

- Water, Sewage, Sand, Gravel, Grain, Plastic Pellets

Internal Configuration

- Baffles, Sloping Floors, C.S. within a C.S.

Any Potential Safety or Health Hazard

- Energy, Mechanical, Purging, Heat, Noise, Mold, Other Contractors, Toxics, Vapors, Animals...



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Can You Have a Non-Permit Required Confined Space?





Responsibility of the Contractor

- Employer may use ***“Alternate Procedures”*** only under the Conditions set forth in:
 - 1926.1204(e)(1) – **Employer Responsibilities**
 - 1926.1204(e)(2) – **Entry Conditions**
- **You will Perform the same Work as a Permit Space Evaluation, Documentation & More!**
 - Everyday for All Confined Space Entries!!



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Multi-Employer Coordination

Host Employer
Controlling Contractor
Entry Employer





YOURS!



CONTRACTOR/ SUBCONTRACTOR TEAMWORK



Common Understanding

HOST EMPLOYER

- Employer that Owns or Manages the Property Where the Construction Work is Taking Place.

CONTROLLING CONTRACTOR

- Employer that has Overall Responsibility for Construction at the Worksite.

ENTRY EMPLOYER

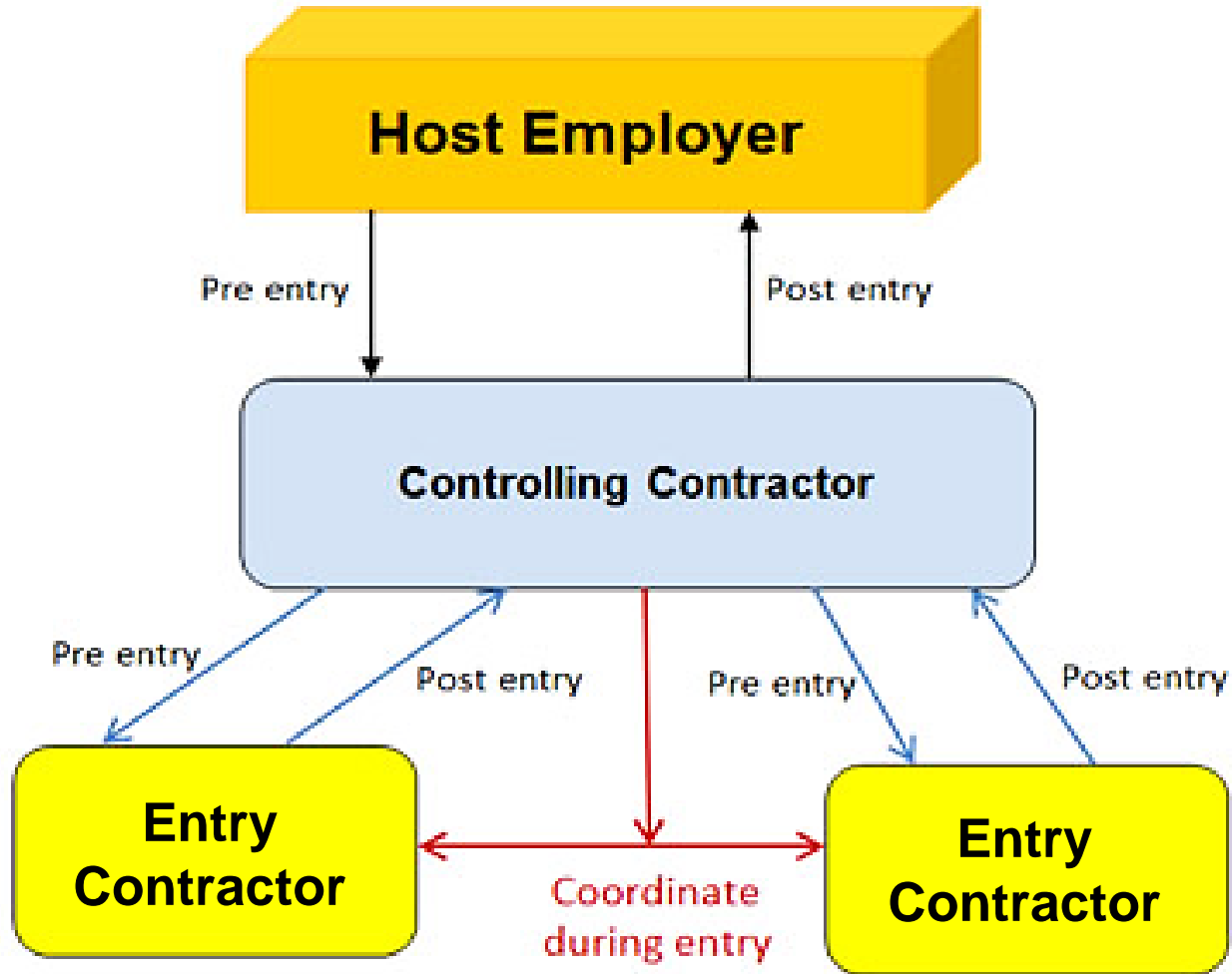
- Any Employer who Decides that an Employee it Directs will Enter a Permit Space.



Depending on the Scenario...

A Single Contractor could be:

- All 3 Entities
 - *Host Employer – Controlling Contractor – Entry Employer*
- Combination of 2 Entities
 - *Host Employer & Controlling Contractor*
 - *Controlling Contractor & Entry Employer*
 - *Host Employer & Entry Employer*
- Any 1 of the Entities
 - *Depends on What's being Built & When, Contract Terms, New Construction vs. Existing Structures...*





Host Employer

Before Entry, Provides the Controlling Contractor:

1. Location of Known Permit Spaces
2. Known or Potential Hazards in Each Space or the Reason the Space is Permit Required
3. Any Precautions that the **Host Employer**, Previous **Controlling Contractor** or **Entry Employer** Implemented for the Protection of Employees



Controlling Contractor

Before Entry, the Controlling Contractor Must:

- Obtain **Host Employer's** Information about Permit Space Hazards, Previous Entry Operations & Necessary Precautions
- Provide the following information to each **Entry Employer** and any other Employer at the Worksite whose Activities could Foreseeably Result in a Hazard in the Permit Space:
 1. **All Information Received from the Host Employer**
 2. **Any Additional Information the Controlling Contractor has about the Potential Hazards & any Necessary Precautions**
 3. **All Precautions that the Host Employer, Controlling Contractor, or other Entry Employers Implemented for the Protection of Employees in the Permit Spaces.**



Entry Employer

Before Entry Operations Begin, Entry Employer Must:

1. Obtain all of the **Controlling Contractor's** Information regarding Permit Space Hazards & Entry Operations
2. Inform the **Controlling Contractor** of the Permit Space Program that the Entry Employer will follow, including any Hazards likely to be Confronted or Created in each Permit Space.
 - **Written Plan(s) is Submitted**
 - **Document all Communication**

Question: **Has the Controlling Contractor just been put on Notice??**



Coordinating Entry Operations

Controlling Contractor & Entry Employer

Must Coordinate Entry Operations when:

1. More than One Entity performs Permit Space Entry at the same Time
2. Permit Space Entry is Performed at the same Time as any Activity(s) that could Potentially Result in a Hazard in the Permit Space
 - **Welding**
 - **Purging Lines**
 - **Spray / Coating Operations**



After Entering the Permit Space...

