Appendix D

Outside Contractor Protocol & Space Entry/Debriefing Form

FREDONIA

OUTSIDE CONTRACTOR PROTOCOL

CONTRACTOR RESPONSIBILITIES:

Whenever outside servicing personnel are to be engaged in activities covered by the scope and applications of this standard, the outside contractor must comply with the confined space entry requirements outlined in OSHA's Permit-Required Confined Space Standard (29 CFR §1910.146). Contractors retained to perform work, which requires confined space entry are also responsible to:

1. Obtain any available information regarding permit-required confined space hazards and entry operations from SUNY Fredonia;

2. Coordinate entry operations with SUNY Fredonia when both SUNY Fredonia personnel and contractor personnel will be working in or near permit required confined spaces; and,

3. Inform SUNY Fredonia of the confined space program the contractor will follow and any hazards confronted or created in the space through a debriefing or during entry operations.

SUNY FREDONIA RESPONSIBILITIES:

Whenever contractors perform work that involves entry into confined spaces, SUNY Fredonia will provide contractors with a copy of this and any other applicable programs prior to performing any service as well as:

1. Inform the contractor that the workplace contains permit-required confined spaces and that entry is allowed only through compliance with a confined permit program;

2. Apprise the contractor of the elements, including SUNY Fredonia's experience with the space that make it a permit-required confined space;

3. Apprise the contractor of any precautions or procedures that SUNY Fredonia has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

4. Coordinate entry operations with the contractor when both SUNY Fredonia personnel and contractor personnel will be working in or near permit-required confined spaces; and,

5. Debrief the contractor at the conclusion of the confined space entry operations regarding the confined space program followed and any hazards confronted or created during entry operations.

6. Use and ensure completion of the Contractor Entry/Debriefing Form.

SUNY FREDONIA

CONTRACTOR ENTRY/EXIT DEBRIEFING FORM

Please print clearly.

PART A: Complete and return to SUNY Fredonia personnel PRIOR to beginning confined space work.

Contractor Company Name:_____

Address:_____

_____

Phone Number:_____

Name of Contractor Employee completing this form: _____

Permit space entered:_____ Date(s) of entry:_____

SECTION I: ENTRY REQUIREMENTS (Place a check after each item completed. All items must be checked prior to entry into the permit space.)

YOU AND YOUR EMPLOYEES HAVE BEEN INFORMED THAT THE AREA YOU ARE WORKING IN CONTAINS CONFINED SPACES AND YOU HAVE RECEIVED A COPY OF FREDONIA'S CONFINED SPACE INVENTORY	
YOU NOR YOUR EMPLOYEES WILL ENTER A PERMIT CONFINED SPACE ON CAMPUS WITHOUT FOLLOWING A CONFINED SPACE ENTRY PROGRAM THAT IS COMPLIANT WITH ALL APPLICABLE SECTIONS OF 29 CFR 1910.146.	
YOU, AS THE CONTRACTOR, ARE RESPONSIBLE FOR ADMINISTERING YOUR OWN PERMIT SPACE ENTRY PROGRAMS FOR YOUR EMPLOYEES ENTERING PERMIT SPACES AT SUNY FREDONIA.	
SUNY FREDONIA PERSONNEL HAVE APPRISED YOUAND YOUR EMPLOYEES OF THE ELEMENTS, INCLUDING HAZARDS IDENTIFIED AND THE CAMPUS EXPERIENCE WITH THE SPACE.	
SUNY FREDONIA PERSONNEL HAVE APPRISED YOU AND YOUR EMPLOYEES OF ANY PRECAUTIONS OR PROCEDURES USED BY CAMPUS PERSONNEL FOR THE PROTECTION OF CAMPUS EMPLOYEES IN OR NEAR PERMIT SPACES WHERE WORK IS BEING PERFORMED.	

SECTION II: SIMULTANEOUS ENTERY REQUIREMENTS

WILL YOU BE SIMULTANEOUSLY ENTERING THE PERMIT SPACE WITH SUNY FREDONIA PERSONNEL? YES _____ NO _____

IF YES, HAVE YOU COORDINATED ENTRY OPERATIONS WITH SUNY FREDONIA SUPERVISORY PERSONNEL TO INCLUDE? YES _____ NO _____

SIGNATURE:_____ DATE:_____

PART B: DEBRIEFING AFTER PERMIT ENTRY IS COMPLETED. ***COMPLETE AND RETURN TO SUNY FREDONIA PERSONNEL AFTER CONFINED ENTRY WORK IS COMPETED.***

List any hazards discovered while in the permit space:

List any hazards created while in the permit space

Signature of Individual completing this form:_____

Date:_____

1. Give the completed form to SUNY Fredonia Facilities Management for filing with completed confined space entry permits.

Appendix E

Blank Confined Space Reclassification Form

SUNY FREDONIA

1. *Give a copy of this completed form to all employees entering the space defined below.*
2. *Give the completed original form to your supervisor for filing with completed confined space entry permits.*

PERMIT SPACE RECLASSIFICATION FORM

PERMIT SPACE LOCATION:_____

PURPOSE OF ENTRY:_____

ENTRY DATE:_____ TIME OF ENTRY:_____

NAME OF PERSON MAKING THIS DETERMINATION:_____

PLACE YOUR INITIALS AFTER EACH ITEM BELOW CERTIFYING THAT THE CRITERIA HAS BEEN MET. IF ALL CRITERIA CAN BE MET THEN THE SPACE MAY BE RECLASSIFIED AS NON-PERMIT REQUIRED DURING THE PERIOD OF ENTRY STATED ABOVE. (*NOTE: even though the space has been reclassified an attendant shall be at the space monitoring the entrant and space conditions at all times*)

CONDITION	INITIALS
THE PERMIT SPACE POSES NO ACTUAL OR POTENTIAL ATMOSPHERIC HAZARDS.	
ALL NON- ATMOSPHERIC HAZARDS CAN BE ELIMINATED DURING ENTERY INTO THE SPACE.	
ENTRANTS, ATTENDANTS, AND ENTRY SUPERVISORS BEEN TRAINED.	

WHAT TASKS ARE TO BE PERFORMED DURING THE ENTRY OPERATION?

LIST THE HAZARDS THAT WERE PRESENT IN THE SPACE AND ELIMINATED:

LIST THE CONTROLS USED TO ELIMINATE THE HAZARDS:

SIGNATURE:_____ DATE:_____

Appendix F

Blank Confined Space Alternate Entry Form

SUNY FREDONIA

ALTERNATE ENTRY PROCEDURE FORM

PERMIT SPACE LOCATION:_____ DATE:_____

LIST THE SIZE (VOLUME) AND CONFIGURATION OF THE SPACE:

WHAT TASKS ARE TO BE PERFORMED DURING ENTRY:

HAVE ENTRANTS, ATTENDANTS, & ENTRY SUPERVISORS BEEN TRAINDED? YES ☐ NO ☐
(IF NO, ENTRY IS PROHIBITED)

IS ATMOSPHERIC TESTING EQUIPMENT CALIBRATED? YES ☐ NO ☐
DATE OF CALIBRATION:_____

IS A HAZARDOUS ATMOSPHERE THE ONLY HAZARD OF CONCERN? YES ☐ NO ☐
IF NO, ALTERNATE PROCEDURES *CANNOT* BE USED.

IS CONTINUOUS FORCED AIR VENTILATION PROVIDED? YES ☐ NO ☐

IF NO, EXPLAIN WHY:_____

IF YES, EXPLAIN CAPACITY IN (CFM) AIR EXCHANGE RATE:_____

STATE THE MINIMUM VENTILATION DURATION PRIOR TO ALLOW ENTRY (IN MINUTES):_____

NOTE: REFER TO INFORMATION ON VENTILATION SYSTEMS AND APPROPRIATE CALCULATIONS. CONDUCT PRE-ENTRY ATMOSPHERIC TESTING AND CONTINUE TO VENTILATE THE SPACE DURING THE ENTRY OPERATION.

ATMOSPHERIC TEST RECORD

SUBSTANCE	ACCEPTABLE LEVEL	READINGS	DATE/TIME
Oxygen	19.5% - 23.5%		
Explosive (gas/vapor)	<10% LFL		
Explosive Dust	<LFL (5ft visibility)		
Carbon Monoxide	50 ppm		
Hydrogen Sulfide	10 ppm		
Name:		Signature:	

NAME OF PERSON COMPLETING THIS FORM:_____ **SIGNATURE:**_____

Appendix G

Personal Protective Equipment

FREDONIA

PERSONAL PROTECTIVE EQUIPMENT

The selection of proper protective clothing is very important for work in confined Spaces. Proper selection and use of protective clothing will help prevent injuries and Illnesses. This selection process should bring together many factors - the type of work, chemicals involved, physical hazards, size of opening to the confined space, size of the workers and quality of the personal protective equipment itself.
The following discusses categories of personal protective equipment (PPE) that may be needed for confined space entry work. The Supervisor in charge of filling out the permit should consider all of the above factors to determine the most appropriate PPE for each confined space.

1. *Eye Protection:*

   In confined space work, the eyes are exposed to a variety of hazards such as dust, flying objects, splashing of corrosive liquids, welding sparks, and arcs and harmful radiation. OSHA requires that eye and face protection be designed to meet the performance requirements set forth in American National Standards Institute (ANSI) Z87.1, Practice for Occupational and Educational Eye and Face Protection. Eye protection should be chosen to protect the worker during specific job tasks. Welders should have protective hoods with tinted lenses to prevent arc burns. Splash goggles should be worn when the danger of splash exists.

2. *Hearing Protection:*

   Working at noise levels above 85 decibels can cause hearing loss. Hearing protection must reduce the decibels down to safe levels. There are three (3) basic types of hearing protection:

   a. Disposable, pliable material such as foam plugs.
   b. Ear plugs which are specifically designed for the wearer.
   c. Cup-type ear protectors that are worn with a band over the head, or are attached directly to a hard hat. Contractor personnel must provide their employees with appropriate hearing protection devices in accordance with their Program. Levels of noise should be evaluated at commencement of activities.

3. *Body Protection:*

   Protective clothing must be selected to provide both chemical protection and physical hazard protection. Suits must be selected using compatibility

charts to ensure adequate chemical protection. Durability and dexterity must also be considered to ensure that the worker can perform the job task safely. The Department Supervisor will review environmental conditions and determine the appropriate level of protective equipment and clothing. Attendants and other personnel indirectly involved with the confined space entry (not directly involved with entry operations) must also wear personal protective equipment such as boots, long sleeved shirts, work pants, eyewear, hard hats, etc.

Note: Protective clothing and equipment may be more susceptible to flame, sparks or heat and its use in potentially explosive or explosive atmospheres should be evaluated thoroughly. During welding activities, caution should be exercised to prevent bodily harm. Boots worn beneath protective clothing must meet minimum ANSI guidelines.

4. *Respiratory Protection:*

NOTE: SUNY Fredonia personnel cannot enter a confined space that requires respiratory protection or contains a hazardous condition as determined by testing without compliance with 29 CFR 1910.134 (Respiratory Protection).

Personnel donning any form of respiratory protection must be deemed medically and physically fit and capable of wearing respiratory protection. The level of respiratory protection must be based on levels of contaminants such as, but not limited to, VOCs and oxygen levels. In addition, the level of respiratory protection for inspection activities must also be evaluated prior to entry. To ensure that any mechanical ventilation of the space used is suitable, environmental conditions must be evaluated prior to entry to determine the appropriate level of respiratory protection.

Note: Filter-type (air-purifying) respirators are of no value in an oxygen-deficient atmosphere. National Institute for Occupational Safety and Health (NIOSH) approved self-contained oxygen or air-supplied respiratory equipment is required in oxygen-deficient atmospheres. Respiratory protection must be thoroughly evaluated and inspected for proper operating conditions prior to donning and tank/confined space entry. Negative-pressure respiratory protection is only utilized when and where appropriate as determined by environmental monitoring. Cartridges for use with negative-pressure, air-purifying respiratory protection are selected based upon the contaminant present in the space.

5. *Lifelines and Harness:*

There are three (3) types of lifeline/harness assemblies that can be used to assist with rescue/retrieval of injured employees. These include:

a. Full-body harness - This is the most preferable device to use. This system lifts

from the center of the harness so the possibility of injury is minimized. Additionally, this device will help maintain the victim in an upright position. Activities involved with tank entry must be performed utilizing a full-body harness and lifelines. Means of retrieval must be performed utilizing mechanical systems attached to either a beam above the tank or the floor.

b. Wristlets - This device is used when the space has a narrow opening. The victim is lifted by the wrists so that the shoulders pass through the opening without getting stuck. This device is often used in combination with a full-body harness so that injuries to the arms, back and neck can be avoided.

c. Safety belt with D rings - This device is not the first choice. This device pulls from the waist and there is no control over the arms or legs. The victim is subject to back injuries when pulled while wearing this device.

This device will not be available for use at SUNY Fredonia.

NOTE: *Under the OSHA confined space standard,* ***each person entering a hazardous atmosphere within a permit-required confined space must have a lifeline.*** *This lifeline must be attached to a harness assembly, which will allow the attendant to quickly remove entry personnel from the space. The attendant is also responsible for keeping the lines from tangling and keeping close communications with the entry personnel. Some type of retrieval device, such as a winch or tripod pulley, must be available to assist the attendant in lifting or pulling workers out of the space.*

6. *Buddy System:*

At SUNY Fredonia, the buddy system is a standard safety practice that must be followed while working in a confined space. This does not necessarily mean there must be at least two people inside the confined space. If only one person is necessary, the entry person should consider the attendant as his/her buddy.

7. *Communication:*

A system of communication between the entry personnel and the attendant must be established. Verbal and/or visual communication must be maintained at all times. A warning alarm signaling hazardous conditions must be implemented in order to let entry personnel know to leave the confined space immediately. A communication system must be established between the attendant and the contact for a rescue team.

Appendix H

Confined Space Work Practices & Procedures

SUNY FREDONIA

CONFINED SPACE WORK PRACTICES AND PROCEDURES

Before work can take place within a confined space, preliminary procedures must take Place:

I. Permitting

Entry into a permit-required confined Space is only performed once a permit has been Completed. Appendix C contains the "Permit Form" which must be filled out and signed every time a permit-required confined SUNY Fredonia personnel enter space. The permit is an authorized approval specifying the location of the confined space, the type of work to be done, and that a qualified person has evaluated the atmosphere and hazards. Only the Entry Supervisor can issue the permit. The permit reviews that the following items have been completed.

1. Location and description of the work to be done.

2. Hazards that may be encountered.

3. Isolation procedures have been accomplished including:

    a. Blanking and/or disconnecting of piping
    b. Electrical Lockout and Tagout
    c. Mechanical Lockout and Tagout

4. Clothing and equipment has been selected and is compatible with the hazardous atmospheres within the space. This selection should include consideration of the following types of equipment to used:

    a. Personal protective equipment
    b. Safety harness and lines
    c. Tools
    d. Approved electrical equipment

5. Atmospheric test readings have been taken including:

    a. Oxygen levels
    b. Flammability and/or explosive levels
    c. Toxic substance levels

6. Continuous monitoring while work is being performed.

7. All personnel involved with the work in the confined space have been properly trained.

All personnel understand the hazards involved with the work.