Entry Employer must:

- Inform the **Controlling Contractor** of:
 1. *The Permit Space Program followed, and*
 2. *Any Hazards Confronted or Created in the Permit Space(s) during Entry Operations*

Controlling Contractor must:

- Debrief/Examine/Interview each **Entry Employer** regarding:
 1. *The Permit Space Program followed, and*
 2. *Any Hazards Confronted or Created in the Permit Space(s) during Entry Operations*
- Provide Information Exchanged with the **Entry Employer(s)** to the **Host Employer**



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Employee Training





Employer Responsibilities

- **Understanding, Knowledge & Skills of the Standard**
 - **Objective-based Training**
 - **Perform a Knowledge & Skill Assessment**
- **Training Must be Provided to Employees:**
 - **Before any Employee is Assigned to C.S.E. Tasks**
 - **Before there is a Change in Assigned Duties**
 - **Whenever there is a Change in Permit Space Entry Operations**
 - **Whenever a new Hazard is Identified that Requires a Control**
 - **Whenever there is any Evidence of a Deviation from the Permit Space Entry Procedures**
 - **Inadequacies in the Employee's Knowledge or Use of Permit Space Procedures & Equipment**



Onsite, Task-specific Training

- **Ongoing Training provided Onsite in Real Time as the Work Progresses & Conditions Change**
- **Entry Permit is an Objective-based Training Plan**
 - **Based on Daily Permit Space Evaluation**
 - ✓ *Job/Task-specific & Conditions-based*
 - ✓ *Individual Roles & Responsibilities*
 - ✓ *Hazard Recognition*
 - ✓ *Necessary Precautions to Protect Employees*
 - ✓ *Equipment-specific Qualifications*
 - ✓ *Rescue Procedures*
 - **Reviewed with all Affected Employees**



Delivering Training

Employers are Required to Provide Training in a Language & Vocabulary that the Worker Understands

- **Using a Foreman or Lead Person as the Interpreter Does Not Comply with the Standard**



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Rescue Options





Rescue Options

Rescue: Retrieving & Providing Medical Care to an Entrant(s) in a Permit Space

- **Self Rescue**
- **Non-Entry Rescue**
- **Non-IDLH Entry Rescue**
- **Technical, Non-IDLH Entry Rescue**
- **IDLH Entry Rescue**



Immediately Dangerous to Life & Health

US National Institute for Occupational Safety & Health (NIOSH)

- **Developed in mid-1970's as Respirator Selection Criteria**
 - Joint effort btw. NIOSH & OSHA Development of Occupational Health Standards and Initial OSHA Permissible Exposure Limits (PELs).
- **Exposure to Airborne Contaminants:**
 - *“...likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.”*



IDLH – Misuse & Abuse

- Intended for Atmospheres
- Nowadays Everything's Accused of IDLH

OSHA 1926.1202

Any Condition that:

1. Interferes with an Individual's Ability to Escape Unaided from a Permit Space, **and**
2. Poses a Threat to Life or would Cause Irreversible Adverse Health Effects



Self Rescue

- A. Entrant** Recognizes a Hazard, Critical Condition or Exposure Symptom(s) & Exits on His or Her Own
- B. Attendant** Recognizes a Hazard, Critical Condition or Exposure Symptom(s) & Orders all Entrants to Immediately Exit the Space

NOTE:

- Preferred Rescue but not Always Possible or Practical
- An Entrant can almost Always Exit a Confined Space in far less time than it takes to Wait for Someone to Come in & Retrieve them



Non-Entry Rescue

When a Rescue Service, usually the Attendant, Retrieves an Entrant in a Permit Space without Entering the Space

- **Designate & Properly Train In-house Rescuers**
- **Secure *Non-Entry* Rescue/Retrieval Equipment**
- **First Aid/CPR Training for Entry Team**
- **Simulate Rescue at least every 12-months**
- **Evaluate 3rd Party EMS to Provide Entry Rescue**
 - Availability, Technical Capabilities & Response Time
 - Properly Equipped and Proficient in Rescue Services
 - Immediate Notification when Service is Unavailable

Non-Entry Rescue

Equipment that can
Become Tangled or
Simply Will Not
Work because of
the Configuration
of the Space
Must Not be Used.





Will Non-Entry Rescue Really Work?





When Non-Entry Does Not Work

- Entry Rescue Capabilities Must be in place as a Back-up to Self Rescue if:
 - **Non-Entry Retrieval Equipment Will Not Work**
 - **Any Reasonable Potential for an Unplanned Change in the Conditions or Hazards Prevents the use of Retrieval Equipment**
- Merely having a Tripod onsite Does Not meet the Expectations for Rescue.



Non-IDLH Entry Rescue

- Designate & Qualify Entry Rescue Employees
- Train to a level of Proficiency for all:
 - **Equipment, Necessary Precautions, PPE, etc.**
 - **Rescue Duties Specific to Conditions of the Worksite**
 - **Includes First Aid & CPR Certifications**
- Simulate Rescue at least every 12-months
 - **Space must be Representative of Opening Size, Configuration, Accessibility, etc.**
 - **Wear all PPE & Use all Rescue/Retrieval Equipment**
 - **Simulate Rescue with Manikin or Live Person**
- Document all Training!



Technical, Non-IDLH Entry Rescue

Technical Rescue

- Rescue involving Extremely High Risk for the Rescuer with a reduced Probability for Survival of the Victim.
 - Specialized Equipment, Tools, Techniques & Individual Qualifications
- Fire Department, Technical Rescue Dept.'s, EMS or Qualified Rescue Vendors



IDLH Entry Rescue

- Fire Department / EMS
- Technical Rescue Dept.'s
- Qualified Rescue Vendor



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Rescue Services





Rescue Service

Personnel Designated by Employer to Rescue Employees from Permit Spaces.