8. Attendant(s) is specifically named on the permit.

9. Written Emergency Procedures and locations of First Aid and rescue equipment have been prepared

10. Procedures to provide pedestrian, vehicle, or other barriers necessary to protect authorized entrants and to prevent unauthorized entry have been conducted.

The confined space permit must be dated and will be valid for one work shift only. Work that requires more than one shift to complete must receive an authorized permit for each shift.

At completion of work, the permit must be cancelled by the Entry Supervisor and filed with the Department Supervisor.

The permit must be posted close to the entrance in plain view and a copy must be filed with the Department Supervisor. In addition as stated previously in this document, the space must be posted with a sign indicating that it is a permit-required confined space and only authorized employees are allowed to enter.

II. Review of Hazards

All personnel involved with confined space entry work must review existing and expected hazards before work begins. All hazards must be reviewed and the measures used to control these hazards must be explained. This discussion should include any additional site-specific information and designated job duties such as:

1. Entry Team
2. Attendant
3. Supervisor
4. EH&S Director and Department Director (if applicable)

III. Isolation Procedures

The confined space must be completely isolated from all other systems and equipment before entry is to be performed. Measures must be taken to prevent the entry of hazardous substances via pipe lines. The method used must prevent the entry of solid, liquids or vapors. There are three (3) common methods of isolation.

1. The first method involves the disconnecting and removal of pipefittings closest to the confined space. The end of the pipeline is capped and misaligned, if possible. The pipe leading into the confined space should be

drained and blanked (capped). Both procedures prevent product from coming in contact with workers inside and outside the space.

2. The second method of isolation involves inserting a full-pressure blank between flanges leading to the confined space. Again, the piping from the blanked flange to the space must be drained.

3. The third method of disconnecting is Lockout/Tagout. Stored energy, whether it is in electrical or mechanical form, can be very dangerous within a confined space. Some spaces move as a whole and some having moving parts within them. Lockout procedures must be in effect if work is to be done in this type of space.

Note: Any company or employee who performs servicing and maintenance of machines and equipment must comply with OSHA standard 29 CFR 1910.147, *"The control of hazardous energy"* (Lockout/Tagout).

IV. Cleaning and Purging Techniques

When isolation and Lockout/Tagout procedures have been completed, the confined space may require cleaning and purging. Many factors affect the efficiency of the cleaning process:

1. The contents of the confined space;
2. Decomposition products or chemical reactions that may change the atmosphere;
3. Scale or sludge that has built-up on the walls and floor;
4. The configuration of the space, such as baffles or sumps; or,
5. The size and location of manholes, doorways, vents.

Due to the variety of confined spaces at SUNY Fredonia, specific cleaning and purging techniques will be discussed during the meeting prior to commencement of activities.

V. Ventilation Techniques

There are basically two (2) ways to ventilate a confined space - natural ventilation and mechanical ventilation.

1. Natural Ventilation consists of opening doors, hatches, manways, and side covers to allow the natural air currents to ventilate the confined space. The exchange of gases and vapors is unpredictable and the direction of these escaping vapors may cause hazardous atmospheres in the adjacent work areas. This method is not recommended as there may be limited access or incomplete distribution of air. However, if the sole atmospheric danger is a low oxygen content, natural ventilation may be effective. Proper oxygen monitoring must be performed to establish the effectiveness of natural ventilation.

2. Mechanical Ventilation is accomplished by directing a flow of air into the space by the use of a blower unit and hosing. All mechanical/electrical equipment used for ventilation should be grounded and, in the case of explosive or combustible atmospheres, should be explosion-proof (intrinsically safe). The following precautions are recommended:

a. Exhausted air must be directed to an area where it can be dispersed without causing harm to other employees or work processes.

b. The mechanical exhaust system should be kept in operation during the entire work period to ensure that the air in the space remains safe.

c. Ventilation must maintain the lower explosive limit (LEL) below 10%, the oxygen above 19.5% and the contaminants below Permissible Exposure Limits (PEL). If the oxygen and other levels cannot be maintained, no entry must be made. If, at any time, during entry, the LELs rise higher than 10%, and/or the oxygen levels go below 19.5% or above 23.5%, and/or the PEL of any contaminant is reached, all entrants will leave the space immediately. At this time, a more effective ventilation method must be addressed.

d. The space shall be adequately purged or ventilated for a minimum of 15 minutes. If conditions warrant, deviations from this procedure require approval by the Department Supervisor.

e. If the conditions warrant, the space should be continuously ventilated while work is being performed.

f. These ventilation requirements shall apply to all permit required confined spaces.

VI. Testing

The following testing procedures shall apply to all permit required confined spaces:

1. Confined spaces which have been identified to have the potential to contain an atmosphere that is immediately dangerous to life or health (IDLH) require that continuous monitoring of O_2 levels, explosive gas levels and toxic substances levels is performed.

2. All tests must be conducted by a qualified person and recorded in a log. In addition, all instruments must be calibrated in accordance with the manufacturer's guidelines.

3. Equipment used for continuous monitoring of gases and vapors must be direct reading instruments with audible alarms to warn of hazardous constituents or atmospheres.

4. When tests indicate the concentration of explosive gases is 10% or greater, no entry is permitted.

5. Hot Work is only permitted in the confined space when explosive gas levels do not exceed 8%. When tests indicate levels of toxic contaminants are above Permissible Exposure Limits (PELs), respiratory protection is required. See additional requirements in Section IX below.

6. Entry should not be made to a confined space with oxygen readings below 19.5%.

7. Entry should not be made to a confined space with oxygen readings above 23.5% unless ventilation techniques can be used to reduce oxygen levels to approximately 21%.

8. Employees must ensure that the monitor is in good working order before a test is made. The calibration kit shall be used in testing the instrument at least monthly or according to manufacturer guidelines if they are more restrictive

9. The monitor should remain in the test mode as long as the entrant is in the hole. The long distance probe should be used in the high temperature water holes or any other confined space that has an elevated temperature atmosphere.

10. Any permit space requiring work before entry, (i.e. purging, heat dissipation, or water removal shall be tested initially for combustible and toxic gases and to determine oxygen level and tested again prior to entry.

11. Considerations for manholes:

    a. Every time a manhole is opened it shall be tested to determine whether combustible gas or toxic gases are present and to determine the oxygen level.

VII. Tools and Equipment

The type of tools to be used within the confined space will depend on the type of work, which needs to be accomplished. Air-operated pneumatic tools are preferable over electrically driven tools because they are less likely to ignite a explosive atmosphere. When the use of portable electrical tools in unavoidable, they must be used with ground-fault circuit interrupters and be fully grounded. Temporary lights should be explosion-proof and have guards to prevent contact

with bulbs. Equipment must be suitable for use with the products in the space. For example, very acidic or alkaline solutions may oxidize and corrode metal tools. Material Safety Data Sheets should state what the chemical will react with.

VIII. Other Precautions

1. When necessary for the protection of entrants, permit spaces shall be protected with applicable guards such as manhole guards and warning devices for pedestrians and vehicles. Guards shall be set up at permit spaces before the space is opened for entry.

2. Never enter a permit required confined space until it has been tested.

3. Where there is a tent placed over a manhole opening because of inclement weather, roll or tie up the skirts of the tent before the initial purging of the manhole. Provide an open area around the bottom of the tent roughly the same size or larger than the area of the manhole opening for circulation and dissipation of possible gas accumulation. After the initial purging of the manhole, the tent skirts can be lowered but should be arranged to permit unrestricted circulation from the tent.

4. A hot work permit must be obtained if hot work is to be performed in permit required confined space. All SUNY Fredonia hot work procedures must be followed. No ignition source shall be brought near a confined space or taken into the space.

IX. HOT WORK IN CONFINED SPACES

Hot work procedures must be followed along with permit space entry procedures when operations may cause a source of ignition to a material or substance or create a work induced hazard by ignition within ALL confined spaces.

Additional requirements list below shall also be followed:

1. A pre-entry briefing will be held by the Entry Supervisor.
2. Pre-entry atmospheric testing must be conducted. If the LEL is greater than 8% hot work must not be conducted until the level can be lowered to 8% or less.
3. Ventilation is required. Fans/ventilators shall be used at the point of entrance of the confined space, and adjacent to the work area. If the exhaust is not through alternate access, necessary precautions will be taken so the exhaust is not affecting another work party that may be in the area.
4. If adequate mechanical ventilation cannot be provided, the space shall not be entered.

Appendix I

Non-Entry Rescue Procedures

FREDONIA

Non-Entry Rescue Procedures

The configuration of the confined space will dictate specific rescue procedures to be followed in case of an emergency. SUNY Fredonia does not have an in-house rescue team, however, there are a few rules that should be followed in an emergency.

During the safety discussion prior to commencement of the confined space entry, rescue procedures and locations of retrieval devices must be selected. The following are basic rescue procedures that shall be followed in the event that a rescue from a confined space is necessary.

1. The attendant **must not enter** the confined space for the purpose of rescuing entry personnel.

2. The attendant will notify the employer that a rescue team is needed without leaving the work area.

3. The attendant will attempt to retrieve personnel with the safety equipment provided, such as, hoists or a block-and-tackle device for lifelines.

4. If the attendant is successful in retrieving the entrant from the confined space, he/she shall administer, if necessary, first aid to the best of their ability and capability until rescue personnel arrive.

Note: ***Under no circumstances are SUNY Fredonia personnel to attempt a rescue by entering a confined space.*** ***Such procedures will be provided by outside services.***

Appendix J

Training

CONFINED SPACE ENTRANTS, ATTENDANTS, AND ENTRY SUPERVISORS SHALL BE TRAINED IN THE FOLLOWING:

- The general requirements of 29 CFR 1910.146 *Permit Required Confined Spaces*
- All applicable training requirements listed in 29 CFR 1910.146
- SUNY Fredonia's Employees Handbook for Confined Space Entry, which includes:
    - Location of SUNY Fredonia's written Confined Space Program
    - SUNY Fredonia's confined space inventory
    - Space evaluation requirements
    - Consequences for not following confined space procedures
    - Hazards found in confined spaces
    - Entrant, Attendant, and Entry Supervisor duties
    - Work Practices and Procedures for confined space entry
        - Permitting
        - Communication of Hazards
        - Isolation Procedures
        - Cleaning and Purging
        - Ventilation Techniques
        - Atmospheric Testing
        - Tools and Equipment
        - Other Precautions
        - Hot Work in Confined Spaces
    - Alternate Entry Procedures
    - Reclassification of Permit Space Procedures
    - Non-entry rescue procedures
    - Personal Protective Equipment
    - Contractor Protocol
    - Blank Confined Space Entry Permit
    - Blank Confined Space Survey Form

- Standard First Aid
- Adult CPR
- Non-Entry Rescue Hands-On Training

...ace Experts

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April 28, 2005

email: Bartlett@fredonia.edu

Julie Bartlett
Environmental Health and Safety / Facilities Planning
280 Central Avenue
Fredonia, NY 14063

Re.: Confined Space / First Aid-CPR Training

Dear Julie:

Per your request, Occupational Safety & Environmental Assoc., Inc. is pleased to provide a proposal for the above training. We understand you wish to provide both of these training courses for 27 people at your facility. These two training classes combined will require a full day and a half.

Our instructor will require a classroom-like facility, such as a conference room with either a dry-erase board or easel, power point projector (if possible) and a television and video cassette player. Confirmed with Colin

Confined Space Non-Entry Rescue Refresher training is designed to address compliance with the confined space standard 29 CFR 1910.146.

Program Contents:

- Standard summary
- Compliance programs
- Training programs
- Permits
- Entrant/Attendant Qualifications
- Non entry rescue

Cost : 4-Hr class $700

Training Materials Option: Given the cost of reproducing materials and the copyright nature of our training manuals, OSEA will provide you with one (1) copy of reproducible materials for this training class. You will be responsible for making the required number of copies needed to complete the class; **OR** OSEA can provide all materials at a cost of $10/per Confined Space manual.

National Safety Council First Aid (3 yr), CPR (2 yr) certification to give your company and employees the tools to respond effectively to an emergency and maintain OSHA compliance.

Program Contents

- Scene survey
- Bone injuries
- Basic life support
- Spinal injuries
- Emergency medical system
- Muscle injuries
- Bleeding
- Heart attack
- Shock
- Stroke
- Swallowed poison
- Seizures
- Bums
- Insulin shock
- Common emergencies: nosebleed, loss of tooth, insect stings, poison ivy
- Heat related emergencies × CPR - evaluation and emergency skills
- Cold related emergencies

Cost: $1800
8-hour class with required National Safety Council student materials

If this proposal meets with your approval, please sign the attached standard contract language or submit a purchase order reflecting terms contained within this document. When we receive the signed agreement we will contact you to arrange a date and time convenient for you. For this training assignment, payment in full prior to the start of class will be required. Please refer to the following contract language.

BASIC UNDERSTANDING OF ENGAGEMENT & AGREEMENT TRAINING SERVICES

The terms of this proposal are effective for thirty (30) days. Either party may terminate this agreement by giving written notice to the other party. In the event that the client terminates this agreement, the client shall pay the costs OSEA, Inc. has incurred up to the effective date of termination. In this event, all finished and unfinished documents and other confidential information, at the option of the client, become their property, provided OSEA, Inc. has been paid in full for services rendered to date.

OSEA, Inc. will not knowingly disclose to others, any confidential information furnished by the client in connection with this project or work performed on the client's behalf. It is recommended that the client clearly mark particularly sensitive information or documents as confidential. OSEA, Inc. will not publish information obtained in a manner that would be identifiable to the client's project, without the prior written consent of the client. The client acknowledges that the relationship between OSEA and its employees is especially essential to the viability of OSEA; accordingly the client shall not directly nor indirectly induce, or attempt to influence, any employee of OSEA to terminate his or her employment with OSEA and that the breach of this covenant may result in material, irreparable injury to the company or its affiliates or subsidiaries.

Accordingly, and other than by written agreement with OSEA, Inc., you agree that unless first having secured our written consent thereto, you will not hire, employ nor retain, directly or indirectly, the services of any employee, servant or agent of our company for a period of two (2) years following the effective date of termination or expiration of your agreement with us.

Our services will be compensated on the basis of this proposal unless a change order is submitted in writing. Deposit is required prior to scheduling of training. Full payment is required prior to or on the day of training. Training certificates will be issued when account is paid in full. **Interest of one and one-half percent (1½%) monthly charged on all amounts unpaid. In accordance with our firm's policies, OSEA, Inc. reserves the right to suspend services if your account becomes overdue, and may not be resumed until your account is paid in full.** If suspension does go into place due to failure of payment, OSEA, Inc. is not responsible, or under any obligation, if undesirable circumstances arise due to non-service of this account. In all cases, you remain responsible to pay for all services rendered and costs incurred to date. For this engagement, a deposit as indicated must be forwarded, along with this signed acceptance in order for services to be initiated. Expenses incurred on behalf of a client will be billed immediately with a 20% handling fee, and payment due upon receipt of invoice.

The liability of OSEA, Inc. for services performed or provided will be limited to the amount paid to OSEA, Inc. under this contract. No other warranty, whether expressed or implied, is made or is intended for services performed or provided. OSEA, Inc. will render services to the client in a professional manner and will use that degree of care and skill ordinarily exercised under similar conditions by reputable and competent firms providing similar consultation.

The client remains as the considered **person** in charge. In this regard, the client remains solely responsible for providing any notices and/or disclosures to public agencies or to the public at large regarding safety, health or issues that may impact on the welfare of the employees or the public. OSEA, Inc.'s role remains to provide the client with prudent advice in these matters and to work with clients' assigned staff or counsel.

It remains the responsibility of the client to ensure the medical fitness of the participants who may be involved in the hands on practice and/or demonstrations.

Medical qualifications for other training activities as required remains the responsibility of the client. This would include physical examinations, fit tests, certifications to utilize equipment such as but not limited to; respiratory protection equipment, personal protective equipment, hardware and devices used for such training. If the client is unsure of these requirements, please notify OSEA for clarifications.

***. . . . . It is agreed that the fee for services may be adjusted should the nature of the project and its scope be modified at your request, or our suggestion, during the course of the project. There must be mutual agreement to any modification in the scope of this project and fee. The fee for services could result in a + or - shift should unforeseen circumstances arise due to the nature of the job. This letter will become our understanding of engagement upon your approval and signature below.**

This proposal and the Standard Engagement Provisions set forth the business terms of our relationship. Please read these materials carefully. If the agreement set forth in this proposal and the enclosed Standard Engagement Provisions are agreeable, please sign and return the enclosed copy of this letter together with full payment to OSEA, Inc. Our agreement will not take effect and OSEA, Inc. will have no obligation to provide services until the signed copy is received in our office.

All services are charged on a portal-to-portal basis unless other arrangements have been made. Minimal travel expenses such as mileage ($.42/mile), lodging and meals are additional and billed (as it pertains to specific proposal). *(Rev 4/13/05)*

ACCEPTANCE:

TRAINING for 27 students:

☒ 4-Hr Confined Space - $700
☒ SUNY will copy manuals
☐ OSEA will provide manuals at cost

☒ 8-Hour First Aid/CPR - $1800

OSEA, Inc.
President

4/28/05
Date

Name

Title

Date

OSEA... The Workplace Experts looks forward to providing continued EH&S assistance to SUNY Fredonia. Please call with any questions.

Very truly yours,

Michael J. Leone
Marketing/EH&S Consultant

OSEA

OSEA

The Workplace Experts

CONFINED SPACE

Entrant & Attendant Training

12/2000

Occupational Safety & Environmental Assoc., Inc.
3320 N. Benzing Road
Orchard Park, NY 14127
716-821-0091(Phone)
716-821-0232 (Fax)
800-867-6732
email: experts@osea.com

OSEA

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Confined Space Entrant & Attendant Training

CONTENTS

INTRODUCTION

After years of debate, OSHA and congress promulgated a standard in 1993 entitled "Permit Required Confined Spaces." This standard has since been adopted by reference in 29CFR 1926 (Construction) now covering workers in virtually any facet of work.

The importance of knowing this standard is vital to providing each worker a safe and healthy workplace. A confined space may appear simple and harmless but it is critical to recognize the potential dangers.

This program will review the definitions of "confined space" and "permit-required confined space" along with how to insure safe entry, work, and non-entry rescue. The course meets the requirements for the Entrant, Attendant and Entry Supervisor. Title 29CFR 1910.146 and 1926.21(b)(6)), and 1926.956 standard requirements for training are met or exceeded.

OSEA, Inc., *The Workplace Experts* recommends that all employees participating in the classroom session perform at minimum one mock entry of a classified confined space at their workplace within 60 days of completion of this course. This will meet not only the mandate of the standard but also the spirit of the performance basis of this training course.

DEFINITIONS

Confined Space:
Large enough for employee to enter
Limited or restricted means for entry or exit
Not designed for continuous occupancy

Permit-required confined space - one or more of the following characteristics:
Contains or has potential to contain a hazardous atmosphere
Contains material that has the potential for engulfing an entrant
Has an internal configuration that could trap or asphyxiate entrants with inwardly converging walls or a floor that slopes downward
Contains other recognized serious safety or health hazards

Alternative Procedure: A procedure designed only for entry into a confined space that has an atmospheric hazard that CAN be controlled.

Attendant: An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized Entrant: An employee who is authorized by the employer to enter a permit space.

Emergency: Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Engulfment: The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or can exert enough force on the body to cause death by strangulation, constriction or crushing.

Entry: OSHA's latest clarification states that the head breaking the plane of the opening constitutes entry. Exception: when contaminants exist or are suspected to exist that could harm any other body part.

Entry Permit: A written document describing the space, purpose of the entry, what testing has been done, precautions to take and listing the authorized entrants and attendant with issuances & expiration times and dates.

Entry Supervisor: The Field Supervisor and/or Crew Leader who will determine if the space has acceptable entry conditions, overseeing the entry and terminating the entry. This person must:

- Know the hazards of the space
- Verify the space testing, equipment procedures
- Verify availability of a rescue team/service
- Remove unauthorized entrants
- Maintain a consistent approach

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10 % of its lower flammable limit (LFL);
- Airborne combustible dust at a concentration that meets or exceeds its LFL;
- Atmospheric oxygen concentration below 19.5 % or above 23.5 %;
- Any other atmospheric condition that is IDLH.

Hot work Permit: The employer's written authorization to perform operation (for example use of a torch in a manhole) capable of providing a source of ignition.

Immediately Dangerous to Life and Health (IDLH): Any condition that poses an immediate or delayed threat to life that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

Isolation: (for the purpose of this Policy only) the process by which a permit space is removed from service and completely protected against the release of stored energy and material into the space by such means as: opening, holding, blanking or grounding all sources of energy.

Non-permit Confined Space: A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serous physical harm.

Oxygen Deficient Atmosphere: An atmosphere containing less than 19.5% oxygen by volume.

Oxygen Enriched Atmosphere: An atmosphere containing more than 23.5% oxygen by volume.

Prohibited Condition: Any condition in a permit space that is not allowed by the permit during the period entry is authorized.

Rescue Service: Qualified/Trained (proof by documentation) personnel hired by the owner to rescue employees from permit spaces.

Retrieval System: the equipment (including a retrieval line, chest or full body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing: The process by which the airborne hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

PRE-ENTRY REQUIREMENTS

Preparing for Entry:

1. Evaluate the workplace to determine if any spaces are permit-required confined spaces.

2. Inform exposed employees with signs indicating the existence, location, and dangers associated with the premises.

"DANGER - PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER"

3. Verify the space is safe for entry and provide written certification that contains the date, location of the space, and signature of the person providing certification. This shall be made before entry and made available to each employee entering the space.

4. Develop and implement the procedures for safe permit space entry operations, such as:

   - Specify acceptable entry conditions
   - Isolate the permit space
   - Purge, insert, flush or ventilate the permit space as necessary to eliminate or control atmospheric hazards.

5. Provide barriers to protect entrants from external hazards.

6. Provide and maintain the following equipment and ensure it is being used properly:
   - Testing and monitoring equipment
   - Ventilation equipment
   - Communications equipment
   - Personal protective equipment
   - Lighting equipment
   - Ladders or other equipment needed for safe entry and exit
   - Rescue and emergency equipment

7. Provide at least one attendant outside the permit space for the duration of work. Attendants may be assigned to more than one permit space provided all duties are effectively performed. Also, attendants may be stationed at any location outside the permit space provided all duties are effectively performed.

8. Designate persons involved in the entry operations (authorized entrants, attendants, entry supervisors, person to test or monitor the atmosphere). Identify duties and provide training for each employee.

Verifying Air Quality:

Test internal atmosphere with a calibrated direct-reading instrument. The following items must be tested in the order given:

1 - Oxygen content

The following chart outlines the effects of an atmosphere that is enriched to low-level deficiency.

Oxygen Content % by Volume	Effects and Symptoms (at atmospheric pressure)
23.5% and above	Extreme fire hazard
19.5%	Minimum permissible oxygen level
15-19%	Decreased ability to work strenuously. May impair coordination and may induce early symptoms in persons with coronary, pulmonary, or circulatory problems.
12-14%	Respirations increase, pulse increases, impaired coordination, perception and judgement.
10-12%	Respirations further increase in rate and depth, poor judgement, lips blue.
8-10%	Mental failure, fainting, unconsciousness, ashen face, blueness of lips, nausea, and vomiting.
6-8%	8 minutes, 100% fatal; 6 minutes, 50% fatal; 4-5 minutes, recovery with treatment possible.
4-6%	Coma in 40 seconds, convulsions, respirations cease, death.

These values are approximate and vary with the individual's state of health and his or her physical activities.

Exposure to atmospheres containing 12% or less oxygen can bring about unconsciousness without warning so quickly that the individuals cannot help or protect themselves.

2 - Combustible/Flammable gases & vapors

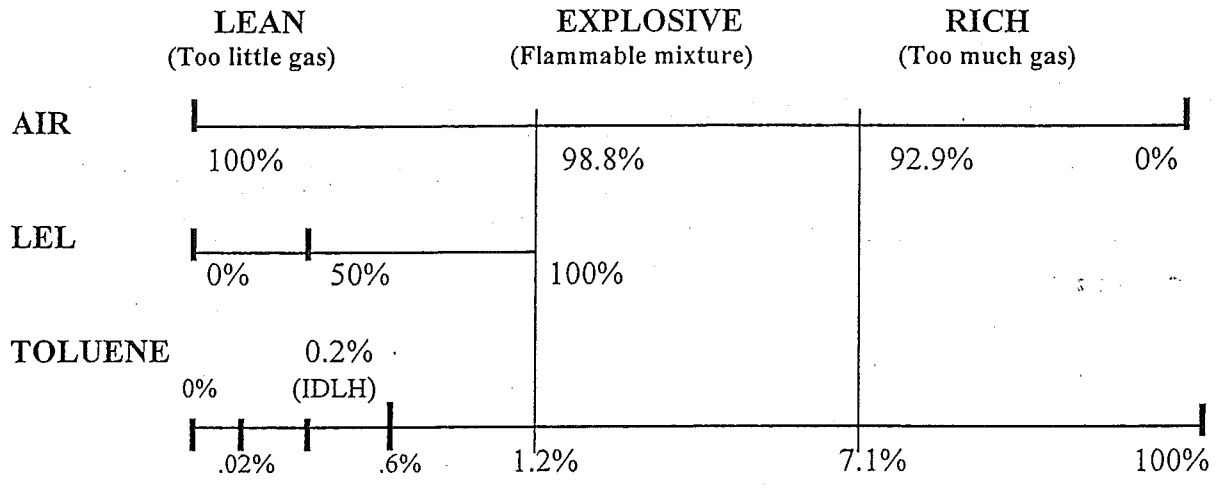
Combustible/flammable gases and vapors can pose a significant threat of fires and/or explosion in permit spaces.

The lowest concentration (air-fuel mixture) at which a gas or vapor can ignite is called its Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL). Concentrations below this limit are too lean to burn.

The highest concentration that can be ignited is its Upper Explosive Limit (UEL) or Upper Flammable Limit (UFL). Above this concentration, the mixture is too rich to burn.

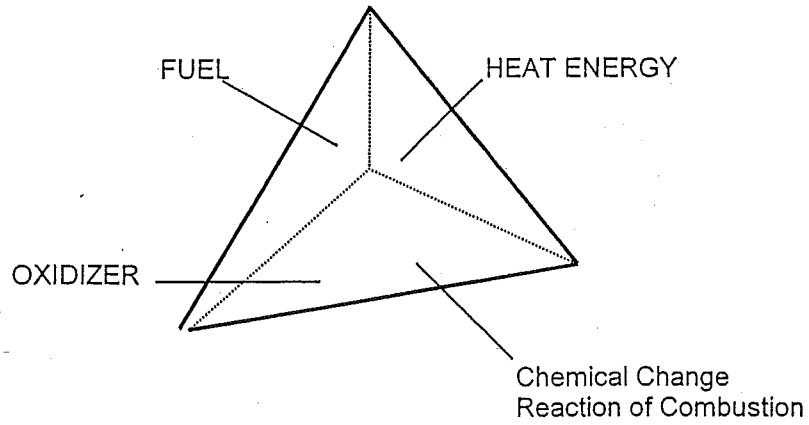
A gas or vapor is only explosive/combustible between its LEL and UEL, but any concentration of combustible gas or vapor should be of concern when in a confined space. Lean mixtures can collect in an area and reach a combustible level, or rich mixtures can be diluted with air to become combustible.

Lower Explosive Limit (LEL) vs. Upper Explosive Limit (UEL) for Toluene



1% = 10,000 parts per million (ppm)

In order for an explosion or fire to occur, all components of the "fire tetrahedron" have to be present: fuel, oxygen, ignition source, and a chain reaction.



Many provisions in the standard address prevention of fire and explosion hazards by removing components of the fire tetrahedron, including:

- Preventing an atmosphere from containing a flammable gas, vapor or mist concentration in excess of 10% of the Lower Explosive Limit.
- Conducting atmospheric testing to determine the percentage of the LEL present.
- Elimination or control of sources of ignition.

3 - Potential toxic air contaminants

These substances come in the form of gases, vapors, mists, dusts, fumes or radiation. Atmospheric conditions are hazardous when the dose or PEL (permissible exposure limit) is exceeded per Subpart Z or G of 29 CFR 1910.

Substances for which OSHA has not established a dose or PEL must be evaluated by the employer to determine their hazards. Sources of information include:

- Material Safety Data Sheets (MSDS)
- Published information on the substance
- Industry established exposure levels
- National Consensus Standards, including American Conference of Governmental Industrial Hygienists (ACGIH), National Institute of Safety and Health (NIOSH)

PELs may be expressed as 8-hour Time Weighted Averages (TWAs), 15-minute Short Term Exposure Limits (STELs), or ceiling limits. The ACGIH Threshold Limit Values (TLVs) and NIOSH Recommended Exposure Limits (RELs) are recommended exposure limits. In the absence of an OSHA PEL, OSHA can enforce TLVs and RELs.

Toxic substances will have acute (short-term) or chronic (long-term) health effects, some have both. It is important for the employer to know which, since acute health hazards are of an immediate concern when determining the presence of a hazardous atmosphere. Three (3) of the most common toxic gases found in permit spaces include hydrogen sulfide, carbon monoxide, and methane.

Hydrogen Sulfide

Hydrogen sulfide is a flammable, colorless gas with characteristic rotten-egg odor and is soluble in water. It is commonly found in areas where petroleum products are processed, is a by-product of manufacturing operations such as tanneries, is released during the decay of sulphur-containing organic matter, and is encountered in sewers and sewage treatment plants. Hydrogen sulfide has a strong odor noticeable at low concentrations, but overall, this substance has poor warning properties because of rapid olfactory fatigue. Employees will quickly lose their ability to smell the gas, even though the gas is still present in the space.