- Qualified Employee(s)
- Fire Department
- EMS
- Qualified Rescue Vendor

EXAMPLE:

Non-entry rescue occurs when a **Rescue Service**, usually the attendant, retrieves employees in a permit space without entering the permit space.



Identifying Rescue Services

A Permit Space Entry Plan Cannot be put together without Knowing the Availability & Capabilities of a Rescue Service.

- Willing or Able to Respond to Permit Space Rescues?
- Available During Working Hours when Needed?
- Technical & Equipment Capabilities?
- Trained on Controlling Hazards in Confined Space Entry?
- Trained to Recognize the Signs & Symptoms of Exposure and Control Hazardous Atmospheres?
- Equipped & Trained in Emergency Medical Assistance?
- Response Time?



Determining Response Time

Reaction Time

- Recognizing the Entrant has Problem & Respond

Contact Time

- Attendant Contacts Rescue Service & Relays Information

Response Time

- Time Needed for Rescuers & Equipment to Arrive on Site

Assessment Time

- Determine the Strategy to Perform a Safe, Efficient Rescue

Preparation Time

- Setup all Necessary Equipment

Rescue Time

- Time taken to Reach, Treat, Package and Evacuate the Victim



Formal Evaluation of Service

Permit Required Confined Space Rescue Services Evaluation Form

| | | |
|---|--------------------------------|--------------------------------|
| Facility Location: | Evaluator: | Date of Evaluation: |
| █ | █ | █ |
| Rescue Service Evaluated: | Rescue Service Contact: | Rescue Service Phone #: |
| █ | █ | █ |
| Availability and Response Time | | |
| | Yes | No |
| Is the rescue service willing/able to respond to confined space rescues at the above facility? | <input type="checkbox"/> | <input type="checkbox"/> |
| If the rescue service is notified we are performing a confined space entry, will they guarantee their availability or notify us if their confined space rescue services become unavailable? | <input type="checkbox"/> | <input type="checkbox"/> |
| When available, is the rescue service able to provide confined space rescue services at the facility <u>after</u> being notified (for IDLH environments, rescuers must be on standby outside the confined space and available/equipped for immediate action)? | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the rescue service available 24 hrs/day, 365 days/year? If no, enter the times/dates they are unavailable (entries may not occur during these times): | <input type="checkbox"/> | <input type="checkbox"/> |
| Equipment and Skills | | |
| | Yes | No |
| Are rescue service crews trained on the hazards of confined space entry and to recognize the signs, symptoms, and consequences of exposure to hazardous atmospheres that exist at this facility? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are rescue service crews trained and equipped for: | <input type="checkbox"/> | <input type="checkbox"/> |
| • IDLH Environments (e.g. SCBA's, atmospheric monitoring, etc.); | <input type="checkbox"/> | <input type="checkbox"/> |
| • Vertical (> 5') Tank Entry (e.g. fall protection, technical rope/rigging knowledge, tripod, etc.); | <input type="checkbox"/> | <input type="checkbox"/> |
| • Horizontal Tank Entry; | <input type="checkbox"/> | <input type="checkbox"/> |
| • Limited size openings (less than 24 inches in diameter); and | <input type="checkbox"/> | <input type="checkbox"/> |
| • Limited internal space or internal obstacles. | <input type="checkbox"/> | <input type="checkbox"/> |
| Are crews trained on hazard communication and able to read/understand SDS information? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do rescue service crews practice confined space rescues at least once every 12 months using confined spaces that are similar to those that may be encountered at this facility? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are crews equipped and trained to provide emergency medical assistance? If "yes" to what level of training? | <input type="checkbox"/> | <input type="checkbox"/> |
| Has the rescue service been informed of the hazards that exist in on-site permit spaces and provided access to the permit spaces for evaluation and training purposes? | <input type="checkbox"/> | <input type="checkbox"/> |
| Notification Procedures | | |
| How will the rescue service be notified that this facility will be performing a PRCS entry? | █ | |
| How will the rescue service be notified in the event of an emergency involving a PRCS entry? | █ | |
| If the Agency/Company becomes unavailable while an entry is underway, what is the procedure for notifying this facility so the attendant can instruct the entrants to abort the entry immediately? | █ | |
| Final Determination | | |
| | Yes | No |
| This rescue service meets all requirements (e.g. all above boxes are checked yes) for a confined space rescue service? If "no" explain: █ | <input type="checkbox"/> | <input type="checkbox"/> |
| Evaluator's Signature: █ | | |

- Document Initial Assessment
 - Availability
 - Capabilities, Equipment, Qualifications
 - Response Time
- Engage in On-going & Routine Communication with Rescue Services
 - Document all Interactions
- Update Rescue Services:
 - New Site Conditions
 - Changes in Site Layout
 - New Hazards
- Document Everything!



Gather Detailed Information

- Name of Specific Fire Department / EMS Unit
 - **Contact Number of the Specific Service Team**
 - **Names of Rescue Leadership**
 - **Dates/Times of Availability**
- 911 may cause Unnecessary Delays
 - **Sends Closest Available Fire Department / EMS**

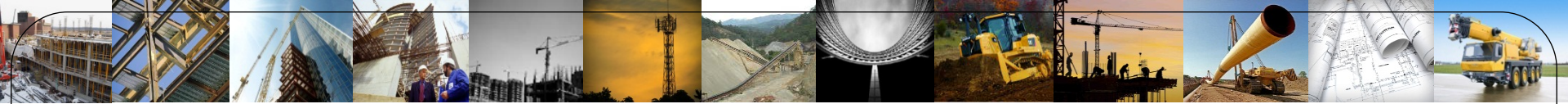


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Permit Process





What is a PERMIT?

- **Logical, Systematic Evaluation:**
 1. *Actual & Potential Hazards*
 2. *Methods to Eliminate/Reduce/Control Hazards*
- **Formal, Written Strategy**
 - *Who – Where – When – How*
 - *Rescue Plan & Emergency Response*



Hazard Recognition & Control

- **Identify Specific Controls to Manage C.S. Hazards**
 - *Eliminate, Isolate, Reduce, Capture, Secure, Vacate*
- **Atmospheric Monitoring Strategies**
- **Define Acceptable Entry Conditions**
 - *Determine Test Methods to Confirm Actual Environment*
- **Entry Team Roles & Responsibilities**
- **Communication Procedures**
 - *Verbal, Hand, Radio, Alarm, Air-horn, Lighting*
- **Entry Equipment & Necessary Precautions**
- **Rescue Plan & Emergency Contact Information**



Confined Space Permit

16 Essential Criteria for a Compliant Permit



Compliant Permit Information

1. Permit Space Location
2. Purpose of Entry
3. Date & Authorized Duration of the Permit
4. Names of Authorized Entrants in the Permit Space
 - *Attendant Must be able to Quickly & Accurately determine the Authorized Entrants are Inside the Space*
 - *Roster or Tracking System are Commonly Used*
5. Name of the Attendant(s)
6. Continuous Communication Procedures
7. Entry Supervisor Name &
 - *Provide a Space for the Name/Signature/Initials of the Entry Supervisor who Originally Authorized Entry*

CONFINED SPACE ENTRY PERMIT

PERMIT IS NOT VALID UNLESS ALL APPROPRIATE ITEMS ARE COMPLETED AND ALL SAFE CONDITIONS ARE SATISFIED.