EFFECT OF VARIOUS H_2S	
H_2S Level in PPM*	**Resulting Condition/Effects on Humans**
0.13	Minimal perceptible odor
4.60	Easily detectable, moderate odor
10.0	Beginning eye irritation. Permissible exposure level, 8 hours (OSHA, ACGIH)
27.0	Strong, unpleasant odor, but not intolerable
100	Coughing, eye irritation, loss of sense of smell after 2 to 5 minutes
200	Marked conjunctivitis (eye inflammation) and respiratory tract irritation after one hour of exposure
300	IDLH
500-700	Loss of consciousness and possibly death in 30 minutes to one hour
700-1000	Rapid unconsciousness, cessation (stopping or pausing) of respirations, and death
1000-2000	Unconsciousness at once, with early cessation of respirations and death in a few minutes. Death may occur even if individual is removed to fresh air at once.
*PPM = Part per million 10,000 PPM = 1% by volume IDLH = Immediately Dangerous to Life and Health	
All values are approximate. The effects can vary depending on the individual's health and the type of physical activity being performed.	
Source: American National Standards Institute (ANSI Standard No. Z37.2-1972)	

Hydrogen sulfide is a common toxic gas encountered in many permit space locations. Hydrogen sulfide has an LFL of 4.3% or 43,000 ppm. The standard requires maintaining an environment of less than 10% of the LFL to avoid a potential explosion. Hydrogen sulfide also has Permissible Exposure Limit (PEL) of 10 ppm and an Immediately Dangerous to Life and Health concentration of 300 ppm. Say, for example, the LFL is found to be 5%, though the testing indicates no explosive hazard, it does indicate a level of approximately 2,150 ppm which exceeds the PEL and IDLH.

HYDROGEN SULFIDE	
Percentage of LFL	**PPM**
100%	43,000
10%	4,300
5%	2,150
.7%	300 IDLH
.02%	10 PEL

Carbon Monoxide

Carbon monoxide is a very toxic, colorless, odorless combustible gas that is a product of incomplete combustion. It is generated by many sources such as gasoline-powered internal combustion engines, arc welding where carbon dioxide is used as an inert gas, and fires, just to name a few. Carbon monoxide has a high affinity for the hemoglobin in blood and can quickly replace oxygen. In high concentrations, carbon monoxide can cause chemical asphyxiation.

EFFECT OF VARIOUS CO LEVELS	
Co Level in PPM*	**Resulting Condition/Effect on Humans**
50	Permissible exposure level, 8 hours (OSHA)
200	Possible mild frontal headache in 2 to 3 hours
400	Frontal headache and nausea after 1 to 2 hours; Occipital after 2 ½-3 ½ hours
800	Headache, dizziness, and nausea in 45 minutes. Collapse and possibly death in 2 hours
1500	IDLH
1600	Headache, dizziness, and nausea in 20 minutes. Collapse and possibly death in 2 hours
3200	Headache and dizziness in 5 to 10 minutes. Unconsciousness and danger of death in 30 minutes.
6400	Headache and dizziness in 1 to 2 minutes. Unconsciousness and danger of death in 10 to 15 minutes
12,800	Immediately effect unconsciousness. Danger of death in 1 to 3 minutes.
*PPM = Part per million 10,000 PPM = 1% by volume IDLH = Immediately Dangerous to Life and Health	
All values are approximate with the exception of the OSHA PEL. The effects can vary depending on the individual's health and the type of physical activity being performed.	
Source: American Industrial Hygiene Association	

Methane (Natural Gas)

Methane is a colorless, odorless, flammable gas. It is a simple asphyxiant and displaces air in a confined space. The natural decaying process or organic materials is the most common source.

Provide forced air ventilation, if necessary, from a fresh air source to eliminate any hazardous atmosphere.

Periodically test permit area as long as the space is occupied.

The following conditions must exist within a confined space:

- Oxygen level must be between 19.5 and 23.5 percent.
- Flammable gasses must not be over 10 percent of the LFL (Lower Flammable Limit).
- Toxic concentrations must not be over the PEL (Permissible Exposure Limit).

All tests must be complete, accurate, and documented before entry.

Other atmospheric conditions to consider are:

- Residue materials after draining of space
- Cleaning solvents
- Fumes/Gases from welding/cutting
- Leaking valves that are not blanked and bled correctly

A good source of information concerning the substances present or suspected is the MSDS that should be available to the Entry/Rescue Team. Remember, the MSDS supplies the following information:

- Flammability
- Density (heavier/lighter than air)
- Acute and chronic health hazards
- Lower explosive limit/Upper explosive limit
- PEL
- ACGIH (TLVs)
- IDLH levels

4 - Combustible/Explosive Dust

The following group of materials is usually referred to as nuisance and can be very hazardous. Combustible dust may also pose a significant hazard to employees should their airborne concentration reach the lower flammability limit for the specific dust. Some common types of combustible/explosive dust include:

Food Products
grain dusts
flour
starches

Spices
pepper
tea
cinnamon

Metal Powders
aluminum
magnesium
zinc

Other Dusts
hard rubber
plastic

Wood Products
wood dust
cellulose

Many other organic as well as inorganic materials, if ground fine enough, will burn and support a flame.

Because there is currently no reliable dust-monitoring equipment available to provide on-site combustible dust concentration measurements, a test should be verified visually. When the dust is found in concentrations heavy enough to obscure/block your vision at 5 feet (1.52 meters) or less, some type of control measure should be adopted.

ENTRY PERMIT

Post the entry permit by the entrance of the permit space and make available to all authorized entrants at the time of entry. The entry supervisor shall terminate entry and cancel the entry permit when operations are completed or a condition arises that is not allowed by the permit.

Identify the following on each entry permit:

1. Permit space to be entered
2. Purpose of entry
3. Date & authorized duration of permit
4. Authorized entrants with method to determine which authorized entrants are inside the permit space
5. Personnel currently serving as attendants
6. Individual currently serving as entry supervisor
7. Hazards of permit space
8. Measures to isolate the permit space and eliminate or control hazards before entry
9. Acceptable entry conditions
10. Results of initial and periodic tests with tester's signature and time performed
11. Rescue and emergency services including equipment and phone numbers for requesting services
12. Communication procedures for entrants and attendants to maintain contact during entry
13. Equipment to be provided for compliance, such as personal protective equipment, communications equipment, alarm systems, and rescue equipment.
14. Any other information that is necessary.
15. Any additional permits issued to authorized work in the permit space, such as hot work permits.

ALTERNATIVE ENTRY PROCEDURE

When a space has no atmospheric hazards or has atmospheric hazards that can be controlled, an alternate method of entry (less restrictive) may be instituted. Be sure the following conditions are met:

1. The designated space only has a documented actual or potential hazardous atmosphere
2. The use of continuous forced ventilation during the entry will maintain a safe breathable atmosphere.
3. Monitoring data and inspection confirms the fact that the environment only has an actual or potential hazardous atmosphere.
4. Entry to confirm the hazards is performed using the permit required confined space guidelines mentioned above.
5. Each employee designated to enter under the Alternative Procedures will be provided access to the data and verify by signature that they have read the data and agree with the classification.
6. If removal of the entrance cover creates a hazard, the condition/hazard must be eliminated before the removal of the hatch/cover (bleed off air that would create a sudden movement of the hatch/cover).
7. As soon as the hatch/cover is opened / removed a barrier must be installed around the entrance to prevent accidental falls of objects/tools into the space.
8. Documented testing records of the air monitoring demonstrating a safe atmosphere with a direct read instrument that tests for Oxygen, Hydrogen Sulfide Gas, Carbon Monoxide Gas, Combustible Gas (methane or petroleum based) and toxic gases with evidence of a current calibration (within 48 hours of the entry – field calibration).
9. All air monitoring results must register O%
10. Continuous ventilation must ventilate the entire area that entrant will be working in.
11. The air source used to ventilate must be from a verified clean atmosphere (free of air contaminants).
12. Continuous air monitoring will be conducted during entry. If any hazard is detected during the entry all employees/entrants will be evacuated immediately.
13. After the source of the hazardous atmosphere is determined a decision will be made whether the space will either be re-entered under the "Alternative Entry" or "Permit Required". If the source of the hazard is such that it can not be eliminated continuously from the atmosphere then the space will be re-classified as a "Permit Required".

TRAINING

Training shall be provided by employer so all employees whose work is regulated acquire the understanding, knowledge, and skills necessary for safe performance. Training shall be provided before employee is assigned duties in a permit space, before any change in assigned duties, and whenever a change in permit space operations presents a hazard on which an employee has not been trained. The employee shall provide written certification of training that includes employee's name, signatures of trainers, and dates of training.

RESCUE & EMERGENCY SERVICES

The following requirements apply to employers who have employees enter permit spaces to perform rescue services. Employers must determine and schedule/hire rescue services that will be present for the duration of the entry. If rescue service personnel are not at the site, they must be able to respond within 4-6 minutes.

1) Each member of the rescue service is provided with, and trained to use, personal protective equipment and rescue equipment necessary for making rescues.

2) Each member shall receive training on assigned rescue duties and for authorized entrance.

3) Each member shall practice making permit space rescues at least once a year by means of simulated rescue operations.

4) Each member shall be trained in basic first aid and CPR. Because the rescue worker is trained in First Aid/CPR each rescuer must also receive Bloodborne Pathogens training.

Retrieval systems shall be used to facilitate in non-entry rescue whenever an authorized entrant enters a permit space, unless the retrieval equipment would not contribute to the rescue of the entrant.

1) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level or above the head. Wristlets may be used if the chest or full body harness is infeasible or creates a greater hazard.

2) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space so rescuer can be made aware that rescue is necessary.

3) Mechanical devices shall be used for retrieval from vertical type permit spaces more than 5 feet deep.

An MSDS or other similar written information is required to be made available to any medical facility treating an entrant exposed to a hazardous substance.

DESIGNATED PERSONNEL

AUTHORIZED ENTRANT:

An employee authorized by the employer to enter a permit space.

Duties:

1. Know the hazards that may be faced during entry including mode, signs, symptoms, and consequences of exposure.

2. Proper use of required equipment.

3. Communicate with attendant as necessary.

4. Alert attendant whenever any warning sign or symptom of exposure is detected or a prohibited condition is detected.

5. Exit permit space whenever ordered by attendant or entry supervisor, a warning sign or symptom of exposure or prohibited condition is detected, or when an evacuation alarm is activated.

ATTENDANT:

Individual stationed outside one or more permit spaces who monitors the authorized entrants and performs all duties assigned in the employer's permit space program.

1. Know hazards that may be faced during entry including information on the mode, signs, symptoms, and consequences of exposure.

2. Be aware of possible behavioral effects of exposure.

3. Continuously maintain an accurate count of entrants in the permit space.

4. Remain outside permit space during entry operations until relieved by another attendant.

5. Communicate with authorized entrants as necessary to monitor entry status and alert entrants of need to evacuate.

6. Monitor activities inside and outside permit space to continue safe operation for entrants and order evacuation whenever a behavioral effect of exposure or prohibited condition is detected, dangerous contents are detected outside the permit area, or if the attendant cannot effectively and safely perform all required duties.

7. Summon rescue/emergency services as soon as entrants may need assistance to escape permit space hazards.

8. Ensure unauthorized persons do not enter the permit space and notify the authorized entrants and entry supervisor if unauthorized persons have entered the permit space.

9. Perform non-entry rescues as specified by the rescue procedure.

10. Perform no duties that may interfere with attendant's primary duty to monitor and protect authorized entrants.

ENTRY SUPERVISOR:

The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required.

1. Know the hazards faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.

2. Verifies all tests specified by the permit have been conducted and all procedures and equipment are in place before endorsing the permit and allowing work to begin.

3. Terminates the entry and cancels the permit when necessary.

4. Verifies rescue services are available and can be summoned if needed.

5. Removes unauthorized individuals who enter or attempt to enter the permit space during entry operations.

6. Determines entry operations remain consistent with terms of the entry permit whenever responsibility is transferred or at intervals dictated by the hazards or operations performed within the space.

SAFETY EQUIPMENT AND CLOTHING

The entry permit will include a list of necessary protective equipment to be used in the confined space as determined by the qualified person. The employer will be responsible for the proper use of the safety equipment, and the inspection and maintenance procedures performed on the safety equipment. The type of protective equipment required will be determined by the qualified person.

Those items normally used to protect against traumatic injury include: safety glasses, hard hats, footwear and protective clothing.

a) **Eye and Face Protection** - For persons who wear corrective spectacles, either prescription ground safety glasses or plano-goggles will be provided. Additionally, if eye irritating chemicals, vapors, or dusts are present, safety goggles will be required. If both the face and eyes are exposed to a hazard, as during scrapping scale or cutting rivets, a full coverage face shield with goggles or shields required will be in accordance with 29 CFR 1910.252.

b) **Head Protection** - Hard hats will meet the requirements cited in 29 CFR 1910.135.

c) **Foot Protection** - All foot protection will meet or exceed the requirements cited in 29 CFR 1910.136 and will provide, in addition to protection from falling objects and protection from any other hazard identified by the qualified person.

d) **Body Protection** - All personnel entering a confined space will wear full coverage work clothing as specified by the qualified person. Gloves and clothing made of impervious rubber or similar material are to be worn to protect against toxic or irritating materials. If the hazards of heat or cold stress exist in the confined space, clothing which has been tested to provide protection from over-exposure to these hazards will be worn. Other body protection required in specific operations such as welding (flame proof), riveting (heat resistant), and abrasive blasting (abrasion resistant) will be provided to insure worker safety.

e) **Hearing Protection** - Will be required when engineering technology is insufficient to control the noise level, and the ambient exposure limit exceeds those allowed in Table G-16 of 29 CFR 1910.95. Emergency alarms will be distinguishable when hearing protection is worn. The sound level meters used to measure noise levels will be certified by NIOSH in accordance with 24 CFR 82. Where the potential for explosion exists, the sound level meters will be of an explosion-proof design.

f) **Respiratory Protection** - Will be determined by the qualified person based upon conditions and test results of the confined space, and the work activity to be performed.

There are three classes of respirator:

Class 1 – Air Purifying. This device cleans the atmosphere of contaminants. Contaminants may be either gaseous, vapor or particulate with each chemical group requiring its own filter media. This type of respirator requires normal O2 levels.

Class 2 – Air Supplied. These respirators come in three groups: (1) supplied air; (2) Self Contained Breathing Apparatus (SCBA); and (3) Combination SCBA and supplied air.

Class 3 – Combination Air Purifying /supplied Air. This unit operates normally with supplied air; however, should the supply fail the wearer can switch over to the air purifying to give some measure of protection.

Minimal Acceptable Respirator Program	
Requirement	**Standard (29 CFR 1910)**
Written Operating Procedures	.134(b)(1), (e)(1), and (e)(3)
Proper Selection	.134(b)(2), (c), and (e)(2)
Training and Fitting	.134(b)(3), (e)(5) and (e)(5)(I-iii)
Cleaning and Disinfecting	.134(b)(5) and (f)(3)
Storage	.134(b)(6), and (f)(5)(I-iii)
Inspection and Maintenance	.134(b)(7), (e)(4), (f)(2)(I-iv), and (f)(4)
Work Area Surveillance	.134(b)(8)
Inspection/Evaluation of Program	.134(b)(9)
Medical Examinations	.134(b)(10)
Approved Respirators	.134(b)(11)

The respirators used will be NIOSH and MSHA approved devices and will be fitted and maintained in accordance with 29 CFR 1910.134.

(f) **Hand Protection** - If hands are exposed to rough surfaces or sharp edges, the degree of protection can range from canvas to metal mesh gloves, depending on the material handled. Gloves made of impervious rubber or similar material are to be worn to protect against toxic or irritating materials. Heat protective gloves are required when employees handle objects with temperatures greater than 60°C (140°F). Where a current flow through the body of more than five milliamperes may result from contact with energized electrical equipment, employees will wear insulating gloves that have been visually inspected before each use. Above 5,000 volts, rubber gloves in accordance with 29 CFR 1910.137 will be worn.

(g) **Retrieval Equipment** - The standard requires employers to provide, maintain and ensure the use of protective equipment. This includes equipment necessary to facilitate both entry into and exit from a permit space. Whenever possible, rescues should be performed outside the confined space so rescuers are not exposed to hazardous conditions. Proper retrieval equipment generally needed for permit space entries include:

1) chest or full-body harness
2) heavy-duty lifeline
3) mechanical winches
4) tripods
5) wristlets

Winches should be self-braking to prevent free falls and to hold personnel in place when raising and lowering has stopped. Additionally, tripods should have two winches; one for lowering, arresting and retrieving an entrant and a second for tools. By having two winches, the entrant would not be tempted to disconnect himself/herself from the lifeline.

A wide variety of harnesses are available. Some coveralls have been specifically designed with a built-in full-body harness for easy donning.

In deciding what type of retrieval equipment is needed for a specific entry operation, an evaluation of the permit space must be conducted with the following conditions in mind:

1) the size and configuration of the confined space
2) the size and location of the opening
3) any obstacles within the space
4) whether or not a rescue of the entrant would be vertical or horizontal
5) the potential hazards within the space

Retrieval lines are very effective in assisting in the safe removal of unconscious personnel from many permit spaces. Therefore, each authorized entrant must use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head.

Wristlets may be used in lieu of chest or full body harness if the employer can demonstrate the use of a harness is not feasible or creates a greater hazard. Wrist harnesses are used where the entrant may need to be withdrawn through a small opening.

In some situations, however, retrieval lines have been known to pose an additional risk by creating an entanglement hazard. In these particular situations, the use of retrieval lines may be inappropriate. In such cases, the following guidelines are provided to determine if retrieval lines are appropriate:

1. A permit space with obstructions or turns that prevent pull on the retrieval line from being transmitted to the entrant does not require the use of a retrieval system.

2. A permit space from which an employee being rescued with the retrieval system would be injured be cause of forceful contact with projections in the space does not require the use of a retrieval system.

3. A permit space that was entered by an entrant using an air supplied respirator does not require the use of a retrieval system if the retrieval line could not be controlled so as to prevent entanglement hazards with the air line.

In circumstances where retrieval lines or harnesses cannot be worn, an alternative method must be in place should an entrant need assistance. If an acceptable alternative method is not available, then entry is prohibited. In all circumstance, inspect retrieval equipment prior to use.

Additional safety equipment that is necessary to protect the worker in the environment of a confined space: a safety belt with "D" rings for attaching a life line will be worn at all times; the combination of a body harness and/or safety belt with life line will be used when an employee is required to enter to complete the gas analysis; when an employee is working in an area where entry for purposes of rescue would be contraindicated (special limitations or fire hazard); when any failure of ventilation would allow the build-up of toxic or explosive gases within the time necessary to evacuate the area, or when the atmosphere is immediately dangerous to life and health. Safety belts may be used as the primary means of suspension for the lifeline only when rescue may be made by keeping the disabled body in a position that will maintain easy passage through exit openings. If the exit opening is less than 18 inches (45 cm) in diameter, then a wrist type harness will be used. When it is determined by the qualified person that none of the special hazards associated with confined spaces pose an immediate threat to life, as in a Class C entry, then life lines will be readily available but not used during entry and work procedures.

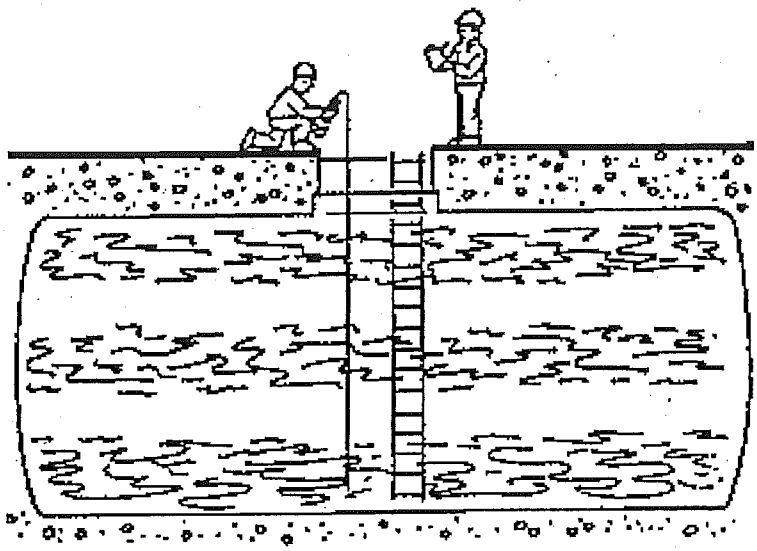
Other protective measures will include: safety nets used to protect employees working 10 feet (3 m) above ground or grade level when other protective devices are impractical; life jackets worn if the workers are exposed to falls into liquid over four feet (1.2 m) in depth; and insulated floor mats when hot work requires use of electrical energy.

When employees enter a confined space, a barricade will be erected if inadvertent entry poses a problem. The barricade will have a mechanism to prevent closure of the escape way, signs warning of the danger present, a physical barrier (fence) to keep the area clear, and an adequate platform (3 feet x 3 feet as a minimum) for entry or exit. Such added features as a tripod with block and tackle for safety lines and communication equipment should be considered when the entry plan is formulated. The employer will be responsible for maintenance of the barricade system.

WORK PRACTICES

Before entering a confined space, employees will review the specific guidelines appropriate for safe entry and emergency exit. These guidelines or standards will be compiled by the qualified person and be definitive on all the possible hazards. Areas covered by such guidelines will follow this recommended standard.

1 - **Purging and Ventilating** Environmental control within a confined space is accomplished by purging and ventilating. The method used will be determined by the potential hazards that arise due to the product stored or produced, suspected contaminants, the work to be performed, and the design of the confined space. When mechanical ventilating and/or purging operations are to be performed, the blower controls will be at a safe distance from the confined space.



Methane Combustible Gas (lighter than air)

Carbon Monoxide (CO) (approximately the same weight as air)

Hydrogen Sulfide (H_2S) (heavier than air)

Ventilation

Once a confined space has been determined to contain or potentially contain a hazardous atmosphere, steps must be taken to ventilate the space before personnel are allowed to enter. Ventilation can be accomplished by natural and mechanical means for the general purpose of:

- Controlling atmospheric contaminants
- Prevention of fire and explosion hazards
- Control of heat and humidity

Natural Ventilation

Natural ventilation is performed by removing roof and side covers and allowing natural air currents to remove gases and vapors. Natural ventilation employs wind and thermal convection to dilute any atmospheric hazard. However, the configuration of some confined spaces, and the unpredictability of wind currents and thermal effects makes natural ventilation unreliable as a primary control method. When natural ventilation is insufficient to achieve and maintain acceptable atmospheric levels, mechanical ventilation is necessary.

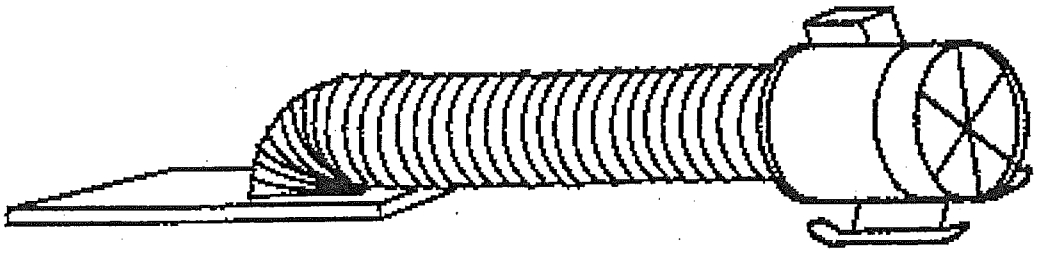
Mechanical Ventilation

Mechanical ventilation typically refers to mechanical dilution ventilation and local exhaust capture ventilation. The applicability of each method is dependent on the type of atmospheric hazard present, whether the hazard is created by the contents in the space, or created by an operation conducted within the space. When alternative procedures are used, mechanical dilution ventilation is a prerequisite.

Mechanical Dilution Ventilation

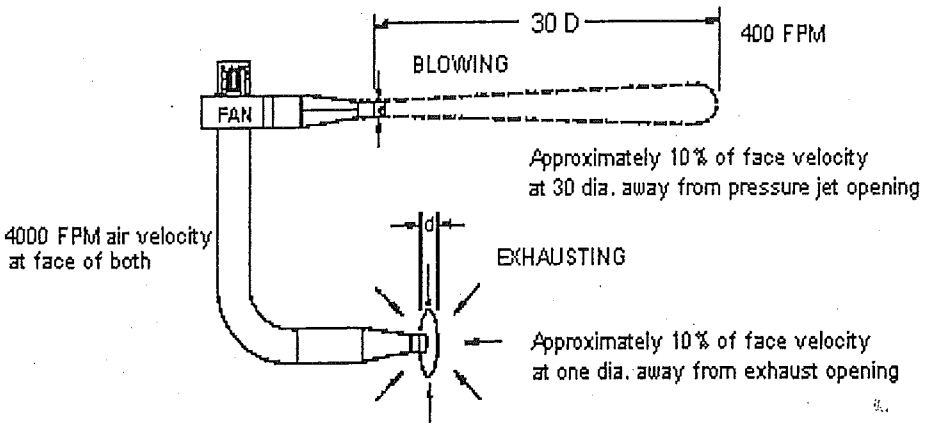
This method uses mechanical means (fans, blowers, etc.) to provide uncontaminated air to a permit space. This control measure places the permit space in a positive pressure atmospheric condition. If the amount of fresh air being supplied to the space is sufficient, the concentrations of toxic and flammable contaminants can be maintained at acceptable levels. The acceptable dilution ventilation method commonly used is to supply clean air by explosion-proof blowers located far enough away from any source of contamination.

Portable Ventilating Unit with Flexible Ductwork



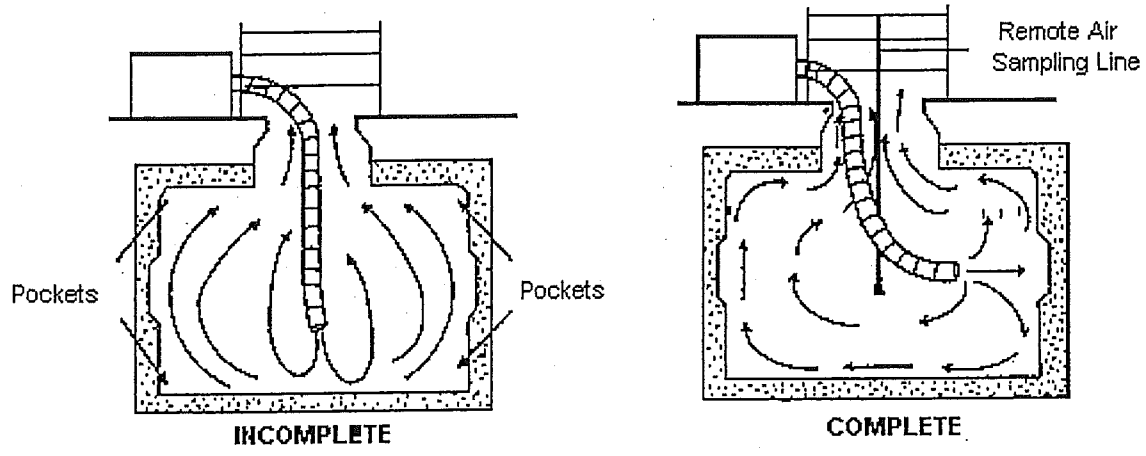
Air should be blown into a space that contains a hazardous atmosphere. Remember that contaminants are likely heavier or lighter than air. Blowing air into a space will agitate and help evaporate the contaminants and disperse them throughout the space. A space under positive pressure will eventually expel the contaminant through any openings in the space. Theoretically, air blows a distance of 30 diameter times farther than it can be exhausted.

Blowing Versus Exhausting



Purging

If an actual or potential hazardous atmosphere exists, then purging of the space is necessary. Keep in mind that forced air ventilation must be directed to ventilate the immediate area where an employee will be or is working. However, during the initial pre-entry ventilation procedure, the blowing duct outlet should be positioned for uniform dilution and elimination of any gas pockets as illustrated. Shown below are examples of complete and incomplete ventilation of manholes:



When purging a space, an effective initial purging duration must be determined. The following is a list of instructions for determining purging times using the nomographs (line charts) provided on the following pages.

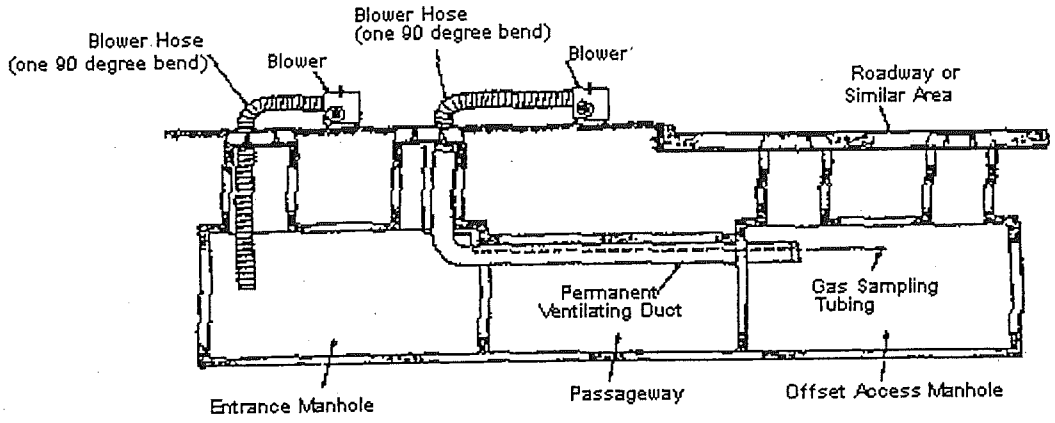
Instructions

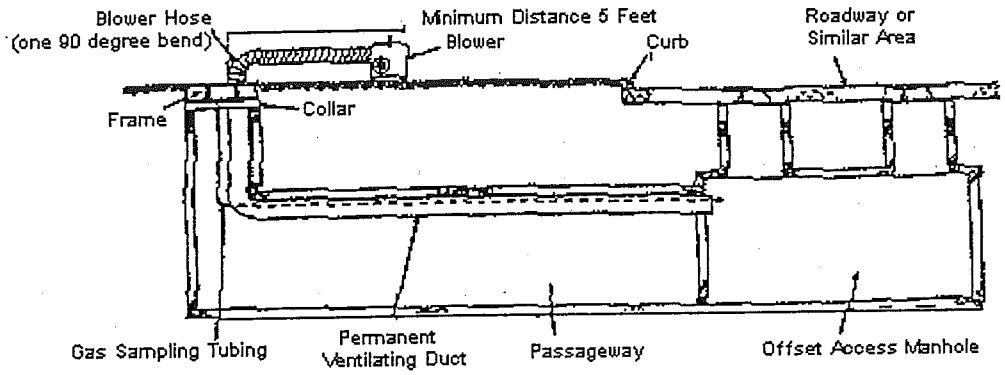
1. Test the confined space atmosphere to determine the initial atmospheric conditions.