HOST EMPLOYER Info Received & Date/Time: _____

CONTROLLING CONTRACTOR Info Received & Date/Time: _____

ENTRY EMPLOYER Info Received & Date/Time: _____

DATE: _____ ADDRESS / LOCATION: _____

TIME: _____ AM / PM CITY & STATE: _____

| | |
|-------------------------|--|
| SCOPE OF WORK / PURPOSE | |
| | |

PARTICIPANTS

MINIMUM OF ONE (1) ATTENDANT AND ONE (1) SUPERVISOR REQUIRED.

| ROLE | PRINT NAME | SIGNATURE | CONFINED SPACE ENTRY TRAINING DATE |
|------------------|------------|-----------|------------------------------------|
| ENTRY SUPERVISOR | | | |
| ENTRY ATTENDANT | | | |
| ENTRY ATTENDANT | | | |
| ENTRANT | | | |
| ENTRANT | | | |
| ENTRANT | | | |
| ENTRANT | | | |

COMMUNICATION METHODS (VERBAL, RADIO, HAND, ETC.): _____



Compliant Permit Information

8. Rescue & EMS Contact Information

- *Identify the Means of Contact (Cell Phone, Office Phone)*
- *Names & Contact Information*

9. Means of Detecting any Increase in Atmospheric Hazard Levels if Ventilation Controls Fails

- *Air Monitoring: Personal or Area*

10. Any Necessary Information, Given the Specific Circumstances of the Particular Confined Space, that Safeguards Employee

11. Any Additional Permits Authorizing Work

- *Hot Work, Environmental, Blasting, etc...*

IN CASE OF EMERGENCY

RESCUE SERVICE ON STANDBY: _____

PHONE: _____

EQUIPMENT

RETRIEVAL SYSTEM IN PLACE: Y / N

RETRIEVAL HARNESS(ES) INSPECTED BY: _____

TRIPOD & WINCH ACCEPTABLE: Y / N

FIRE EXTINGUISHER INSPECTION DATE: _____

DESCRIBE NON-ENTRY RETRIEVAL PLAN: _____

WORKZONE, PEDESTRIAN & VEHICLE PROTECTION

LIST SITE SECUREMENT PRECAUTIONS: _____

TRAFFIC CONTROL PLAN IN PLACE: Y / N

WARNING SIGN POSTED: Y / N

CONFINED SPACE ENTRY COMMUNICATED TO OTHER CONTRACTORS PRESENT: Y / N

LIST OTHER CONTRACTORS PRESENT: _____

LIST CONFINED SPACE ENTRANCE BARRIERS: _____

CONFINED SPACE ENTRY PREPARATION

CONFINED SPACE FULLY VENITLATED PRIOR TO ENTRY* **? Y / N

*REFER TO VENTILATION NOMOGRAPH

OTHER FACILITIES PRESENT IN CONFINED SPACE? Y / N

**CONTINUOUS VENTILATION IS REQUIRED DURING PRESENCE OF ENTRANT(S)

NOTES ON ISOLATING OTHER FACILITIES: _____

WELDING OR HOT WORK REQUIRED*? Y / N

*IF YES, A CONFINED SPACE HOT WORK PERMIT MUST BE COMPLETED BEFORE BEGINNING ANY WORK, APPROVED BY THE ENTRY SUPERVISOR AND A COPY MUST BE ATTACHED TO THE ENTRY PERMIT



Compliant Permit Information

12. All Initial & Periodic Testing

- *Results of Each Test*
- *Testing Personnel Names or Initials*
- *Time Each Test was Performed*

13. Acceptable Entry Conditions

- *Conditions that Must Exist in a Permit Space to Allow Safe Entry into, and Work within, the Space.*

ATMOSPHERIC TESTING

4-GAS MONITOR: RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS

INITIAL ATMOSPHERIC TESTING TIME, PRIOR TO ENTRY: _____ AM / PM

MODEL: _____ SERIAL #: _____ CALIBRATION DATE: _____

| TEST | PERMISSIBLE LEVELS | INITIAL TEST | TIME: | TIME: | TIME: | TIME: | TIME: |
|-----------------------|--------------------|--------------|-------|-------|-------|-------|-------|
| OXYGEN | 19.5% - 23.5% | % | % | % | % | % | % |
| LOWER EXPLOSIVE LIMIT | < 10% | % | % | % | % | % | % |
| HYDROGEN SULFIDE | < 10 PPM | PPM | PPM | PPM | PPM | PPM | PPM |
| CARBON MONOXIDE | < 35 PPM | PPM | PPM | PPM | PPM | PPM | PPM |

CONFINED SPACE ENTRY & EXIT TIMES

| ENTRANT | TIME IN | TIME OUT | TIME IN | TIME OUT | TIME IN | TIME OUT |
|---------|---------|----------|---------|----------|---------|----------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

THIS CONFINED SPACE ENTRY PERMIT IS ONLY VALID FOR A SINGLE WORK SHIFT.