2. Use the alignment chart to determine the minimum purging time required by:
   a) placing the straight edge on the Confined Space Volume (left scale);
   b) placing the other end of the straight edge on the Blower Capacity (right scale);
   c) read the minimum required purging time from the diagonal scale in minutes.
   d) if two blowers are used, add the two capacities, and then proceed as outlined above.

3. Note: the effective blower capacity is affected by the number of bends and the length of hose. As the length of hose and the number of bends increases, the effective blower capacity will decrease. The effective blower capacities listed in the alignment charts are based on one to two 90-degree bends and standard 15-foot blower hose.

4. It is very important to remember that these values are theoretical approximations with safety margins included. The duration for purging a space is dictated by not only the size and blower capacity, but also by the configuration, number of openings, and the airborne contaminant. The configuration of some confined spaces, for example multi-floor-level spaces or baffled spaces, restrict airflow and require additional purging time. In some situations, adequate purging and venting can only be achieved through permanently installed ventilation ducts that will introduce fresh air directly into the space. In light of this, employers are encouraged to install permanent ventilation ducts whenever possible, Examples are shown in the following illustrations.



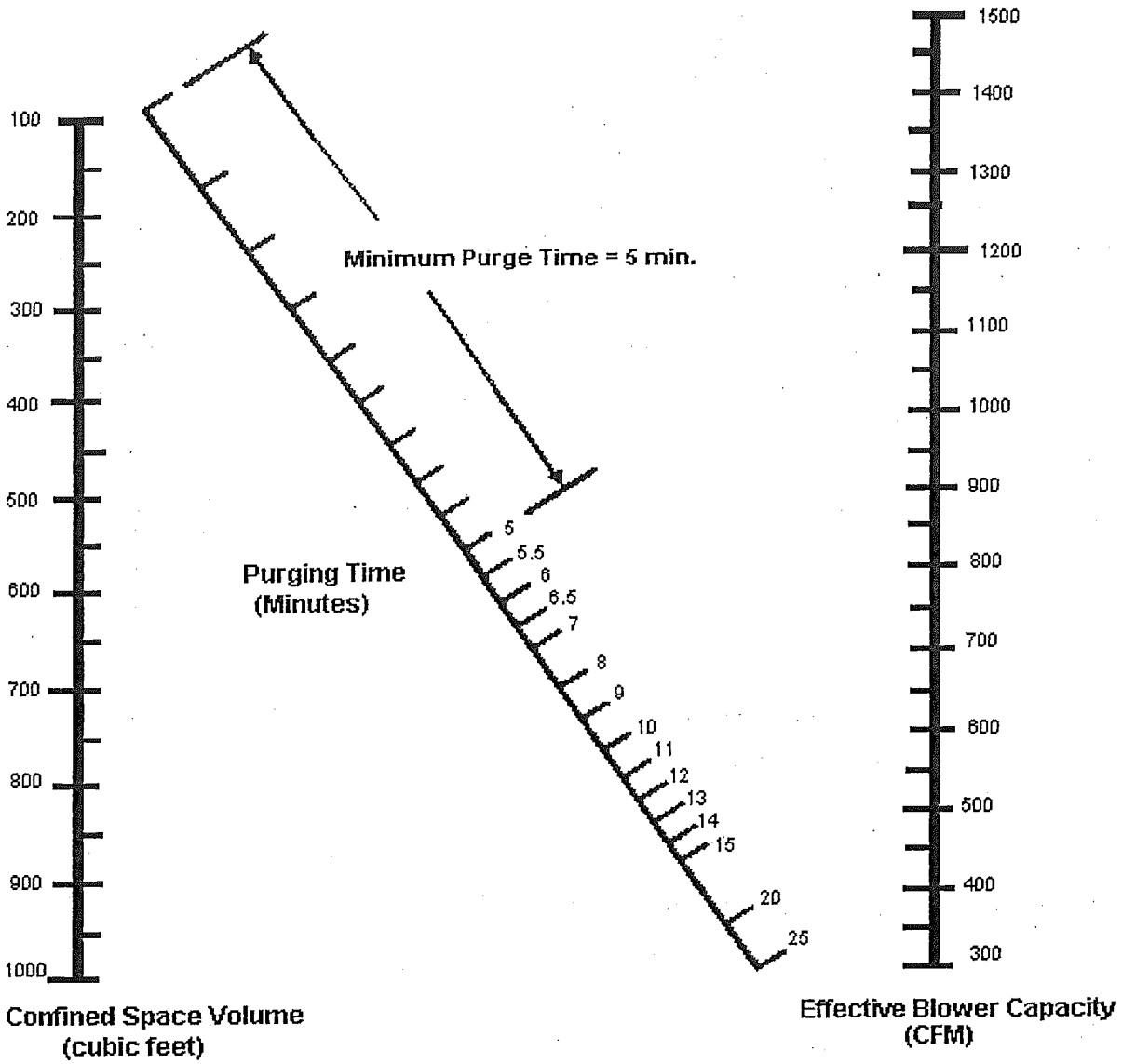


5. Employers are further reminded that under no circumstance should entry be allowed at the end of the purging time until the atmosphere is tested and shown to be at acceptable levels. If unacceptable levels are obtained, then it will be necessary to repeat the process.

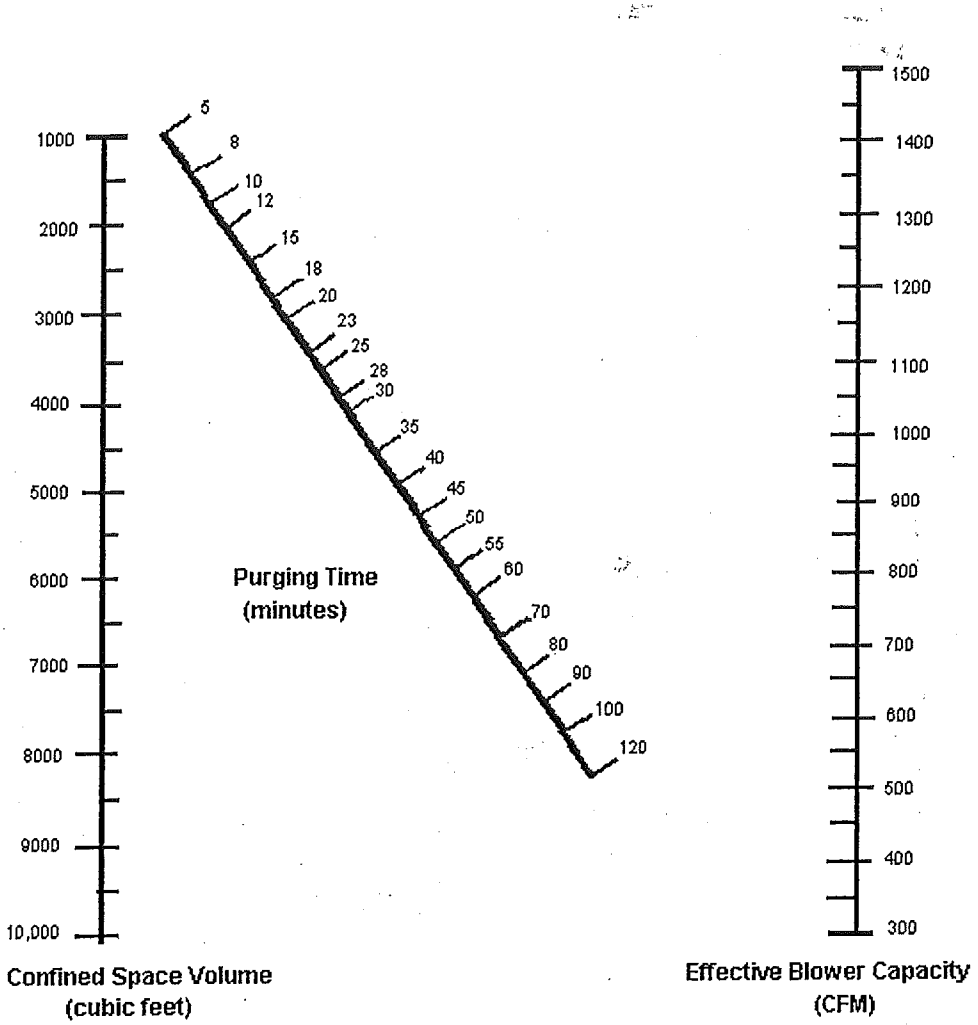
6. If forced air ventilation is necessary to control any existing or potential atmospheric hazards, then the blower must remain in constant operation for the duration of the permit space entry operation.

The theoretical purging time can also be determined using the ventilation calculations provided below.

Alignment Chart
Side 1



Alignment Chart
Side 2



VENTILATION CALCULATIONS

Determine the flow rate (Q) required to achieve 20 air changes per hour (ACH) in an underground lift station 20 ft. high, 40 ft. long, and 20 ft. wide.

N = Nos. of ACH
Q = Ventilation Flow Rate (CFM)

$$N = \frac{Qx60}{VOL}$$

$$20ACH = \frac{Q \times 60\,\text{min}/hr}{16{,}000\,ft^3}$$

60 = Constant (mins/hrs)
Vol = Space Volume (ft^3)
N = 20
Q = ?
Vol = 20'x40'x20' = 16,000 $ft.^3$

$$Q = \frac{20\text{AC}/\text{Hr} \times 16{,}000\,ft^3}{60\text{mins}/\text{hrs}}$$

$= 5{,}333\ ft^3/\text{min}$

To remove flammable atmospheres, it may be necessary to purge the space with an inerting gas such as nitrogen, carbon dioxide, argon, etc. Other times, it may be possible to open the space and allow air to naturally ventilate the space.

- Flammable and toxic residues on the walls and floor should also be removed prior to entry. Water is commonly used. If the residue cannot be washed away, steam may be used. However, be aware that steam may not be suitable for use in some situations where the substance has a low ignition temperature or flash point. This is because the steam condensate could build up a static electric charge and create a spark, thereby igniting the flammable atmosphere. In situations where steam is needed to clean or purge a vessel, make sure that the static electricity is eliminated by bonding and grounding the steam lines and vessel. Also, allow plenty of time for the space to cool down after steam is used.

- Occasionally, cleaning solvents may be needed. In these circumstances make sure that the cleaning compound is compatible with the residue to be cleaned from the space.

- Never assume that the space is safe for entry after the purging and cleaning process is completed. The atmosphere in the space must be tested prior to entry. If a hazardous atmosphere still exists or potentially exists, purge and clean the space again.

- Continue to ventilate the space and conduct atmospheric testing frequently or continuously during the entire entry procedure.

- In the situations where the purpose of entry is to clean the confined space, the space must first be cleaned to the extent possible from the outside. Proper personal protective equipment must be used to protect individuals from any hazards that might remain after the pre-entry cleaning. If atmospheric hazards cannot be brought to acceptable levels by purging, cleaning, and continuous ventilation, then special procedures must be put in place after properly evaluating the situation. If it is determined that an individual must enter the permit space, then these special precautions will include respiratory protection such as an airline respirator with escape bottle or Self-Contained Breathing Apparatus (SCBA). Note, most companies only allow such types of entries during emergency situations because of the immediate dangers and risks.

There should be an audible warning device installed on the ventilating equipment to signal when there is a failure. When the system is operational, airflow measurements must be made before each workshift to ensure a safe environment. Initial testing of the atmosphere will be performed from outside the confined space before ventilation begins to determine what precautions are necessary in purging and ventilating. Testing of more remote regions within the confined space has been made safe. Exhaust systems will be designed to protect workers in the surrounding area from contaminated air. If flammable concentrations are present, all electrical equipment will comply with the requirements of Article 250 of NEC (NFPA no. 70) hazardous locations, and the

bonding requirements of Article 250 of NEC, 1978. Where continuous ventilation is not a part of the operating procedure, the atmosphere will be tested until continuous acceptable levels of oxygen and contaminants are maintained for three tests at five-minute intervals. Care will be taken to prevent re-circulation of contaminated air and interaction of airborne contaminants.

Continuous general ventilation will be maintained where toxic atmospheres are produced as a part of a work procedure, such as welding or painting, or where a toxic atmosphere may develop due to the nature of the confined space, as in the case of desorption from walls, or evaporation of residual chemicals. General ventilation is an effective procedure for distributing contaminants from a local generation point throughout the work space to obtain maximum dilution. However, special precautions will be taken if the ventilating system partially blocks the exit opening. These precautions include a method for providing respirable air to each worker for the time necessary for exit, and a method of maintaining communications.

Local exhaust ventilation will be provided when general ventilation is not effective due to restrictions in the confined space or when high concentrations of contaminants occur in the breathing zone of the worker. Local high concentrations of contaminants may occur during work activities such as welding, painting, and chemical cleaning. The worker will not be exposed to concentrations of contaminants in excess of those specified in 29 CFR Part 1910 Sub Part Z. Therefore, respiratory protection may be needed in addition to engineering controls. The use of respiratory protection will be determined by the qualified person.

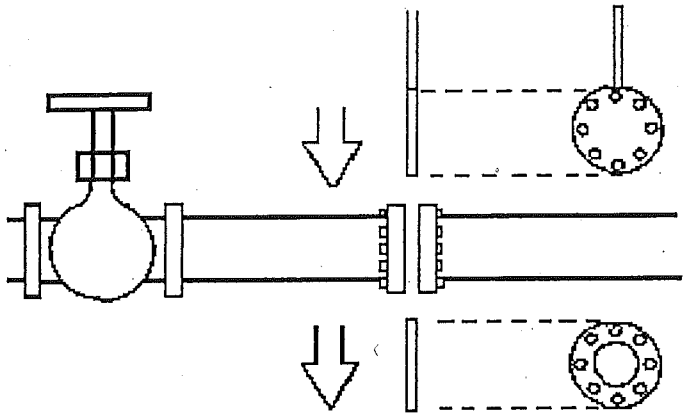
However, when fumes may be generated that contain highly toxic or other airborne metal contaminants, the provisions of 29 CFR 1910.252 will be observed. When freely moving exhaust hoods are used to provide control of fumes generated during welding, such hoods will maintain a velocity of 100 feet per minute in the zone of the welding. The effective force of freely moving exhaust hoods is decreased by approximately 90 percent at a distance of one duct diameter from the plane of the exhaust opening. Therefore, to obtain maximum effectiveness, the welder will re-position the exhaust hood as he changes welding locations to keep the hood in close proximity to the fume source.

Special precautions will be taken when outgassing or vaporization of toxic and/or flammable substances is likely. If the vapor-generating rates can be determined, the exhaust rate required can be calculated to dilute the atmosphere below the PEL and/or 10 percent of the LFL, whichever is the lower. This will be the lowest acceptable ventilation rate. If the area of concern is relatively small, diffusion of the contaminants may be controlled by enclosure with a relatively low volume exhaust for control, or by exhaust hoods located as close as possible to the area of vaporization or outgassing. If the area to be ventilated is too extensive to be controlled by local exhaust, then general ventilation procedures will be used to control the contaminant level. When the problem of outgassing is due to the application of protective coatings or paint, ventilation will be continued until the build-up of a flammable and/or toxic atmosphere is no longer possible.

There are three components necessary for combustion: fuel, oxygen, and a source of ignition. If work with fire becomes necessary in a confined space and the source of fuel cannot be controlled, then the atmosphere will be inerted. This is a highly hazardous work situation, and continuous monitoring of the inert make-up ventilation is mandatory. Monitoring will include flow measurement as well as gas analysis. The inerting operation will be continuously monitored and supervised by the qualified person. Since every confined space will have its own infiltration rate, inerting will continue for the entire duration of the work at a rate that will prevent air from entering the confined space.

2 - Isolation/Lockout/Tagging The isolation procedures will be specific for each type of confined space. Safety equipment required during this procedure will be designated by the qualified person and be dependent upon the potential hazards involved. A Class A or B confined space will be completely isolated from all other systems by physical disconnection, double block and bleed, or blanking off all lines. In continuous systems, where complete isolation is not possible such as sewers or utility tunnels, specific written safety procedures that are approved and enforced by the employer will be used. Blanks used to seal off lines will be capable of withstanding the maximum working pressure or load of the line (with a minimum safety factor of four), be provided with a gasket on the pressure side to insure a leak-proof seal, and be made of chemically non-reactive material. Shutoff valves serving the confined space will be locked in the closed position and tagged for identification. In addition to blanking, pumps and compressors serving these lines entering the confined space will be locked out to prevent accidental activation.

All blanks for that specific confined space will be recorded on the entry permit and recorded in the employer's file, which will be available for inspection.



Blanking and Blinding is the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the borehole in line with the system. This plate (such as a spectacle blind or a skillet blind) should be made of the same material as the line and must be able to withstand the maximum pressure exerted by the line. This method involves installing a blank between flanges with a leak-proof gasket at a point in the conducting line as close to the confined space area as possible. The blank or blind should be marked identifying its purpose.

Double Block and Bleed is a method that uses a three-point system to prevent leakage into the confined space -- two closed valves and an open drain or vent valve located in between. Lockout or tagging the valves in their required positions provides additional protection.

Line Breaking is the intentional and physical disconnection of a pipe, line or duct. Added protection is obtained by misaligning or removing a section of the pipe, line, or duct. Lines where potentially hazardous residues might remain downstream from the disconnecting point should be purged. Any disconnected line, blank or block valve should be checked with an atmospheric testing monitor to make sure it is not leaking.

If a drain line is located within the confined space, provision will be made when necessary to tag it and leave it open. This will also be recorded on the entry permit.

Additional procedures which are necessary when the confined space is of a double wall type construction, e.g., water jacketed or similar type will be determined by the qualified person and noted on the entry permit.

Electrical isolation of the confined space to prevent accidental activation of moving parts that would be hazardous to the worker is achieved by locking circuit breakers and/or disconnects in the open (off) position with a key-type padlock. The only key is to remain with the person working inside the confined space. If more than one person is inside the confined space, each person will place his own lock on the circuit breaker. In addition to the lockout system, there must be an accompanying tag that identifies the operation and prohibits use.

Mechanical isolation of moving parts can be achieved by disconnecting linkages, or removing drive belts or chains. Equipment with moving mechanical parts will also be blocked in such a manner that there can be no accidental rotation.

3 - Cleaning Procedures and processes used to clean the inside of a confined space will be reviewed and authorized by the qualified person. The method to be prescribed will be dependent upon the product in the space. If the confined space contains a flammable atmosphere above the upper flammable limit, it will be purged with an inert gas to remove the flammable substance before ventilating with air. Initial cleaning will be done from outside the tank if at all possible.

Special procedures should be adopted to handle the hazards created by the cleaning process itself. For example: if the tank is steamed, (1) it will be allowed to cool prior to entry; (2) ventilation will be maintained during neutralization procedures to prevent build-up of toxic materials; (3) steaming will not be used as a cleaning method when the product stored was a liquid with an auto ignition temperature 120 percent or less of the steam temperature, and (4) the pipe or nozzle of the steam hose will be bonded to the tank to decrease the generation of static electricity that could accumulate in tanks during steaming procedures.

These and other hazards and controls will be evaluated by the qualified person.

4 - Equipment and Tools: Equipment and tools to be used in a confined space will be carefully inspected and will meet the following requirements:

A. Hand tools will be kept clean and in good repair.

B. Portable electric tools, equipment, and lighting will be approved in accordance with 29 CFR Part 1910 Sub Part S and be equipped with a ground fault circuit interrupter that meets the requirements of 29 CFR 1910.309. All grounds will be checked before electrical equipment is used in a confined space.

C. All electrical cords, tools, and equipment will be of heavy-duty type with heavy-duty insulation and inspected for visually detectable defects before use in a confined space.

D. Air driven power tools will be used when flammable liquids are present. The use of air driven power tools will reduce the risk of explosion, not eliminate it. Explosions can arise by tools overheating (drilling), sparks produced by striking (percussion), grinding or discharge of accumulated electrostatic charges developed from the flow of compressed air.

E. Lighting used in confined spaces will be of explosion proof design and where necessary, equipped with guards. Only equipment listed by the Underwriters Laboratories for use in Division 1, atmospheres of the appropriate class and group, or approved by U.S. Bureau of Mines or Mining Enforcement and Safety Administration, or Mine Safety and Health Administration, or the U.S. Coast Guard will be used. Lighting will not be hung by electric cords, unless specifically designed for that purpose. The illumination of the work area will be sufficient to provide for safe work conditions as referenced in the ANSI standard All-1-1965, or the revision, 1970. Under no circumstances will matches or open flames be used in a confined space for illumination.

F. Cylinders of compressed gases will never be taken into a confined space, and will be turned off at the cylinder valve when not in use. Exempt from this rule are cylinders that are part of self-contained breathing apparatus or resuscitation equipment.

G. Ladders will be adequately secured, or of a permanent type which provides the same degree of safety as cited in 29 CFR Part 1910 Sub Part D.

H. Scaffolding and staging will be properly designed to carry maximum expected load (safety factor of 4), be equipped with traction-type planking, and meet the requirements of 29 CFR 1910.28.

I. Electrical lines, junctions and appurtenances will be in accordance with National Electrical Code (NEC) and National Fire Code (NFC) as cited in 29 CFR 1910.309.

J. Only hose lines and components designed specially for the compressed gas and working pressure will be used, and such systems will have a pressure relief valve outside the confined space.

K. All equipment that may be used in a flammable atmosphere will be approved as explosion proof or intrinsically safe for the atmosphere involved by a recognized testing laboratory such as the U.S. Bureau of Mines, MESA, or MSHA for methane and by the Underwriters Laboratories or by Factory Mutual for all cases.

RECORDKEEPING

The employer will maintain a written record of training including safety drills, inspections, tests, and maintenance. The records will be retained one year after the last date of training, inspection, test, or maintenance. In the event of separation of the employee, disposal of equipment or appliance, records may be disposed of after one year.

Where atmospheric testing indicates the presence of a toxic substance, records will be maintained in accordance with the existing Federal regulation(s). These records will include the dates and times of measurements; duties and location of the employees within the confined space; sampling and analytical methods used; number, duration, and results of the samples taken; PEL concentrations estimated from these samples; type of personal protective equipment used, if any; and employees' names. These records will be made available to the designated representatives of the Secretary of Health, Education and Welfare; of the employer; and of the employee or former employee.

CONTRACTORS

Any contractor expecting to enter a designated Confined Space in the performance of their work is expected to comply with the owner's program, state and federal regulations. Compliance will be handled in the following manner.

- Contractor will provide a written Confined Space Entry/Rescue Program. The program must include the following:
  - policy
  - responsibilities
  - permit space identification
  - prevention of unauthorized entry
  - permit required confined space – defined
  - reclassification to a non-permit required
  - authorized entrants/attendants – duties
  - entry supervisor – duties
  - rescue personnel (must have current First Aid/CPR, respiratory clearance physical along with qualification/certification to wear SCBA and perform entry rescue

- Each entrant/attendant will submit proof of training and re-certification within the last 12 months

- Contractor will present a form that will give data to determine air quality and equipment requirements to enter space. (Confined Space Survey & Permit).

- Contractor will present all necessary equipment for entry and rescue including air handler, 3-4 gas air monitor with calibration certification, barricade/barrier system, explosion-proof lighting, harness in good working condition for each entrant, life line, tripod (if necessary), and communication equipment (if necessary).

Each contractor will be given a copy of the owner's survey of the space they are required to enter.

Programs\training\confined space\training manual 12-00

This is an example of a CONFINED SPACE ENTRY PERMIT. The actual entry permit you will use depends on the atmospheric and physical hazards of that particular confined space. All regulations for that permit are addressed in 29 CFR Part 1910.146, A Permit Required Confined Spaces for General Industry; Final Rule.

CONFINED SPACE ENTRY PERMIT

1. Permit Space to be Entered	
2. Purpose of Entry	
3. Date of Entry	Authorized Duration of Entry Permit
4. Authorized Entrants	
5. Attendant(s)	
6. Name of Current Entry Supervisor(s) 1.	Time:
2.	Time:
Entry Supervisor who originally authorized entry:	(Signature or initials)

7. Record hazards of the permit space to be entered				8. Check or list the measures used to isolate the permit space and to eliminate or control permit space hazards before entry.
HAZARD	YES	NO	N/A	
A. Lack of Oxygen				☐ A. Purge-Flush and Vent
B. Combustible Gases				
C. Combustible Vapors				☐ B. Ventilation
D. Combustible Dusts				
E. Toxic Gases				☐ C. Lockout/Tagout
F. Toxic Vapors				
G. Chemical Contact				☐ D. Inerting
H. Electrical Hazards				
I. Mechanical Exposure				☐ E. Blanking, Blocking, Bleeding
J. Temperature				
K. Engulfment				☐ F. External Barricades
L. Entrapment				
M. Others				☐ G. Confined Space Identification/Signs

DO NOT DESTROY THIS PERMIT

AFTER CANCELLATION THIS ENTRY PERMIT MUST BE RETAINED BY EMPLOYER FOR AT LEAST ONE YEAR

(over)

9. Acceptable Entry Conditions

10. Test(s) to be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
A. Percent of Oxygen	19.5% to 23.5%				
B.					
C.					
D.					
E.					
F.					
G.					
H.					
Name or Initials of Tester					
Test Times					

11. Rescue and Emergency Services Available:

Name _____ Name _____

Telephone _____ Telephone _____

12. Communication procedures to be used by authorized entrants and attendants:

13. Equipment supplied to the employee

Yes	No	N/A	Equipment	Description
			(I) Gas Test and Monitoring	Name
			(ii) Ventilating	
			(iii) Communications	
			(iv) Personal Protective Equipment	
			(v) Lighting	
			(vi) Barriers/Shields	☐ Pedestrian ☐ Vehicle ☐ Other
			(vii) Safe Ingress/Egress	☐ Ladders
			(viii) Rescue and Emergency	☐ Lifelines ☐ Hoists ☐
			(ix) Other Safety Equipment	

14. Other information for this particular confined space to ensure employee safety:

15. Additional permits required: ☐ Hot Work ☐ Other

THIS CONFINED SPACE ENTRY PERMIT HAS BEEN CANCELLED:

BY: _____ _____

Entry Permit Supervisor Time (am /pm) Date

CONFINED SPACE ENTRY PERMIT

Date: _____ **Permit Space #:**_____

Entry Supervisor: _____

Location of Confined Space: _____

Work to be Performed:_____

Materials Present in Space:

1. **ISOLATION:** The above confined space has been isolated from all sources of ingress of hazardous materials, all sources of electrical and mechanical power and all sources of heat.

Signed: _____ Date: _____ Time:_____

2. **TESTING:** Combustible gas concentration: _____%
   Oxygen concentration: _____%
   Other (Specify): _____%

Signed: _____ Date: _____ Time:_____

3. **PRECAUTIONS:** (Specify PPE, emergency phone number, special equipment, personal monitoring equipment, rescue procedures, etc.)

4. **AUTHORIZED ENTRANT(S):**
   Name: _____ SS#:
   Name: _____ SS#:
   Name: _____ SS#:
   Name: _____ SS#:

   ATTENDANT:
   Name: _____ SS#:

TIME ISSUED: _____ **TIME EXPIRES:** _____ **PERMIT #:** _____

CONFINED SPACE PRE-ENTRY CHECKLIST

OSEA
The Workplace Experts

LOCATION_____ DATE_____ TIME _____

ENTRY SUPERVISOR_____ PHONE_____

Mark the appropriate column: X Yes, X No, or X N/A Not Applicable		Yes	No	N/A
1.	Is a "DANGER CONFINED SPACE" sign posted to identify the site as requiring a confined space entry permit to occupy the area?			
2.	Is a written permit space entry program developed and implemented that complies with Section 1910.146(c)(4)?			
3.	Is the written program available for inspection by employees and their representatives?			
4.	Have all ENTRANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(h)?			
5.	Have all ATTENDANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(I)?			
6.	Have all ENTRY SUPERVISORS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910(j)?			
7.	Is the only hazard an actual or potential hazardous atmosphere?			
8.	Will continuous forced air ventilation alone be sufficient to maintain the permit space safe for entry?			
9.	Has monitoring and inspection data been developed to eliminate the hazardous atmosphere through forced air ventilation?			
10.	Has the permit space been isolated?			
11.	Have steps been taken for purging, inerting, flushing or ventilating the permit space to eliminate or control atmospheric hazards?			
12.	Is monitoring available to verify that conditions are acceptable for entry throughout the duration of an authorized entry?			
13.	Are employees trained on how to maintain and properly use testing and monitoring equipment?			
14.	Is ventilating equipment needed to obtain acceptable entry?			
15.	Is communication equipment necessary and available for use between attendant and entrant?			
16.	Are the entrants provided with personal protective equipment to be adequately protected insofar as feasible engineering and work practice controls allow?			
17.	Has adequate lighting equipment been supplied to allow a safe work area and allow a quick exit in an emergency?			
18.	Has the area been secured with barriers and shields from pedestrian, vehicle or other barriers to			

Mark the appropriate column: X Yes, X No, or X N/A Not Applicable	Yes	No	N/A
protect the entrants from external hazards?			
19. Is the confined space provided with equipment, such as ladders, needed for safe ingress and egress by authorized entrants?			
20. Is there other training, equipment or services needed to provide safe confined space entry?			

SAFETY EQUIPMENT CHECKLIST

	✓		✓
Safety Harness with Attached Life Lines		Ear Protection	
Respirator & Type		Foot Protection	
		Protective Clothing	
Hard Hat		Ventilator	
Eye Protection		Resuscitator	
Hand Protection		Communications Equipment	
		Gas Tester with Alarms	

OTHER (specify)

GAS TESTS TAKEN						
Gas	Permissible Entry Level	Yes	No	Instrument Used	Actual Reading	Tested by
1. Oxygen %	19.5% to 23.5%					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

Calibrated direct-reading instruments used to test confined space atmosphere:

Name_____Name

Make_____Make

Serial No._____Serial No.