Compliant Permit Information

- 14. List All Hazards Affecting the Permit Space**
- 15. List of All Necessary Precautions**
 - *PPE, Monitoring/Testing Equipment, Alarm Systems, Communication Equipment and Rescue Equipment*
- 16. Methods/Measures/Means Necessary to Isolate, Control, Reduce, Eliminate All Hazards**
 - *Ventilating, Purging, Flushing, LOTO, etc...*

HAZARD IDENTIFICATION

| HAZARD | LIST CONTROLS / SOLUTIONS TO EFFECTIVELY REDUCE OR ELIMINATE THE HAZARD |
|--|---|
| <input type="checkbox"/> ATMOSPHERE | |
| <input type="checkbox"/> HAZMAT | SDS(s) on site or readily available? Y / N |
| <input type="checkbox"/> FIRE / EXPLOSION | |
| <input type="checkbox"/> ELECTRICAL | |
| <input type="checkbox"/> ENGULFMENT | |
| <input type="checkbox"/> ENTRAPMENT | |
| <input type="checkbox"/> LIGHTING / VISIBILITY | |
| <input type="checkbox"/> SITE SECURITY | |
| <input type="checkbox"/> TEMPERATURE | |
| <input type="checkbox"/> TOXIC GAS / VAPORS | |
| <input type="checkbox"/> LO/TO CONTROLS | |
| <input type="checkbox"/> SLIPS / FALLS | |
| <input type="checkbox"/> | |
| <input type="checkbox"/> | |

PERMIT APPROVAL

DESIGNATED EVALUATOR

NAME: _____ SIGNATURE: _____ DATE: _____

ENTRY SUPERVISOR

NAME: _____ SIGNATURE: _____ DATE: _____

PERMIT CANCELLATION

ENTRY SUPERVISOR

NAME: _____ SIGNATURE: _____ TIME: _____ AM / PM



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Air Monitoring

Equipment & Use





OSHA States:

Continuous Atmospheric Monitoring Shall be Performed, Whenever Possible

- **Initial Assessment of Conditions**
- **Verify Controls are Effective before Entry**
- **Throughout the Entire Entry Operation**



Multi-gas Monitors

Common Sensor Combinations

4 Standard Gases

- Hydrogen Sulfide **H₂S**
- Carbon Monoxide **CO**
- Oxygen **O₂**
- Combustible Gases **LEL**

All Potential Air Contaminates must be Monitored:

- Ammonia
- Sulfur Dioxide
- Nitrogen
- **VOC's** (*Volatile Organic Compounds*)
 - **Require a PID** (*Photoionization Detector*)



Confirming Correct Function

Didn't Document, Didn't Do It...

Annual & Monthly Calibration

- Exposing the Monitor to a Certified Concentration of Gas for a Particular Time to Verify an Accurate Reading
- Establishes the accuracy of the sensors & the monitor
- Ensures Monitor performs within stated specifications

Daily “Bump” Test

- Brief Exposure of the Monitor Sensors to a Gas Verifying the Sensors & Instrument Alarm Functions Correctly
- Does Not Check the Accuracy of the Instrument

2 Different Ways of Monitoring Gases

Application determines Method & Equipment

1. Diffusion

- Sensors have a Working Surface Open to the Surrounding Environment
- Gas Migrates to Sensor by Gaseous Diffusion

2. Sample Draw

- Monitor has a Motorized Sample Pump (*aspirator*) to Draw Air Sample from the Test Space into the Sensor Chamber

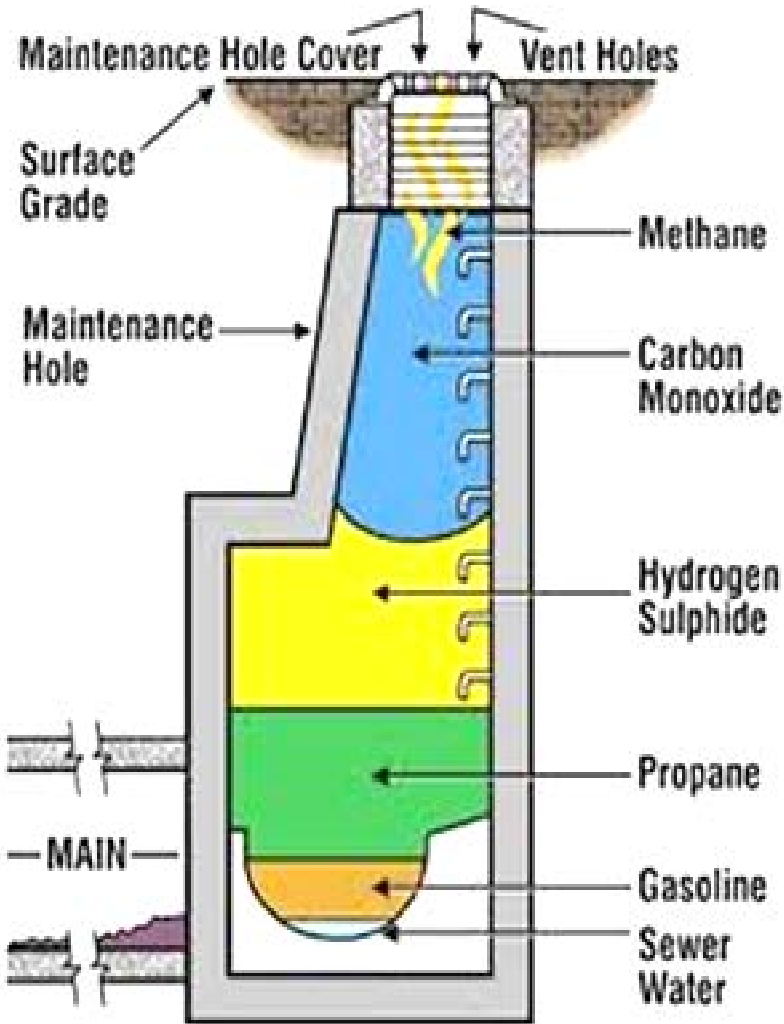
Diffusion Method



- Can You Read the Meter?
- How Much Time are You Allowing for a Reading?



Testing Stratified Air



Always test the air at various levels to be sure that the entire space is safe.

Good air near the opening does NOT mean there is good air at the bottom!

Good Air

Poor Air

Deadly Air

Gases may be present at different depths in a space.



Sample Draw Method



CS DZ OSHA's Order of Air Testing

1. Oxygen Level
2. Combustible / Flammable Gases or Vapors
3. Toxic Atmospheres



Contaminants & Alarm Concentrations

Oxygen levels and Concentration levels of typical gases potentially present in a confined space

| Contaminant | Alarm Concentrations |
|---------------------|----------------------|
| → Oxygen | <19.5% or >23% |
| → Carbon Monoxide | 35 ppm |
| Carbon Dioxide | 5000 ppm |
| → H ₂ S | 10 ppm |
| Nitrogen Dioxide | 3.0 ppm |
| Chlorine | 0.5 ppm |
| Methane | >10% LEL |
| Ozone | 0.1 ppm |
| → Combustible Gases | 10% LEL |
| Particulates | >10% LEL |

**Ammonia, Toxic Vapor/Gas, Purging Agents (Nitrogen, Argon)
Welding Fumes & Many More...**

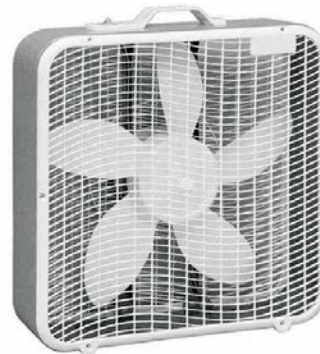


What Options Do Contractors have if Monitoring Results Cannot Verify Clean Air?