Last Calibration Date_____Last Calibration Date

RESCUE AND EMERGENCY SERVICES

1. Contacts in the event of an emergency - include name and telephone number:

A._____ C._____

B._____ D._____

2. Rescue services available for this confined space entry:

_____employee _____outside rescue service

3. Rescue Equipment available:

_____Oxygen
_____ Resuscitator-Inhalor
_____ First Aid Equipment
_____ De-Fibrillator
_____ Chest/full body harness
_____ Retrieval line properly installed
_____ Wristlets when it is the safest and most effective alternative

Additional rescue equipment available

OSHA Regulations (Standards - 29 CFR)

Examples of Permit-required Confined Space Programs - 1910.146 App C

OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.146 App C
- **Standard Title:** Examples of Permit-required Confined Space Programs
- **SubPart Number:** J
- **SubPart Title:** General Environmental Controls

Interpretation(s)

Example 1.

Workplace. Sewer entry.

Potential hazards. The employees could be exposed to the following:

Engulfment.

Presence of toxic gases. Equal to or more than 10 ppm hydrogen sulfide measured as an 8-hour time-weighted average. If the presence of other toxic contaminants is suspected, specific monitoring programs will be developed.

Presence of explosive/flammable gases. Equal to or greater than 10% of the lower flammable limit (LFL).

Oxygen Deficiency. A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume.

A. ENTRY WITHOUT PERMIT/ATTENDANT

Certification. Confined spaces may be entered without the need for a written permit or attendant provided that the space can be maintained in a safe condition for entry by mechanical ventilation alone, as provided in 1910.146(c)(5). All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter an enclosed/confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the

duration of the job. The Confined Space Pre-Entry Check List must be completed by the LEAD WORKER before entry into a confined space. This list verifies completion of items listed below. This check list shall be kept at the job site for duration of the job. If circumstances dictate an interruption in the work, the permit space must be re-evaluated and a new check list must be completed.

Control of atmospheric and engulfment hazards.

Pumps and Lines. All pumps and lines which may reasonably cause contaminants to flow into the space shall be disconnected, blinded and locked out, or effectively isolated by other means to prevent development of dangerous air contamination or engulfment. Not all laterals to sewers or storm drains require blocking. However, where experience or knowledge of industrial use indicates there is a reasonable potential for contamination of air or engulfment into an occupied sewer, then all affected laterals shall be blocked. If blocking and/or isolation requires entry into the space the provisions for entry into a permit-required confined space must be implemented.

Surveillance. The surrounding area shall be surveyed to avoid hazards such as drifting vapors from the tanks, piping, or sewers.

Testing. The atmosphere within the space will be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. Detector tubes, alarm only gas monitors and explosion meters are examples of monitoring equipment that may be used to test permit space atmospheres. Testing shall be performed by the LEAD WORKER who has successfully completed the Gas Detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL, and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connecting spaces.

Entry Procedures. If there are no non-atmospheric hazards present and if the pre-entry tests show there is no dangerous air contamination and/or oxygen deficiency within the space and there is no reason to believe that any is likely to develop, entry into and work within may proceed. Continuous testing of the atmosphere in the immediate vicinity of the workers within the space shall be accomplished. The workers will immediately leave the permit space when any of the gas monitor alarm set points are reached as defined. Workers will not return to the area until a SUPERVISOR who has completed the gas detector training has used a direct reading gas detector to evaluate the situation and has determined that it is safe to enter.

Rescue. Arrangements for rescue services are not required where there is no attendant. See the rescue portion of section B., below, for instructions regarding rescue planning where an entry permit is required.

B. ENTRY PERMIT REQUIRED

Permits. Confined Space Entry Permit. All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter a permit-required confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Entry Permit must be completed before approval can be given to enter a permit-required confined space. This permit verifies completion of items listed below. This permit shall be kept at the job site for the duration of the job. If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new Confined Space Entry Permit must be completed.

Control of atmospheric and engulfment hazards.

Surveillance. The surrounding area shall be surveyed to avoid hazards such as drifting vapors from tanks, piping or sewers.

Testing. The confined space atmosphere shall be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. A direct reading gas monitor shall be used. Testing shall be performed by the SUPERVISOR who has successfully completed the gas detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connected spaces.

Space Ventilation. Mechanical ventilation systems, where applicable, shall be set at 100% outside air. Where possible, open additional manholes to increase air circulation. Use portable blowers to augment natural circulation if needed. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.

Entry Procedures. The following procedure shall be observed under any of the following conditions: 1.) Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels; 2.) The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop; 3.) It is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems; or 4.) An emergency exists and it is not feasible to wait for pre-entry procedures to take effect.

All personnel must be trained. A self contained breathing apparatus shall be worn by any person entering the space. At least one worker shall stand by the outside of the space ready to give assistance in case of emergency. The standby worker shall have a self contained breathing apparatus available for immediate use. There shall be at least one additional worker within sight or call of the standby worker. Continuous powered communications shall be maintained between the worker within the confined space and standby personnel.

If at any time there is any questionable action or non-movement by the worker inside, a verbal check will be made. If there is no response, the worker will be moved immediately. Exception: If the worker is disabled due to falling or impact, he/she shall not be removed from the confined space unless there is immediate danger to his/her life. Local fire department rescue personnel shall be notified immediately. The standby worker may only enter the confined space in case of an emergency (wearing the self contained breathing apparatus) and only after being relieved by another worker. Safety belt or harness with attached lifeline shall be used by all workers entering the space with the free end of the line secured outside the entry opening. The standby worker shall attempt to remove a disabled worker via his lifeline before entering the space.

When practical, these spaces shall be entered through side openings -- those within 3 1/2 feet (1.07 m) of the bottom. When entry must be through a top opening, the safety belt shall be of the harness type that suspends a person upright and a hoisting device or similar apparatus shall be available for lifting workers out of the space.

In any situation where their use may endanger the worker, use of a hoisting device or safety belt and attached lifeline may be discontinued.

When dangerous air contamination is attributable to flammable and/or explosive substances, lighting and electrical equipment shall be Class 1, Division 1 rated per

National Electrical Code and no ignition sources shall be introduced into the area.

Continuous gas monitoring shall be performed during all confined space operations. If alarm conditions change adversely, entry personnel shall exit the confined space and a new confined space permit issued.

Rescue. Call the fire department services for rescue. Where immediate hazards to injured personnel are present, workers at the site shall implement emergency procedures to fit the situation.

Example 2.

Workplace. Meat and poultry rendering plants.

Cookers and dryers are either batch or continuous in their operation. Multiple batch cookers are operated in parallel. When one unit of a multiple set is shut down for repairs, means are available to isolate that unit from the others which remain in operation.

Cookers and dryers are horizontal, cylindrical vessels equipped with a center, rotating shaft and agitator paddles or discs. If the inner shell is jacketed, it is usually heated with steam at pressures up to 150 psig (1034.25 kPa). The rotating shaft assembly of the continuous cooker or dryer is also steam heated.

Potential Hazards. The recognized hazards associated with cookers and dryers are the risk that employees could be:

1. Struck or caught by rotating agitator;

2. Engulfed in raw material or hot, recycled fat;

3. Burned by steam from leaks into the cooker/dryer steam jacket or the condenser duct system if steam valves are not properly closed and locked out;

4. Burned by contact with hot metal surfaces, such as the agitator shaft assembly, or inner shell of the cooker/dryer;

5. Heat stress caused by warm atmosphere inside cooker/dryer;

6. Slipping and falling on grease in the cooker/dryer;

7. Electrically shocked by faulty equipment taken into the cooker/dryer;

8. Burned or overcome by fire or products of combustion; or

9. Overcome by fumes generated by welding or cutting done on grease covered surfaces.

Permits. The supervisor in this case is always present at the cooker/dryer or other permit entry confined space when entry is made. The supervisor must follow the pre-entry isolation procedures described in the entry permit in preparing for entry, and ensure that the protective clothing, ventilating equipment and any other equipment required by the permit are at the entry site.

Control of hazards. Mechanical. Lock out main power switch to agitator motor at main power panel. Affix tag to the lock to inform others that a permit entry confined space entry is in progress.

Engulfment. Close all valves in the raw material blow line. Secure each valve in its closed position using chain and lock. Attach a tag to the valve and chain warning that a permit entry confined space entry is in progress. The same procedure shall be used for securing the fat recycle valve.

Burns and heat stress. Close steam supply valves to jacket and secure with chains and tags. Insert solid blank at flange in cooker vent line to condenser manifold duct system. Vent cooker/dryer by opening access door at discharge end and top center door to allow natural ventilation throughout the entry. If faster cooling is needed, use an portable ventilation fan to increase ventilation. Cooling water may be circulated through the jacket to reduce both outer and inner surface temperatures of cooker/dryers faster. Check air and inner surface temperatures in cooker/dryer to assure they are within acceptable limits before entering, or use proper protective clothing.

Fire and fume hazards. Careful site preparation, such as cleaning the area within 4 inches (10.16 cm) of all welding or torch cutting operations, and proper ventilation are the preferred controls. All welding and cutting operations shall be done in accordance with the requirements of 29 CFR Part 1910, Subpart Q, OSHA's welding standard. Proper ventilation may be achieved by local exhaust ventilation, or the use of portable ventilation fans, or a combination of the two practices.

Electrical shock. Electrical equipment used in cooker/dryers shall be in serviceable condition.

Slips and falls. Remove residual grease before entering cooker/dryer.

Attendant. The supervisor shall be the attendant for employees entering cooker/dryers.

Permit. The permit shall specify how isolation shall be done and any other preparations needed before making entry. This is especially important in parallel arrangements of cooker/dryers so that the entire operation need not be shut down to allow safe entry into one unit.

Rescue. When necessary, the attendant shall call the fire department as previously arranged.

Example 3.

Workplace. Workplaces where tank cars, trucks, and trailers, dry bulk tanks and trailers, railroad tank cars, and similar portable tanks are fabricated or serviced.

A. During fabrication. These tanks and dry-bulk carriers are entered repeatedly throughout the fabrication process. These products are not configured identically, but the manufacturing processes by which they are made are very similar.

Sources of hazards. In addition to the mechanical hazards arising from the risks that an entrant would be injured due to contact with components of the tank or the tools being used, there is also the risk that a worker could be injured by breathing fumes from welding materials or mists or vapors from materials used to coat the tank interior. In addition, many of these vapors and mists are flammable, so the failure to properly ventilate a tank could lead to a fire or explosion.

Control of hazards.

Welding. Local exhaust ventilation shall be used to remove welding fumes once the tank or carrier is completed to the point that workers may enter and exit only through a manhole. (Follow the requirements of 29 CFR 1910, Subpart Q, OSHA's welding standard,

at all times.) Welding gas tanks may never be brought into a tank or carrier that is a permit entry confined space.

Application of interior coatings/linings. Atmospheric hazards shall be controlled by forced air ventilation sufficient to keep the atmospheric concentration of flammable materials below 10% of the lower flammable limit (LFL) (or lower explosive limit (LEL), whichever term is used locally). The appropriate respirators are provided and shall be used in addition to providing forced ventilation if the forced ventilation does not maintain acceptable respiratory conditions.

Permits. Because of the repetitive nature of the entries in these operations, an "Area Entry Permit" will be issued for a 1 month period to cover those production areas where tanks are fabricated to the point that entry and exit are made using manholes.

Authorization. Only the area supervisor may authorize an employee to enter a tank within the permit area. The area supervisor must determine that conditions in the tank trailer, dry bulk trailer or truck, etc. meet permit requirements before authorizing entry.

Attendant. The area supervisor shall designate an employee to maintain communication by employer specified means with employees working in tanks to ensure their safety. The attendant may not enter any permit entry confined space to rescue an entrant or for any other reason, unless authorized by the rescue procedure and, even then, only after calling the rescue team and being relieved by an attendant or another worker.

Communications and observation. Communications between attendant and entrant(s) shall be maintained throughout entry. Methods of communication that may be specified by the permit include voice, voice powered radio, tapping or rapping codes on tank walls, signalling tugs on a rope, and the attendant's observation that work activities such as chipping, grinding, welding, spraying, etc., which require deliberate operator control continue normally. These activities often generate so much noise that the necessary hearing protection makes communication by voice difficult.

Rescue procedures. Acceptable rescue procedures include entry by a team of employee-rescuers, use of public emergency services, and procedures for breaching the tank. The area permit specifies which procedures are available, but the area supervisor makes the final decision based on circumstances. (Certain injuries may make it necessary to breach the tank to remove a person rather than risk additional injury by removal through an existing manhole. However, the supervisor must ensure that no breaching procedure used for rescue would violate terms of the entry permit. For instance, if the tank must be breached by cutting with a torch, the tank surfaces to be cut must be free of volatile or combustible coatings within 4 inches (10.16 cm) of the cutting line and the atmosphere within the tank must be below the LFL.

Retrieval line and harnesses. The retrieval lines and harnesses generally required under this standard are usually impractical for use in tanks because the internal configuration of the tanks and their interior baffles and other structures would prevent rescuers from hauling out injured entrants. However, unless the rescue procedure calls for breaching the tank for rescue, the rescue team shall be trained in the use of retrieval lines and harnesses for removing injured employees through manholes.

B. Repair or service of "used" tanks and bulk trailers.

Sources of hazards. In addition to facing the potential hazards encountered in fabrication or manufacturing, tanks or trailers which have been in service may contain residues of dangerous materials, whether left over from the transportation of hazardous cargoes or generated by chemical or bacterial action on residues of non-hazardous cargoes.

Control of atmospheric hazards. A "used" tank shall be brought into areas where tank entry is authorized only after the tank has been emptied, cleansed (without employee

OSHA Regulations (Standards - 29 CFR)

Sewer System Entry. - 1910.146 App E

OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.146 App E
- **Standard Title:** Sewer System Entry.
- **SubPart Number:** J
- **SubPart Title:** General Environmental Controls

Interpretation(s)

Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

(1) Adherence to procedure. The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

(2) Atmospheric monitoring. Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions are encountered: Oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above 10 ppm or 35 ppm, respectively, measured as an 8-hour time-weighted average. Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions. The oxygen sensor/broad range sensor is best suited for initial use in situations where the actual or potential contaminants have not been identified, because broad range sensors, unlike substance-specific sensors, enable employers to obtain an overall reading of the hydrocarbons (flammables) present in the space. However, such sensors only indicate that a hazardous threshold of a class of chemicals has been exceeded. They do not measure the levels of contamination of specific substances. Therefore, substance-specific devices, which measure the actual levels of specific substances, are best suited for use where actual and potential contaminants have been identified. The measurements obtained with substance-specific devices are of vital importance to the employer when decisions are made concerning the measures necessary to protect entrants (such as ventilation or personal protective equipment) and the setting

and attainment of appropriate entry conditions. However, the sewer environment may suddenly and unpredictably change, and the substance-specific devices may not detect the potentially lethal atmospheric hazards which may enter the sewer environment.

Although OSHA considers the information and guidance provided above to be appropriate and useful in most sewer entry situations, the Agency emphasizes that each employer must consider the unique circumstances, including the predictability of the atmosphere, of the sewer permit spaces in the employer's workplace in preparing for entry. Only the employer can decide, based upon his or her knowledge of, and experience with permit spaces in sewer systems, what the best type of testing instrument may be for any specific entry operation.

The selected testing instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrant's direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

(3) Surge flow and flooding. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

(4) Special Equipment. Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

[58 FR 4549, Jan. 14, 1993; 58 FR 34845, June 29, 1993; 59 FR 26115, May 19, 1994]

OSHA Regulations (Standards - 29 CFR) - Table of Contents