Continuous Mechanical Ventilation



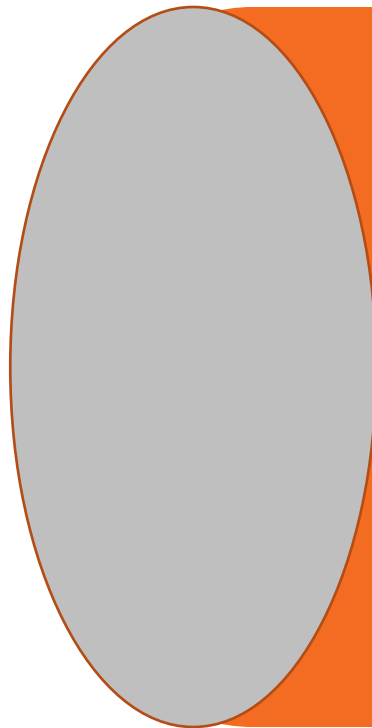
What about Fans like these?



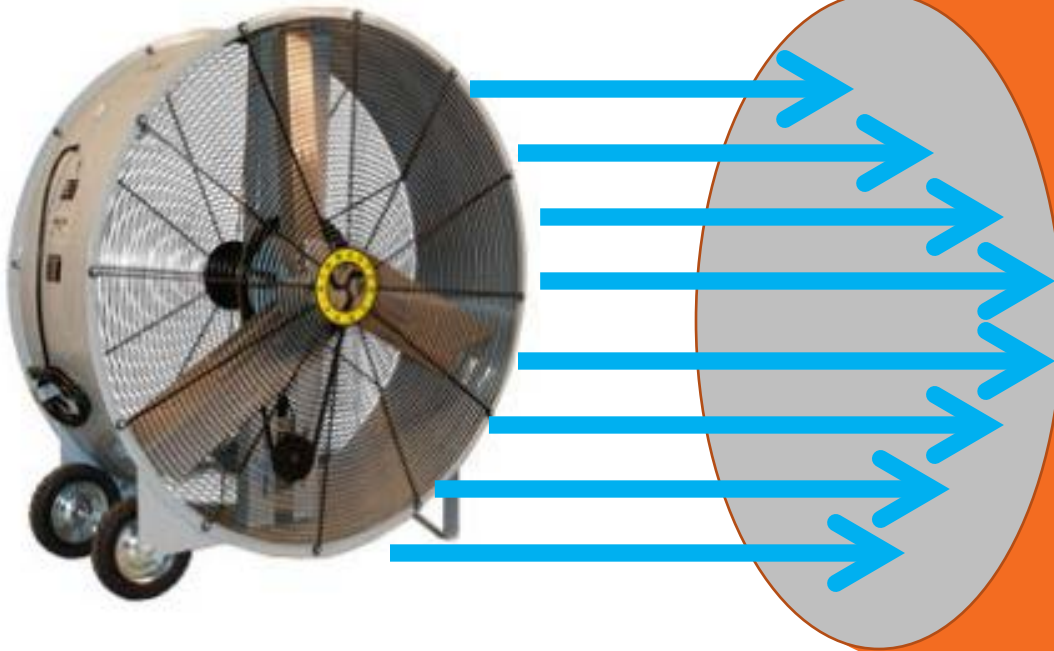
- **What is the Fan's Capacity?**
- **How Many CFM Do You Need?**



Is this Effective.....Really?



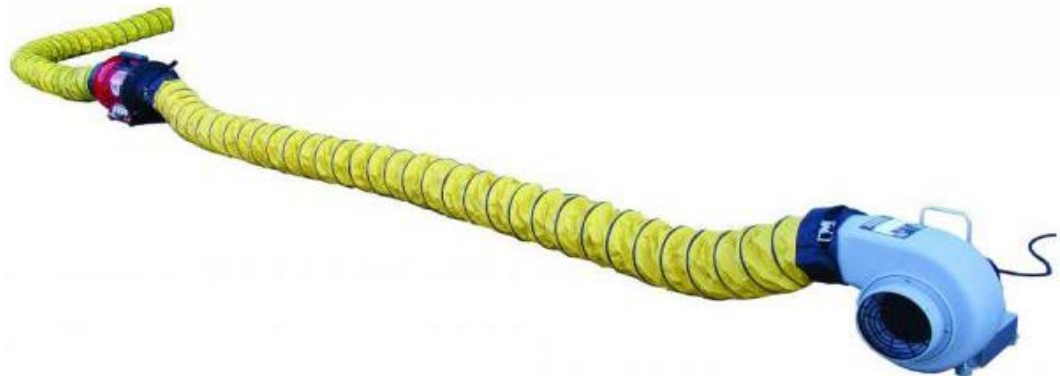
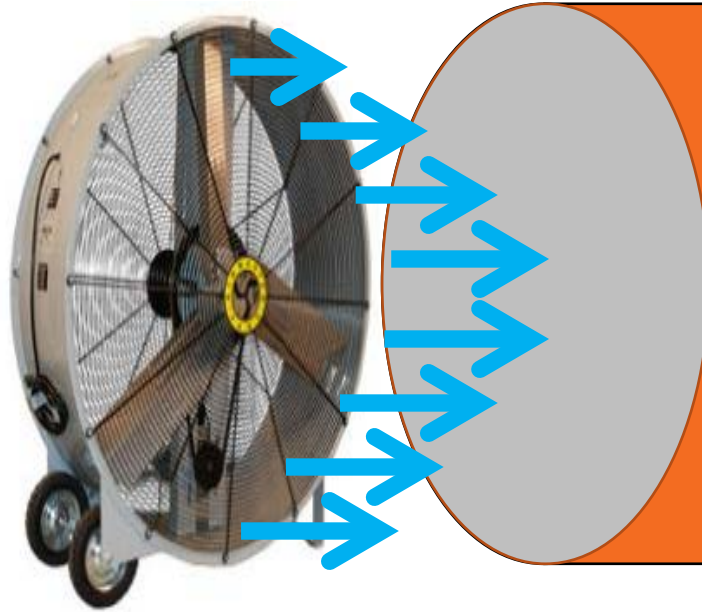
Any Configuration Limitations?



- Achieving Necessary CFM for Air Exchange?
- Is Your Plan Effective or Just Cheap?



Air Quality Concerns?



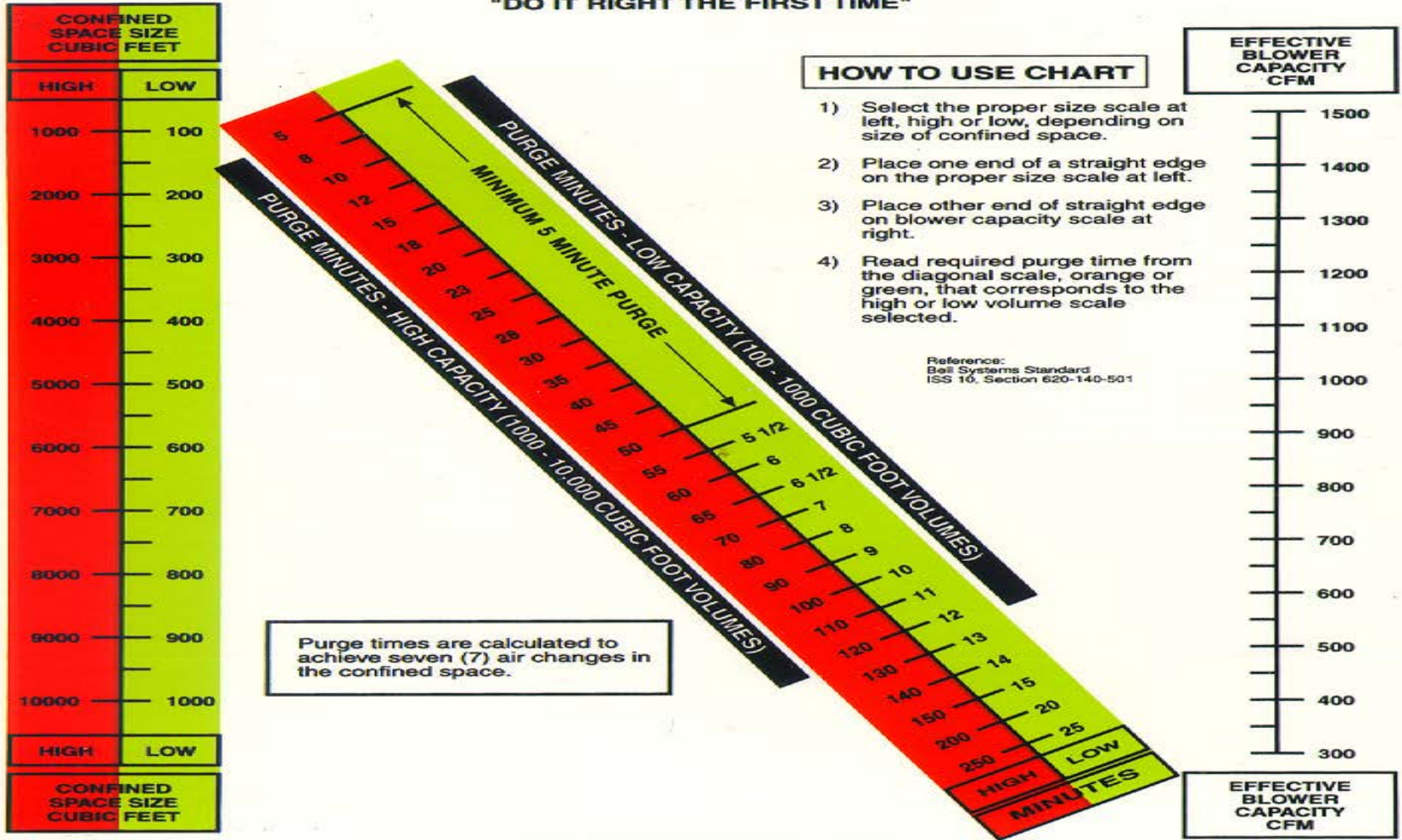
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ESTIMATING APPROXIMATE PURGE TIMES



Ventilation Namograph

CONFINED SPACE ENTRY "DO IT RIGHT THE FIRST TIME"



SPECIAL NOTES

- 1) Air quality of the confined space should be tested prior to ventilation.
- 2) Ventilate confined space for the minimum times as determined in the above chart and then retest air quality.
- 3) If toxic (combustible) gases or low oxygen is encountered, increase purge times by 50%.
- 4) If 2 blowers are used, add the two capacities, then proceed with the "How to use chart" above.
- 5) Effective blower capacity is measured with one or two 90° bends in 8" diameter 25 ft. blower hose.



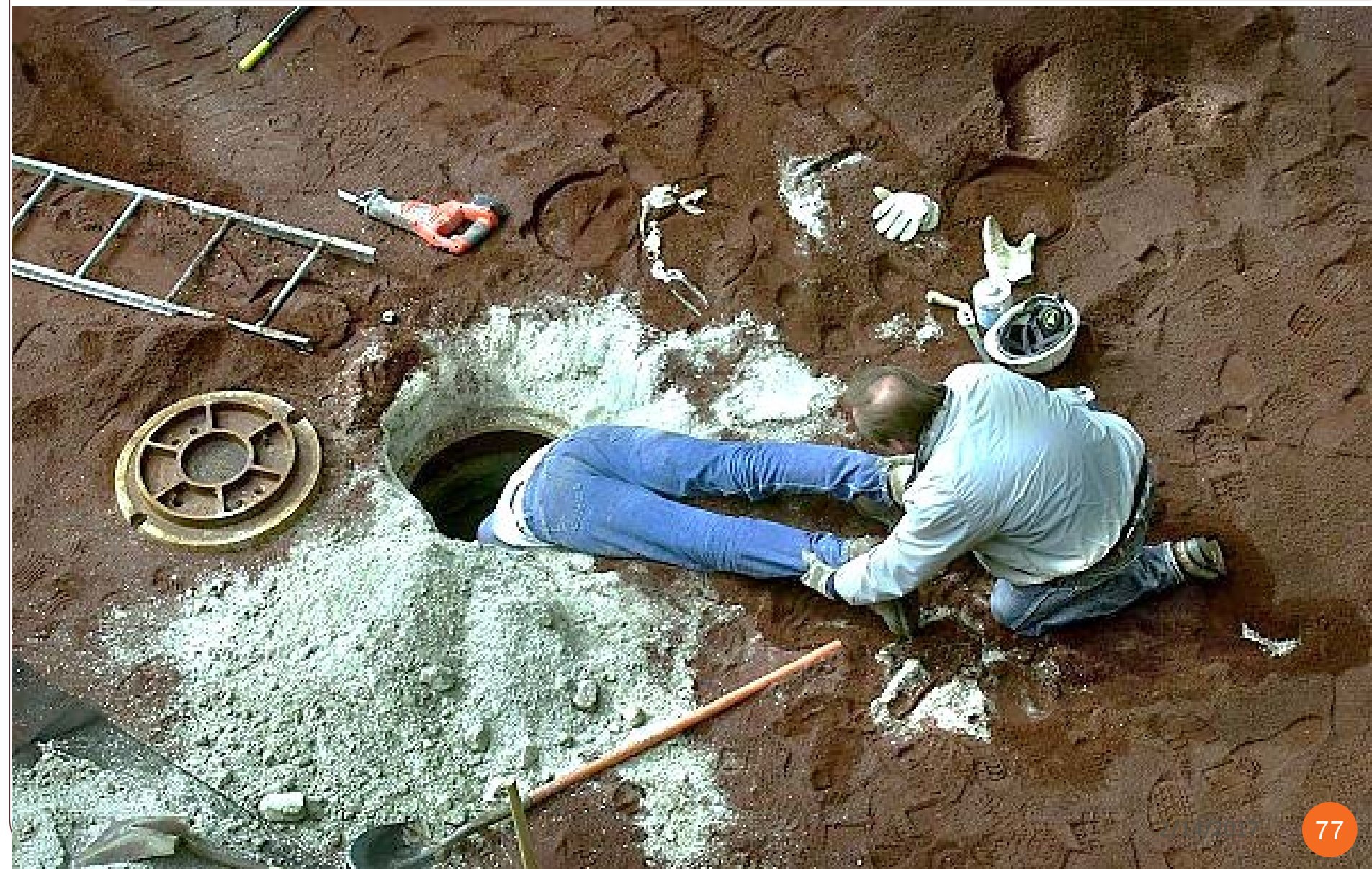
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Entry Activities



Example of “*Breaking the Plane*”





Continuous Communication

Attendant maintains Continuous, Effective Communication with all ***Entrants***:

- **Verbal Cues** - Screaming is Not a Form of Communication
- **Hand Signals**
- **Radios** – 2-way, Citizen Band (CB)
- **Alarm System**
- **Lighting**
- **Any others??**



Entry Team

Authorized Entrant

Attendant

Entry Supervisor



AUTHORIZED ENTRANT

- Read & Understand all Permit Requirements
- Onsite Training Provided before Entry
- Recognize the Symptoms and Effects of Exposure:
 - **Dizziness, Sleepiness, Confusion, Breathing Problems, etc.**
- Know How to Correctly Operate all Equipment
 - **Testing, Monitoring, Communication, Rescue, etc.**
- Continuous Communication with Attendant
- Communicate & Respond to any Changes in the Permit Space
- Evacuate the Space Immediately if:
 - **Ordered to do so by the Attendant**
 - **Warning Signs or Symptoms of Exposure are Experienced**
 - **Evacuation Alarm is Activated**



ATTENDANT (QUARTER BACK)

- Proficient in the Job/Tasks being Performed
- Recognize & Respond to Permit Space Hazards
- Know How to Correctly Use All Equipment :
 - **Testing, Monitoring, Communication, Rescue**
- Monitor Entrant at All Times During Entry
- Monitor All Activities & Controls Inside & Outside the Space
- Maintain Continuous Communication with the Entrant
- Order all Entrants to Evacuate if:
 - **Prohibited Condition Is Detected Inside the Permit Space**
 - **Dangerous or Compromising Situation Outside of the Space Occurs**
 - **Behavior of an Entrant has Changed**
 - **Attendant Cannot Perform All Duties & Has Not Been Relieved**



ATTENDANT

- Warn & Keep Unauthorized Persons Away from the Permit Space
- Advise & Immediately Remove all Unauthorized Persons from Area around the Permit Space
- Inform Authorized Entrant & Entry Supervisor if Unauthorized Employees Enter the Space.
- Perform No Duties that Might Interfere with their Ability to Assess, Respond & Protect Authorized Entrant(s).



ATTENDANT

- Maintain Accurate Count of All Entrants
- Summon Rescue Team or Contact Emergency Services, when Necessary
- Perform Rescue as Defined by the Permit & Not to Exceed Individual Qualifications
 - **Non-Entry Retrieval, Entry Rescue, etc.**
- Remain Outside Permit Space Until:
 - 1. Operation is Complete, or**
 - 2. Until Relieved by a Trained Attendant**



ENTRY SUPERVISOR

- Review & Evaluate the Permit Space Hazards
- Collaborate on all Necessary Precautions
- Review the Entry Permit for Accuracy
- Verify:
 - **All Specified Tests have been Conducted**
 - **All Controls are In-place & Effective**
 - **All Procedures & Equipment are in Place**
 - **Rescue Services are Available**
- Sign the Permit to Authorize Entry



ENTRY SUPERVISOR

- Remove all Unauthorized Personnel from the area of the Permit Space
- Record any Problems occurring during Entry on the Permit
- Suspend or Cancel the Permit when a Unsafe Condition Arises in or Near the Permit Space
- Cancel and File the Permit when Entry Operations are Complete



Can the **Entry Supervisor** Perform More than One Function on the Entry Team?

TRAINER'S NOTE:

- OSHA anticipates there will be entry situations, especially if an employer has only a few employees, where the **Entry Supervisor** will serve either as the **Attendant** or as an **Authorized Entrant**.
- OSHA indicates this is acceptable as long as the **Entry Supervisor** is *trained and equipped for each role he or she fills.*
- All pertinent requirements relating to the duties of **Attendants** and **Authorized Entrants** would still apply to the **Entry Supervisor** who serves as an **Attendant** or an **Authorized Entrant**.



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Summary of Entry Operations





Beginning Entry Operation

- Designate the Entry Team
- Entry Team Readies Permit Space :
 - **Obtains a current Entry Permit**
 - **Identify & Evaluate all Potential Permit Space Hazards**
 - **Secures all Necessary Precautions & Equipment**
 - **Verify all Hazards are Eliminated or Controlled**
- All Conditions & Activities are Recorded on Entry Permit
- Entry Team receives on-the-spot Training to the Permit
 - **All Potential Hazards**
 - **Specific Control Methods & All Necessary Precautions**
 - **Special Instructions, Equipment, Testing Methods, Communication**



Entry Operation

- Permit Space Entry may Begin only AFTER Eliminating All Hazards OUTSIDE Space.
 - **Traffic Control / Work Zone Protection**
 - **Other Contractors, Equipment, etc...**
- Completed Permit Posted at the Entry Point
- Throughout the Entire Operation:
 - **Verify All Precautions are In-place & Effective**
 - **Continuous Communication**
 - **Continuous Air Monitoring**



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